St. Joseph's College of Pharmacy

Approved by Pharmacy Council of India and affiliated to Kerala University of Health Sciences
Approved by Govt. of Kerala
Dharmagiri College Campus, Naipunnya Road, Cherthala-688524, Kerala, India
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PROGRAMME OUTCOMES – B.PHARM

PO Nos.	Program Objectives	Program Outcomes
PO 1	Pharmacy Knowledge	Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.
PO 2	Planning Abilities	Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.
PO 3	Problem analysis	Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate and apply information systematically and shall make defensible decisions.
PO 4	Modern tool usage	Learn, select, and apply appropriate methods a O3: Problem analysis: Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate and apply systematically information and shall make defensible decisions.
PO 5	Leadership skills	Understand and consider the human reaction to change, motivation issues, leadership and team-building when planning changes required for fulfillment of practice, professional and societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and wellbeing.
PO 6	Professional Identity	Understand, analyze and communicate the value of their professional roles in society (e.g. health care professionals, promoters of health, educators, managers, employers, employees.
PO 7	Pharmaceutical Ethics	Honor personal values and apply ethical principles in professional and social contexts. Demonstrate behavior that recognizes cultural and personal variability in values, communication and lifestyles. Use ethical frameworks; apply ethical principles while making decisions and take responsibility for the outcomes associated with the decisions.
PO 8	Communication	Communicate effectively with the pharmacy community and with society at large, such as, being able to comprehend and write effective reports, make effective presentations and documentation, and give and receive clear instructions.
PO 9	The Pharmacist and society	Apply reasoning informed by the contextual knowledge to assess societal, health, safety and legal issues and the consequent responsibilities relevant to the professional pharmacy practice.

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PO 10	Environment and sustainability	Understand the impact of the professional pharmacy solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development
PO 11	Life-long learning	Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self assess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis

COURSE OUTCOMES OF B.PHARM

Sl. No	Course Name With Code	CO Number	Course Outcome
		SEMESTER I	
1.	HUMAN ANATOMY & PHYSIOLOGY -I– Theory (BP101T)	CO 1	Learn the scope of anatomy and physiology, cellular and tissue level organization of human body, basic life processes and anatomical terminologies.
		CO 2	Understand the structure and function of skin, skeletal system and joints.
		CO 3	Understand the composition, functions, formation and disorders of blood and lymphatic system.
		CO 4	Study the structure and functions of sympathetic and parasympathetic nervous system: structure, functions and disorders of eye, ear, nose and tongue.
		CO 5	Learn the anatomy, physiology and disorders of heart, blood vessels; regulation of heart beat and blood pressure.
2.	PHARMACEUTICAL ANALYSIS - Theory (BP102T)	CO 1	Understand definition and scope of analysis, methods of expressing concentration, preparation and standardization of standard reagents and errors encountered in analytical techniques.
		CO 2	Learn about acid-base titrations and non-aqueous titrations.
		CO 3	Develop analytical skills in gravimetry, precipitation, complexometric and diazotization titrations.
		CO 4	Understand the concept of oxidation-reduction and redox titration.
		CO 5	Understand various electrochemical methods of analysis such as as conductometry, potentiometry, polarography etc.

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3.	PHARMACEUTICS-I Theory (BP103T)	CO 1	Understand the historical background, basics of prescription, different dosage forms and posology.
		CO 2	Understand the basics of liquid dosage forms, powders and pharmaceutical calculations.
		CO 3	Learn about various monophasic and biphasic liquid dosage forms.
		CO 4	Learn about pharmaceutical incompatibilities and suppositories.
		CO 5	Understand the preparation, classification and evaluation of semisolid dosage forms.
4.	PHARMACEUTICAL INORGANIC CHEMISTRY - Theory (BP104T)	CO 1	Know the sources of impurities and methods to determine the impurities in inorganic drugs and pharmaceuticals.
		CO 2	Understand the concept of buffers, major physiological ions, major intra and extracellular ions and dental products .
		CO 3	Learn the general methods of preparation, properties, assay and medicinal uses of gastrointestinal agents.
		CO 4	Study the general methods of preparation, properties, assay and medicinal uses of Expectorants, astringents, emetics, haematinics, poison and antidotes.
		CO 5	Learn about the properties, applications and storage conditions of radiopharmaceuticals.
5.	COMMUNICATION SKILLS - Theory (BP105T)	CO 1	Develop communication skills by understanding the importance of communication, barriers to communication and perspectives in communication.
		CO 2	Know the elements of communication such as face to face, verbal, non-verbal, physical communication and different communication styles.
		CO 3	Develop listening and writing skills.
		CO 4	Develop interview and presentation skills .
		CO 5	Utilization of communication skills in group discussion.
6.	REMEDIALBIOLOGY - Theory (BP106 RBT)	CO 1	Know the classification and salient features of five kingdoms of life and morphology of flowering plants.
		CO 2	Understand the human circulatory system, blood, lymph and life processes such as digestion, absorption, breathing and respiration.
		CO 3	Understand the human excretory system, nervous system, endocrine glands and reproductive system.
		CO 4	Understand the mineral nutrition needs of plants and photosynthesis.
		CO 5	Understand the growth, development and respiration process of plants, tissues and cells.

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7.	REMEDIAL MATHEMATICS - Theory (BP106 RMT)	CO 1	Understand partial fractions, logarithms, functions, limits and continuity and apply them in pharmaceutical problems.
		CO 2	Understand the types, operation, transpose, multiplication and properties of matrices and determinants
		CO 3	Study differentiation and derivation techniques and their applications.
		CO 4	Understand analytical geometry, straight lines, slope and integration.
		CO 5	Solve differential equations and study laplace transform and their applications in solving chemical kinetics and pharmacokinetic equations.
8.	HUMAN ANATOMY AND PHYSIOLOGY- Practical (BP107P)	CO 1	Knowledge on the usage of compound microscope and analyse different body tissues through microscopic study
		CO 2	Identification of axial and appendicular bones
		CO 3	Understand about haemocytometry and applying it in the determination of RBC, WBC and Haemoglobin count.
		CO 4	Ability to determine blood group, bleeding time, clotting time and ESR.
		CO 5	Practical knowledge to determine heart rate, pulse rate and blood pressure.
9.	PHARMACEUTICAL ANALYSIS- Practical (BP108P)	CO 1	Identification of impurities in pharmaceutical compounds by limit test.
		CO 2	Understand the preparation and standardization of different standard analytical solutions.
		CO 3	Ability to determine the purity of different pharmaceutical compounds by performing assay.
		CO 4	Determination of normality by Conductometric titration.
		CO 5	Determination of normality by Potentiometric titration.
10.	PHARMACEUTICS I- Practical (BP109P)	CO 1	Apply the knowledge acquired from theory to prepare different monophasic liquid dosage forms.
		CO 2	Apply the knowledge acquired from theory to prepare different biphasic liquid dosage forms.
		CO 3	Apply the knowledge acquired from theory to prepare different solid dosage forms such as powders and granules.
		CO 4	Apply the knowledge acquired from theory to prepare different semisolid dosage forms.
		CO 5	Apply the knowledge acquired from theory to prepare different dosage forms for external use.

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11.	PHARMACEUTICAL INORGANIC CHEMISTRY- Practical (BP110P)	CO 1	Identification of impurities in pharmaceutical compounds by limit test.
		CO 2	Identification of various pharmaceutical compounds by chemical tests.
		CO 3	Carry out purity tests for pharmaceutical compounds.
		CO 4	Determination of potassium iodate and iodine in potassium iodide.
		CO 5	Preparation of some inorganic pharmaceuticals.
12.	COMMUNICATION SKILLS- Practical (BP111P)	CO 1	Use wordsworth english language lab software to develop basic communication skills
		CO 2	Use wordsworth english language lab software to understand pronunciations
		CO 3	Use wordsworth english language lab software for developing listening skills
		CO 4	Use wordsworth english language lab software to develop effective writing skills
		CO 5	Use wordsworth english language lab software for developing interview handling skills
13.	REMEDIAL BIOLOGY- Practical (BP112RBP)	CO 1	Develop knowledge on the usage of compound microscope and microscopic study of plant tissues.
		CO 2	Develop basic biological experiment skills such as section cutting, mounting, staining and permanent slide preparation.
		CO 3	Knowledge about cell and its inclusions.
		CO 4	Detailed study of frog by using computer models
		CO 5	Ability to determine blood group, blood pressure and tidal volume
SEMESTER II			
14.	HUMAN ANATOMY AND PHYSIOLOGY- II- Theory (BP201T)	CO 1	Understand the organization, electrophysiology, structure and functions of nervous system
		CO 2	Understand the anatomy, functions and disorders of digestive system.
		CO 3	Understand the anatomy,, functions, physiology and disorders of respiratory and urinary system.
		CO 4	Understand the structure and functions of endocrine glands and their disorders.
		CO 5	Understand the anatomy, functions and physiology of reproductive system and a brief introduction to genetics.

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15.	PHARMACEUTICAL ORGANIC CHEMISTRY–I - Theory (BP202T)	CO 1	Understand the basic classification, IUPAC system of nomenclature and isomerism in organic compounds,
		CO 2	Understand the hybridization, stability, reactions and kinetics of alkanes, alkenes and conjugated dienes.
		CO 3	Understand SN1, SN2 reactions of alkyl halides, qualitative and distinguishing tests for alcohols.
		CO 4	Knowledge about nucleophilic addition and various name reactions of carbonyl compounds.
		CO 5	Understand the acidity, qualitative tests, structure and uses of various carboxylic acids.
16.	BIOCHEMISTRY - Theory (BP203T)	CO 1	Knowledge about properties, nomenclature, classification, kinetics, regulation, inhibitors and applications of enzymes.
		CO 2	Understand the classification, chemical nature and biological role of various biomolecules and Knowledge about bioenergetics.
		CO 3	Knowledge about various metabolic pathways involved in carbohydrate metabolism, their disorders and biological oxidation processes.
		CO 4	Knowledge about various metabolic pathways involved in lipid and amino acid metabolism and the disorders associated with it.
		CO 5	Understand the metabolism of nucleic acids and transfer of genetic information.
17.	PATHOPHYSIOLOGY -Theory (BP204T)	CO 1	Understand the basic principles of cell injury, adaptation and basic mechanism involved in the process of inflammation and repair.
		CO 2	Knowledge about the etiology and pathogenesis of disease states associated with cardiovascular, respiratory and urinary system.
		CO 3	Understand the signs, symptoms and causes of haematological diseases and diseases associated with endocrine, gastro intestinal and nervous system.
		CO 4	Understand the etiology and pathogenesis of cancer, diseases of bones and joints.
		CO 5	Knowledge about etiology and pathogenesis of infectious and sexually transmitted disease.

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18.	COMPUTER APPLICATIONS IN PHARMACY- Theory (BP205T)	CO 1	Knowledge about various number systems, information system and software.
		CO 2	Understand various web technologies and programming languages such as HTML, XML, CSS etc.
		CO 3	Understand the applications of computers in pharmacy.
		CO 4	Understand the concept, objectives of bioinformatics, bioinformatic databases and impact of bioinformatics in vaccine discovery.
		CO 5	Understand the use of computers for data analysis in preclinical development.
19.	ENVIRONMENTAL SCIENCES - Theory (BP206T)	CO 1	Understand the multidisciplinary nature of environmental studies.
		CO 2	Understand the natural reservoirs in environment and the problems associated with it.
		CO 3	Learn about the role of an individual in conservation of natural resources.
		CO 4	Learn about the concept, structure and functions of ecosystem.
		CO 5	Knowledge about environmental pollution.
20.	HUMAN ANATOMY AND PHYSIOLOGY- Practical (BP207P)	CO 1	Study of special senses, nervous system and endocrine system etc by using specimens, models, charts etc
		CO 2	Develop knowledge about general neurological examination, function of olfactory nerves, visual and reflex activity etc through demonstration.
		CO 3	Ability to determine tidal volume, vital capacity, body temperature and body mass index.
		CO 4	Understand positive and negative feedback mechanism through demonstration.
		CO 5	Knowledge about family planning devices and pregnancy diagnosis tests.
21.	PHARMACEUTICAL ORGANIC CHEMISTRY-I- Practical (BP208P)	CO 1	Identification of various organic compounds by systematic qualitative analysis
		CO 2	Identification of organic compounds using melting/ boiling point from literatures
		CO 3	Identification of various functional groups by qualitative tests.
		CO 4	Understand the preparation of solid derivatives from organic compounds.
		CO 5	Construction of various molecular models

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22.	BIOCHEMISTRY- Practical (BP209P)	CO 1	Analyse and identify various carbohydrate, protein samples and abnormal constituents of urine through qualitative tests.
		CO 2	Determination of the amount of reducing sugars, blood creatinine, blood sugar and serum total cholesterol through quantitative analysis.
		CO 3	Understand the preparation of buffer solution and measurement of pH.
		CO 4	Understand the enzymatic hydrolysis of starch.
		CO 5	Understand the effect of temperature and substrate concentration on salivary amylase activity.
23.	COMPUTER APPLICATIONS IN PHARMACY- Practical (BP210P)	CO 1	Designing of questionnaire using word processing package to gather information about a particular disease, form in MS access to modify patient record in databases..
		CO 2	Creation of database, invoice table, queries, drug information storage and retrieval using MS Access.
		CO 3	Creation of HTML page to show personal information and mailing labels using label wizard.
		CO 4	Apply online tools to retrieve information of drug and its adverse effects.
		CO 5	Understand the exporting of tables, queries, forms and reports to web pages and XML pages.
SEMESTER III			
24.	PHARMACEUTICAL ORGANIC CHEMISTRY -II - Theory (BP301T)	CO 1	To learn about the mechanism and orientation action of benzene and its derivatives.
		CO 2	To understand the general methods of preparation and reaction of aromatic compounds.
		CO 3	To study about the reactions and analytical constants of fats and oils.
		CO 4	To learn about the general methods, preparations, medicinal uses of polynuclear hydrocarbons.
		CO 5	To understand the preparations, reaction and theories of cyloalkanes.
25.	PHYSICAL PHARMACEUTICS-I - Theory (BP302T)	CO 1	To study the physicochemical properties of solubility for designing the dosage forms.
		CO 2	To understand the physicochemical properties of states of matter.
		CO 3	To learn the physical properties and principle involved in particle size and distribution.
		CO 4	To understand the classification of complexation, application, protein binding and stability studies in pharmaceuticals.
		CO 5	To learn the pH, buffers and isotonic solutions used in pharmaceutical and biological systems.

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26.	PHARMACEUTICAL MICROBIOLOGY - Theory (BP303T)	CO 1	To learn about the scope of microbiology, identification, cultural methods and preservation of various micro organisms
		CO 2	To comprehend several methods of identification and the principles, practices, applications, and assessment of sterilization
		CO 3	To learn about the morphology, classification, cultivation and replication of fungi and virus, classification, mode of action,, evaluation of disinfectants and sterility testing of products.
		CO 4	To understand the designing of aseptic area, and method of prevention, clean area classifications, principle and methods of different microbiological assays and methods for standardization of antibiotics, vitamins and amino acids.
		CO 5	Learn about the microbial spoilage of pharmaceutical products, preservation of pharmaceutical products using antimicrobial agents, evaluation of microbial stability of formulations and basic knowledge of cell culture.
27.	PHARMACEUTICAL ENGINEERING - Theory (BP304T)	CO 1	Knowledge about flow of fluids and unit operations such as size reduction, size separation and mixing.
		CO 2	Learn about unit operations such as evaporation and heat transfer involved in pharmaceutical manufacturing process.
		CO 3	Understand various process like drying, distillation carried out in pharmaceutical industries.
		CO 4	Study various unit operations like filtration and centrifugation involved pharmaceutical process
		CO 5	Learn about various materials of pharmaceutical plant construction, material handling systems, corrosion and its prevention.
28.	PHARMACEUTICAL ORGANIC CHEMISTRY –II- Practical (BP305P)	CO 1	Learn about experiments involved in laboratory techniques like recrystallization and steam distillation.
		CO 2	Determination of acid value, saponification value and iodine of oils
		CO 3	Standardization of reagents involved in determination of oil and fats
		CO 4	Understand the preparation of organic compounds by acylation, halogenation, nitration and oxidatiuon reactions.
		CO 5	Study the preparation of organic compounds by hydrolysis, diazotization, coupling reactions and various name reactions.

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29.	PHYSICAL PHARMACEUTICS-I - Practical (BP306P)	CO 1	Learn about determination of solubility of drug at room temperature.
		CO 2	Understand the determination of pKa value by half neutralization equation.
		CO 3	Understand and determine partition coefficient of benzoic acid and iodine in solvent sytems and percentage composition of NaCl in phenol-water system.
		CO 4	Understand and determine the rheologic properties such as particle size distribution, bulk density, true density, porosity and angle of repose.
		CO 5	To understand and determine stability constants of PABA-Caffeine complex and cupric-glycine complex by solubility and pH titration methods.
30.	PHARMACEUTICAL MICROBIOLOGY - Practical (BP307P)	CO 1	Understand the different equipments and processing used in experimental microbiology.
		CO 2	Understand the preaparation of various media, nutrient slabs and slants; sterilization methods for glasswares and media and subculturing of bacteria and fungus.
		CO 3	Study different staining methods and isolation of pure culture of micro organisms.
		CO 4	Knowledge about microbiological assay of antibiotics, motility determination and sterility testing.
		CO 5	Understand biochemical test and bacteriological analysis of water
31.	PHARMACEUTICAL ENGINEERING - Practical (BP308P)	CO 1	Understand the determination of particle size, overall heat transfer coefficient, moisture content and humidity
		CO 2	Understand the construction, working and application of various pharmaceutical machineries.
		CO 3	Knowledge about size analysis by sieving and laws of size reduction.
		CO 4	Understand the working of major pharmaceutical equipments such as colloidal mill, planetary mixer, freeze dryer etc.
		CO 5	Understand the factors affecting rate of filtration and evaporation and calculation of mixing index.

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SEMESTER IV			
32.	PHARMACEUTICAL ORGANIC CHEMISTRY–III - Theory (BP401T)	CO 1	Understand the stereochemical aspects in optical isomerism of organic compounds
		CO 2	Learn the stereochemical aspects ingeometrical isomerism of organic compounds
		CO 3	Study the nomenclature, classification of heterocyclic compounds and synthesis, reactions and medicinal uses of pyrrole, furan and thiophene.
		CO 4	Understand the synthesis, reactions and medicinal uses of various heterocyclic ring members
		CO 5	Understand the importance, synthetic reactions and its mechanism carried out in wet labs.
33.	MEDICINAL CHEMISTRY –I - Theory (BP402T)	CO 1	Understand the history and development of medicinal chemistry, physicochemical properties and metabolism of drugs.
		CO 2	Understand the SAR, mechanism of actions and therapeutic uses of drugs acting on Sympathetic nervous system.
		CO 3	Understand the SAR, mechanism of actions and therapeutic uses of drugs acting on parasympathetic nervous system.
		CO 4	Knowledge about drugs acting on CNS such as sedatives, hypnotics, antipsychotics and anticonvulsants.
		CO 5	Learn about drugs used as general anaesthetics, narcotic,non narcotic analgesics and anti-inflammatory agents.
34.	PHYSICAL PHARMACEUTICS-II - Theory (BP403T)	CO 1	Learn about the principles of chemical kinetics and accelerated stability study used in expiration dating of pharmaceutical dosage forms.
		CO 2	Understand the concept of rheology, Newtonian, non-newtonian systems and deformation of solids.
		CO 3	Understand the formulation, stability, preservation and rheological properties of suspensions and emulsions.
		CO 4	Knowledge about surface and interfacial properties of dosage forms.
		CO 5	Understand the classification, general characteristics, optical, kinetic and electrical properties of colloidal dispersions.

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35.	PHARMACOLOGY-I - Theory (BP404T)	CO 1	Understand the introduction of pharmacology and pharmacokinetics along with adverse effects, route of administration of different classes of drugs.
		CO 2	To comprehend pharmacodynamic and general pharmacology, biochemical effects, adverse effects, clinical studies, medication interactions, and drug contradictions
		CO 3	Learn the organization, function along with pharmacological action of various drugs used as parasympathetic and sympathetic
		CO 4	Comprehending the pharmacology of central nervous system agents, including hypnotics, sedatives, antiepileptics, and general anesthetics
		CO 5	Learn the pharmacology of central nervous system along with the drugs used as psychopharmacological agents, CNS stimulants, opioid analgesics and antagonists
36.	PHARMACOGNOSY AND PHYTOCHEMISTRY -I - Theory (BP405T)	CO 1	To understand the fundamentals of pharmacognosy like scope, sources of drugs, organized drugs, classification of drugs and quality control of drugs of natural origin.
		CO 2	Learn the techniques involved in the cultivation and production of crude drugs.
		CO 3	Understand the development, types and applications of plant tissue culture in Pharmacognosy.
		CO 4	Learn the various system of medicine in pharmacognosy and introduction of secondary metabolites.
		CO 5	Learn the uses and chemical nature of crude drugs and primary metabolites.
37.	MEDICINAL CHEMISTRY –I – Practical- (BP406P)	CO 1	Understand the preparation of drug inetrmediates such as 1,3-pyrazole, 1,3-oxazole, benzimidazole, benztriazole, 2,3-diphenyl quinoxaline etc
		CO 2	Understand the preparation of drugs such as Benzocaine, Phenytoin, Phenothiazine, Barbiturates etc.
		CO 3	Ability to determine the percentage purity of drugs by assay.
		CO 4	Standardization of reagents involved in the assay of drugs.
		CO 5	Ability to determine the partition coefficient of drugs.

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38.	PHYSICAL PHARMACEUTICS-II - Practical- (BP407P)	CO 1	Understand and determine various physicochemical properties like surface tension, HLB number, critical micellar concentration by various methods.
		CO 2	Understand and determine the physicochemical properties like viscosity of liquids and semisolids by using different viscometers.
		CO 3	Learn and determine the sedimentation volume of different concentrations of single suspending agents.
		CO 4	Understand and determine the reaction rate constants such as first order and second order.
		CO 5	Ability to carry out accelerated stability studies.
39.	PHARMACOLOGY-I - Practical- (BP408P)	CO 1	To learn the experimental pharmacology which common used instruments, common laboratory animals, maintenance of laboratory animals as per CPCSEA guidelines and common laboratory techniques.
		CO 2	To study and determine dose calculation in pharmacology experiments
		CO 3	To learn and determine the different routes of administration in animals
		CO 4	To understand the introduction to in-vitro pharmacology
		CO 5	To comprehend and ascertain the dose response curve of acetylcholine, atropine, and physostigmine using chicken ileum, effect of drugs on gastroinstestinal motility and determination of adverse effect of test substance
40.	PHARMACOGNOSY AND PHYTOCHEMISTRY -I - Practical- (BP409P)	CO 1	Learn and determine the analysis of crude drugs by chemical tests.
		CO 2	Ability to determine stomatal number, index, vein islet number and palisade ratio.
		CO 3	Analyse the size of starch grains, calcium oxalate crystals, fibre length and width by eye piece micrometer
		CO 4	Ability to determine thenumber of starch grains by Lycopodium spore method.
		CO 5	Learn the determination of ash value, extractive value and moisture content of crude drugs.

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SEMESTER V			
41.	MEDICINAL CHEMISTRY –II - Theory (BP501T)	CO 1	Know the development, chemistry, SAR, Mechanism of action and synthesis of various drugs used to treat allergic responses, ulcer and cancer.
		CO 2	Learn the classification, chemistry, SAR, Mechanism of action and synthesis of cardiovascular agents.
		CO 3	Know the chemistry, Mechanism of action, synthesis and uses of Drugs used to treat cardiac related disorders.
		CO 4	Understand the chemistry, SAR, Mechanism of action and uses of drugs acting on endocrine system
		CO 5	Development, chemistry, SAR, Mechanism of action, synthesis and various formulations of hypoglycaemic agents and local anaesthetics
42.	FORMULATIVE PHARMACY - Theory (BP502T)	CO 1	Importance of preformulation of drugs, excipients & their role in formulation design
		CO 2	Knowledge on tablet and liquid dosage forms & their processing problems with QC checking
		CO 3	Knowledge on capsules production and pellets with QC tests
		CO 4	Knowledge on sterile preparation and their QC evaluation.
		CO 5	Knowledge on formulation of cosmetics and packaging material sciences
43.	PHARMACOLOGY-II - Theory (BP503T)	CO 1	Understand the electrophysiology of heart, various heart disease and pharmacological management
		CO 2	Understand the hemostasis, coagulation cascade and drugs used to treat blood disorders and the fluid–electrolyte balance by understanding the pharmacology of diuretics and antidiuretics
		CO 3	Understand the different autocoids and their physiological and pathological role, pharmacology of drugs acting on their receptors.
		CO 4	Understand the role of endocrine system in the body homeostasis, various hormonal disorders and its pharmacological management.
		CO 5	Understand the pharmacology of natural and synthetic sex steroids and principles & applications of bioassay

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44.	PHARMACOGNOSY AND PHYTOCHEMISTRY II - Theory (BP504T)	CO 1	Knowledge about Basic biosynthetic pathways involved in the metabolism of production of secondary metabolites
		CO 2	Understand the sources, phytochemistry, composition, therapeutic and commercial utilization of secondary metabolites present in various crude drugs
		CO 3	Learn the isolation techniques, identification and analysis of selected phytoconstituents
		CO 4	Understand the industrial production, estimation and utilization of therapeutically much useful phytoconstituents
		CO 5	Knowledge about Modern extraction techniques, characterization and identification/quality control of the herbal drugs through spectroscopy.
45.	PHARMACEUTICAL JURISPRUDENCE - Theory (BP505T)	CO 1	Understand Legal definitions to the Drugs and Cosmetics Act, 1910 and its rules 1915, the regulatory authorities and agencies governing the import, manufacture and sale of pharmaceuticals, test and analysis of drugs, loan license and repacking license
		CO 2	Detailed study of Schedules, labeling & Packing guidelines for drugs and cosmetics. Administration of the Act and Rules.
		CO 3	Knowledge about Pharmacy Act 1948, medicinal and toilet preparations act 1955, and narcotic drugs and psychotropic substances act 1985 and rules.
		CO 4	Study of salient features of Drugs and magic remedies act, prevention of cruelty to animals act 1960 and drugs price control order.
		CO 5	Understand the Pharmaceutical legislations, code of pharmaceutical ethics, MTP act, Right to information act and IPR.
46.	FORMULATIVE PHARMACY- Practical (BP506P)	CO 1	Understand the Importance of preformulation of drugs in formulation of dosage forms.
		CO 2	Knowledge on Preparation of tablet and liquid dosage forms & evaluation of the formulations.
		CO 3	Knowledge on Preparation & evaluation of capsules
		CO 4	Knowledge on sterile product preparation and their evaluation
		CO 5	Knowledge on formulation of cosmetics and packaging material sciences.

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47.	PHARMACOLOGY-II- Practical (BP507P)	CO 1	Understand the effect of drugs using isolated tissue preparations.
		CO 2	Understand the effect of local anaesthetics by different methods.
		CO 3	Ability to perform pyrogen testing by rabbit method.
		CO 4	Understand the effect of hepatic microsomal enzyme inhibitors on phenobarbitone sleeping time in mice.
		CO 5	Analyse the effect of Acetylcholine on chicken ileum by different bioassay methods.
48.	PHARMACOGNOSY AND PHYTOCHEMISTRY II - Practical (BP508P)	CO 1	Understand the Macroscopy and Microscopic diagnostic characters of secondary metabolite.
		CO 2	Understand Isolation, detection of selected phytoconstituents.
		CO 3	Detection of phytoconstituents by chromatographic techniques.
		CO 4	Understand the procedure for distillation of volatile oil and detection of phytoconstituents by TLC.
		CO 5	Understand the Chemical analysis of the unorganized crude drugs as per regulatory guidelines.
SEMESTER VI			
49.	MEDICINAL CHEMISTRY III - Theory (BP601T)	CO 1	Know the development, different classes, chemistry, SAR, Mechanism of action and synthesis of antibiotics
		CO 2	Learn the development, different classes, chemistry, SAR, Mechanism of action and synthesis of some antibiotics and antimalarials; Understand the chemistry behind prodrugs and its applications.
		CO 3	Understand the chemistry, Mechanism of action and synthesis and uses of anti infective agents.
		CO 4	Know the chemistry, SAR, Mechanism of action and uses of sulpha drugs and anthelmintics
		CO 5	Understand the basic concept of drug design and able to apply different drug design approaches and techniques towards the drug development.
50.	PHARMACOLOGY-III - Theory (BP602T)	CO 1	Understand various respiratory tract diseases, GI tract diseases and pharmacology of drugs used to treat them.
		CO 2	Understand the basics and principles of chemotherapy and pharmacology of antibiotics.
		CO 3	Understand the chemotherapy of tuberculosis, leprosy, fungal, viral and amoebic infections, malaria etc.,
		CO 4	Understand the chemotherapy of UTI, STD, drugs acting in immune systems.
		CO 5	Understand the basic principles of toxicology, poisoning treatment, biological clock, its significance, rhythms and cycles.

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51.	HERBAL DRUG TECHNOLOGY - Theory (BP603T)	CO 1	Knowledge about Selection of herbs from its sources, authentication, processing and development of herbal raw material, Good agricultural practices, Indian system of medicine, formulation and standardization of ayurvedic formulations.
		CO 2	Study of nutraceuticals in the health care and its market survey
		CO 3	Understand the Sources and description of raw materials of herbal origin used in cosmetics, Herbal excipients used in formulations and the novel dosage forms
		CO 4	Learn the Evaluation and stability testing of herbal drugs as per WHO and ICH guidelines, Patenting and regulatory requirements of natural products.
		CO 5	Learn about Plant based industries and institutions in India and Good manufacturing practices of Indian system of medicine.
52.	BIOPHARMACEUTICS AND PHARMACOKINETICS - Theory (BP604T)	CO 1	Knowledge on absorption & distribution of drugs.
		CO 2	Knowledge on bioavailability, bioequivalence and elimination of drugs
		CO 3	Knowledge on pharmacokinetics, various compartment model of drugs, pharmacokinetic parameters, elimination and their significance with application.
		CO 4	Knowledge on multi compartment model & their significance.
		CO 5	Knowledge on nonlinear pharmacokinetics.
53.	PHARMACEUTICAL BIOTECHNOLOGY - Theory (BP605T)	CO 1	Understand the importance of microbes in enzyme biotechnology, protein engineering and biosensor application.
		CO 2	Apply the genetic engineering knowledge for the production of rDNA products
		CO 3	Understand the immune mechanism and employ it for the production of new immunological products.
		CO 4	Recognize the importance of microbial genetics and its application in biotechnology.
		CO 5	Sketch various process involved in the fermentation technology and apply them m the production of pharmaceutical products

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54.	PHARMACEUTICAL QUALITY ASSURANCE - Theory (BP606T)	CO 1	Knowledge about the responsibilities of QA& QC department, importance of Good practices such as GMP, TQM, certifications and accreditation applicable to Pharmaceutical industries
		CO 2	Understand the importance of organization, personnel, premises, equipment purchase specifications in Pharmaceutical industries
		CO 3	Gain knowledge on quality control test for packaging materials and Good Laboratory practices
		CO 4	Learn the document maintenance in pharmaceutical industry.
		CO 5	Gain knowledge on the aspect of validation, importance of calibration to be performed for the instruments and good warehousing practices in Pharmaceutical industries.
55.	MEDICINAL CHEMISTRY-III- Practical- (BP607P)	CO 1	Understand and carryout the preparation of important medicinal compounds or intermediates by conventional and microwave irradiated methods and their characterization.
		CO 2	Able to find out the percentage purity of given sample of medicinal compounds along with standardisation.
		CO 3	Able to sketch chemical structures using software/online tools.
		CO 4	Able to determine physicochemical properties such as logP, clogP, MR, Molecular weight, Hydrogen bond donors and acceptors for certain class of drugs using drug design software.
		CO 5	Able to analyse the Drug likeliness screening (Lipinski's Rule of 5)
56.	PHARMACOLOGY-III- Practical (BP608P)	CO 1	Study the anti-allergic, anti-ulcer, locomotor and anticonvulsant activity of drugs by various methods.
		CO 2	Study the anxiolytic, anti-inflammatory and analgesic activityof drugs by various methods.
		CO 3	Able to estimate serum biochemical parameters.
		CO 4	Understand the stereotype and anti-catatonic activity of drugs on rats/mice
		CO 5	Able to apply proper biostatistical method for data interpretation and calculations

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57.	HERBAL DRUG TECHNOLOGY - Practical (BP609P)	CO 1	Able to perform the preliminary phytochemical screening of crude drugs.
		CO 2	Able to determine ash value, moisture content, swelling index, foaming index and extractive values of crude drugs.
		CO 3	Understand the Preparation of herbal cosmetics, preparation and standardization of herbal formulations.
		CO 4	Able to determine alcohol content of asava and arista, analysis of fixed oils.
		CO 5	Learn about Monograph analysis of herbal drugs as per Pharmacopoeia.
SEMESTER VII			
58.	INSTRUMENTAL METHODS OFANALYSIS - Theory (BP701T)	CO 1	Learn about the principle, instrumentation and application of UV-Visible spectroscopy and fluorimetry
		CO 2	Understand the principle, instrumentation and application of Infra-red spectroscopy, flame photometry, atomic absorption spectroscopy and nepheloturbidimetry
		CO 3	Learn about various types of chromatographic techniques, electrophoresis, their methodology, advantages, disadvantages and applications
		CO 4	Understand the sophisticated and advanced chromatographic techniques like gas chromatography and High performance liquid chromatography
		CO 5	Learn about the theory, instrumentation and application of ion exchange chromatography, gel filtration and affinity chromatography
59.	INDUSTRIAL PHARMACY- Theory (BP702T)	CO 1	Understand about transformation of a lab scale formula into a viable product by manufacture and method of designing a prototype.
		CO 2	Learn the process of progress from drug discovery to development of product, clinical trial and full skill commercialization of drug product.
		CO 3	Knowledge about role of regulatory affairs in drug development and various regulatory requirements for the approval of the drug.
		CO 4	Knowledge about the Indian regulatory requirements and approval procedures of new drugs.
		CO 5	Understand the layout of an industry, probable hazards, and their safety and maintenance of records.

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60.	PHARMACY PRACTICE - Theory (BP703T)	CO 1	Knowledge about different levels of hospitals, structure of hospital, functions of various medical staffs, distribution of drugs in hospitals and about hospital formulary.
		CO 2	Learn about functions and responsibilities of Pharmacy and Therapeutic Committee, collection of patient medication history, monitoring of drug levels in body, ways to check the adherence to medication.
		CO 3	Study about Adverse Drug reactions, their management, drug interactions, drug information services, and counseling of patients.
		CO 4	Understand the rational use of drugs, management of certain diseases and interpretation of laboratory tests.
		CO 5	Study about wholesale and retail drug store, legal requirements regarding the drug store, maintenance of records and inventory control.
61.	NOVEL DRUG DELIVERY SYSTEMS - Theory (BP704T)	CO 1	Understand about dosage forms that delivers drug in a controlled manner and use of polymers in controlled release form.
		CO 2	Learn methods of microencapsulation, its applications and about delivery of drug into mucosa.
		CO 3	Learn about methods of delivering drugs through skin, naso-pulmonary route and gastro retentive drug delivery system.
		CO 4	Understand concepts in targeted drug delivery systems like liposomes, neosomes, nanoparticles and monoclonal antibodies.
		CO 5	Understand about drugs delivered through ocular route.
62.	INSTRUMENTAL METHODS OF ANALYSIS- Practical (BP705P)	CO 1	Understand the concept of absorption maxima and factors affecting it.
		CO 2	Learn about the estimation of single and combined dosage forms by UV-Visible spectroscopy.
		CO 3	Learn about fluorescence and factors affecting it.
		CO 4	Understand about methods for separation of mixtures by chromatographic techniques.
		CO 5	Study about flames produced by different metals.

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SEMESTER VIII			
63.	RESEARCH METHODOLOGY AND BIOSTATISTICS-Theory (BP801T)	CO 1	Understand various aspects for conducting a research and importance of research in pharmaceutical sector
		CO 2	Learn about different types of data, data collection methods, and data representation in research.
		CO 3	Understand about types of epidemiological studies in research and factors affecting epidemiological studies.
		CO 4	Learn about types of statistics, sampling techniques in biostatistics and factors determining inclusion and exclusion of subjects in a trial.
		CO 5	Understand ways to perform hypothesis testing, types of tests, applications and interpretation of research.
64.	SOCIAL AND PREVENTIVE PHARMACY-Theory (BP 802T)	CO 1	Understand public health, control of various diseases, effect of nutritional deficiency on health and maintenance of personal hygiene.
		CO 2	Learn about possible ways of prevention of various diseases.
		CO 3	Understand various programs related to diseases, mental health and vaccinations.
		CO 4	Learn about various programs related to elderly people, mother and child and tobacco control programs
		CO 5	Learn about services provided in rural, urban and school levels that can promote health.
65.	PHARMACEUTICAL MARKETING-Theory (BP803ET)	CO 1	Study about marketing, marketing analysis and factors that affect pharmaceutical market.
		CO 2	Study about decisions regarding pharmaceutical products and product line management.
		CO 3	Learn about various activities that can be undertaken to encourage sale of the product.
		CO 4	Study various channels of Pharmaceutical marketing and responsibilities of professional sales representatives.
		CO 5	Understand the importance of pricing in pharmaceutical marketing and various concepts emerge in marketing.
66.	PHARMACEUTICAL REGULATORY SCIENCE- Theory (BP804ET)	CO 1	Understand various stages of discovering and developing a new drug.
		CO 2	Study about approvals by authorities regarding a research and various regulatory authorities.
		CO 3	Understand the steps for registration of Indian drug product in overseas market and documents related to it.
		CO 4	Study about the conduct of clinical trials and safety monitoring in clinical trial.
		CO 5	Understand regulatory guidelines, laws and acts.

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67.	PHARMACOVIGILANCE - Theory (BP805ET)	CO 1	Learn about pharmacovigilance, Adverse Drug Reactions and management.
		CO 2	Study classification of drug and diseases, drug dictionaries with special emphasis to MedDRA and Eudravigilance.
		CO 3	Understand safety regarding vaccines, pharmacovigilance methods and importance of communications in pharmacovigilance.
		CO 4	Learn about safety data generation and ICH guidelines for Pharmacovigilance.
		CO 5	Understand evaluation of drug safety in pediatrics, pregnancy, geriatrics, CDSCO and CIOMS.
68.	QUALITY CONTROL AND STANDARDIZATION OF HERBALS - Theory (BP806ET)	CO 1	Learn about various evaluation methods of drugs.
		CO 2	Study about quality assurance parameters to be followed for herbal formulations during and after manufacturing and for finished products.
		CO 3	Learn various guidelines for evaluation of safety, quality and efficacy of herbal drugs.
		CO 4	Understand standardization of herbal products using chromatography and documents for new drug application.
		CO 5	Learn safety monitoring of herbal medicine by WHO guidelines and role of certain markers in standardization of herbal products.
69.	COMPUTER AIDED DRUG DESIGN- Theory (BP807ET)	CO 1	Understand different stages of drug discovery and importance of computer application in drug discovery.
		CO 2	Study about Quantitative Structure Activity Relationship (QSAR) and QSAR methods.
		CO 3	Learn about methods of mapping and screening of pharmacophore and analogue based drug design
		CO 4	Study about docking, quantum mechanics and denovo drug design.
		CO 5	Learn different methods of informatics in drug design.

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70.	CELL AND MOLECULAR BIOLOGY- Theory (BP808ET)	CO 1	Study about cells, comparative study of eukaryotic and prokaryotic cell and cellular reproduction.
		CO 2	Learn about DNA, RNA their functioning and flow of genetic information.
		CO 3	Study structure, pathways and synthesis of proteins.
		CO 4	Understand genetics, analysis of cell cycle and cell division.
		CO 5	Learn about cell signals and their pathways.
71.	COSMETIC SCIENCE- Theory (BP809ET)	CO 1	Study about different cosmetics and excipients used in cosmetics
		CO 2	Learn the formulation of products used in skincare, hair care and oral care.
		CO 3	Study about sun protection, herbs used in cosmetics and cosmetic analysis.
		CO 4	Study about the evaluation of cosmetics.
		CO 5	Learn about problems associated with hair, scalp and skin.
72.	EXPERIMENTAL PHARMACOLOGY (PHARMACOLOGICAL SCREENING METHODS) - Theory (BP810ET)	CO 1	Understand about laboratory animal experiments, techniques of blood collection and euthanasia.
		CO 2	Learn about various steps included in preclinical screening.
		CO 3	Study about models used for preclinical screening for ANS activities.
		CO 4	Study about models used for preclinical screening for CVS activities.
		CO 5	Learn about research methodology, data analysis and data representation.
73.	ADVANCED INSTRUMENTATION TECHNIQUES - Theory (BP811ET)	CO 1	Learn principles, instrumentation and applications of NMR and Mass spectroscopy.
		CO 2	Study principles, instrumentation and applications of thermal methods of analysis and X-ray Diffraction methods.
		CO 3	Learn guidelines for calibration and validation of instruments.
		CO 4	Understand about immunoassays and extraction techniques.
		CO 5	Study different hyphenated techniques in Pharmaceutical Analysis.

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PROGRAMME OUTCOMES – M.PHARM (PHARMACEUTICS)

PO Nos.	Program Objectives	Program Outcomes
PO 1	Scientific knowledge	To apply the scientific and technological principles to design, develop effective pharmaceutical dosage forms and drug delivery systems for better therapeutic results.
PO 2	Technological applications	To utilize technical knowledge and identify any factors affecting the quality of pharmaceutical production.
PO 3	Entrepreneurship	To understand the basics of establishing and management of pharmaceutical enterprise.
PO 4	Modern tool usage	Learn, select, apply appropriate methods, procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.
PO 5	Practical skills	To gain practical expertise in formulating and evaluating various novel drug release systems for minor ailments to major diseases.
PO 6	Applied science	To employ contemporary scientific knowledge viz., pharmacology, biotechnology for designing disease-centric pharmaceuticals.
PO 7	Computational and statistical methodologies	Applying and utilizing the statistical tools with the aid of computer software to optimize the formulations.
PO 8	Pharmaceutical ethics	To respect personal values and apply ethical principles in professional and social contexts. Demonstrate behavior that recognizes cultural, personal variability in values, communication and lifestyles. Use ethical frameworks; apply ethical principles while making decisions and take responsibility for the outcomes associated with the decisions.
PO 9	Environment and sustainability	To understand, protect and cooperate environmental concerns for sustaining biodiversity.
PO 10	Life-long learning	To develop the habit of updating knowledge from time to time to meet industrial demands and social needs for having a fruitful career.

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COURSE OUTCOMES OF M.PHARM (PHARMACEUTICS)

Sl. No	Course Name With Code	CO Number	Course Outcome
FIRST SEMESTER			
1.	MODERN PHARMACEUTICAL ANALYTICAL TECHNIQUES –Theory (MPH 101T)	CO 1	Deep understanding about various spectroscopic methods
		CO 2	Detailed study about various chromatographic methods
		CO 3	To understand various electrophoretic techniques
		CO 4	Understand the principle, working and applications of Potentiometry and different thermal techniques.
		CO 5	To understand the immunological assay methods such as RIA, ELISA and Bioluminescence assays
2.	DRUG DELIVERY SYSTEMS–Theory (MPH 102T)	CO 1	Knowledge on Sustained release & Controlled release formulations, Different polymers, dosage forms for personalized medicines, bioelectronic medicines, 3DPrinting of pharmaceuticals and Tele pharmacy.
		CO 2	Knowledge on design and study of rate controlled, activation modulated and feedback regulated drug delivery systems.
		CO 3	Knowledge on ocular and transdermal drug delivery systems.
		CO 4	Knowledge on barriers, formulation n& evaluation of protein and peptide delivery systems.
		CO 5	Knowledge on vaccine drug delivery systems.
3.	MODERN PHARMACEUTICS–Theory (MPH 103T)	CO 1	Understand the elements of preformulation studies and optimization techniques in pharmaceutical formulations.
		CO 2	Knowledge about pharmaceutical validation.
		CO 3	Understand industrial Management and cGMP Considerations.
		CO 4	Learn about tablet compression and compaction.
		CO 5	Study of consolidation parameters such as diffusion, dissolution and pharmacokinetic parameters.

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4.	REGULATORY AFFAIRS– Theory (MPH 104T)	CO 1	Understand the document processs in pharmaceutical industry and requirements for product approval.
		CO 2	Learn about the regulatory requirements for product approval.
		CO 3	Knowledge about the regulations for combination drug products and medical devices.
		CO 4	Grasp non-clinical drug development submission requirements to regulatory agencies
		CO 5	Learn the clinical trial protocol and pharmacovigilance safety monitoring in clinical trials.
5.	PHARMACEUTICS PRACTICALS -I (MPH105P)	CO 1	Analysis of pharmacopeial compounds and their formulation by UV Visible spectrophotometer, HPLC.
		CO 2	Estimation of the quantity of riboflavin/quinine sulphate by fluorimetry.
		CO 3	Ability to perform In -vitro dissolution profile of CR/SR marketed formulation, experiments based on HPLC and Gas chromatography.
		CO 4	Understand the formulation of osmotically controlled DDS, Muchoadhesive tablets, transdermal patches and to carry out the preformulation studies of tablets.
		CO 5	Understand the effect of compressional force on disintegration and effect of binder and particle size on dissolution of tablets and micromeritic properties of powder and granulation.
SECOND SEMESTER			
6.	MOLECULAR PHARMACEUTICS (NANOTECHNOLOGY & TARGETED DRUG DELIVERY SYSTEMS) – Theory (MPH 201T)	CO 1	Understand the Concept and biological events in drug targeting.
		CO 2	Knowledge on preparation and evaluation of nanoparticles and liposomes.
		CO 3	Knowledge on preparation and evaluation of microspheres, Monoclonal antibodies, niosomes, aquasomes, phytosomes and elecrosomes.
		CO 4	Knowledge on propellants, preparation and evaluation of pulmonary and nasal aerosols.
		CO 5	Knowledge on genetherapy, antisense molecules and aspartamers as drugs of future.

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7.	ADVANCED BIOPHARMACEUTICS & PHARMACOKINETICS– Theory (MPH 202T)	CO 1	Broader understanding about the concepts of biopharmaceutics and pharmacokinetics.
		CO 2	Ability to design drug product by considering various biopharmaceutical factors.
		CO 3	Ability to select proper pharmacokinetic model based on plasma level or urinary excretion data that best describes the process of drug absorption, distribution, metabolism and elimination (ADME).
		CO 4	Ability to design a basic protocol for the conduct of BA/BE study and the interpretation of the BA/BE data.
		CO 5	Ability to design dosage regimens for patients based on calculated pharmacokinetic parameters.
8.	COMPUTER AIDED DRUG DEVELOPMENT– Theory (MPH 203T)	CO 1	Study the role of computers and quality by design concepts in pharmaceutical research and formulation development.
		CO 2	Learn computational modeling techniques of drug disposition.
		CO 3	Inculcate the knowledge of innovative uses of computer in formulation development and market analysis.
		CO 4	Interpret computer aided biopharmaceutical characterization using computer simulations during clinical development.
		CO 5	Apprehend the importance of artificial intelligence, robotics and computational fluid dynamics in pharmaceutical automation.
9.	COSMETICS AND COSMECEUTICALS– Theory (MPH 204T)	CO 1	Knowledge on regulation of cosmetics.
		CO 2	Knowledge on biological aspects of cosmetics.
		CO 3	Knowledge on formulation Building blocks.
		CO 4	Knowledge on design of cosmeceutical products.
		CO 5	Knowledge on herbal Cosmetics.

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10.	PHARMACEUTICS PRACTICALS II- (MPH205T)	CO 1	Understand microcapsule, alginate bead, gelatin/albumin microspheres, liposome, niosomes, spherules etc ,their preparation and evaluation.
		CO 2	Study on dissolution and comparison of marketed brands.
		CO 3	Understand various bioavailability studies.
		CO 4	Learn computer aided drug design and development.
		CO 5	Able to develop and evaluate various cosmetics.
THIRD SEMESTER			
11.	RESEARCH METHODOLOGY & BIOSTATISTICS–Theory (MPH 301T)	CO 1	Ability to design research projects and proposals to test the candidate in preclinical and Clinical testing.
		CO 2	To understand the basic principles and guidelines to conduct clinical trials/clinical research.
		CO 3	To establish, understand, functioning, utilization of laboratory animals and facilities as per CPCSEA guidelines.
		CO 4	To understand the basic principles of medical research, necessity and medicinal care as per International guidelines.
		CO 5	To apply proper statistical method for data interpretation and data management to have quality Research outcome.

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PROGRAMME OUTCOMES – M.PHARM (PHARMACEUTICAL CHEMISTRY)

PO Nos.	Program Objectives	Program Outcomes
PO 1	Scientific knowledge	Apply comprehensive knowledge and skills associated with pharmaceutical chemistry in design and development of new drug like molecules for biological targets.
PO 2	Planning abilities	Identify, formulate and test research problems, analyse, interpret and draw conclusions from data; plan, execute and report the results of an experiment or investigation effectively within time frame.
PO 3	Problem analysis	Demonstrate efficiency in problem solving skills, based on scientific and analytical approach. Analysis and solving problem related to synthesis, purification, physicochemical properties and toxicity of designed compounds.
PO 4	Modern tool usage	Acquire and apply latest scientific methods and computing tools related to synthesis, analysis and characterization of compounds with thorough understanding of limitations.
PO 5	Leadership skills	Demonstrate capability to build and lead team that can help to achieve the vision, inspire and motivate team members to engage with that vision and use leadership skills to guide the team for fulfilment of professional and societal responsibilities.
PO 6	Professional identity	Demonstrate attitude, values, knowledge and skills that are keys to fulfil professional competence. Understand analyse and communicate the value of their professional role in society as health care professionals.
PO 7	Communication	Communicate effectively with scientific community and with society at large, in writing and orally; express views, thoughts and ideas in a clear and concise manner. Write scientific reports, create effectual presentations and documentation and provide and obtain clear instructions.
PO 8	Pharmaceutical ethics	Apply ethical principals while making decisions and take responsibility for outcome associated with the decisions. Demonstrate behaviour that respects cultural and personal variability in values, communication and lifestyles.
PO 9	The Pharmacist and society	Demonstrate responsible behaviour and ability to assess community, health, safety and legal issues and consequent responsibilities relevant to professional practice.
PO 10	Environment and sustainability	Understand the effect of chemicals and materials used in pharmaceutical chemistry on environment, apply contextual knowledge to minimize negative impact on environment and provide sustainable solutions.
PO 11	Life-long learning	Promote lifelong learning activities through self motivation focussed at personal and professional development; to fulfil these needs attend and participate in scientific seminars / conferences / workshop on an ongoing basis.

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COURSE OUTCOMES OF M.PHARM (PHARMACEUTICAL CHEMISTRY)

Sl. No	Course Name With Code	CO Number	Course Outcome
		FIRST SEMESTER	
1.	MODERN PHARMACEUTICAL ANALYTICAL TECHNIQUES – Theory (MPT 101T)	CO 1	Deep understanding about various spectroscopic methods
		CO 2	Detailed study about various chromatographic methods
		CO 3	To understand various electrophoretic techniques
		CO 4	Understand the principle, working and applications of Potentiometry and different thermal techniques.
		CO 5	To understand the immunological assay methods such as RIA, ELISA and Bioluminescence assays
2.	ADVANCED ORGANIC CHEMISTRY – Theory (MPC 102T)	CO 1	Study the basic aspects of Organic Chemistry such as reactive intermediates and types of reaction mechanisms
		CO 2	Understand the mechanism and synthetic applications of various name Reactions
		CO 3	Learn various synthetic reagents, applications and role of protecting groups in organic chemistry
		CO 4	Understand the organic name reactions with their respective mechanism and application involved in synthesis of drugs containing heterocyclic ring
		CO 5	Understand the concept of disconnection to develop synthetic routes for small target molecule
3.	ADVANCED MEDICINAL CHEMISTRY –Theory (MPC103T)	CO 1	Study the different stages of drug discovery ,role of medicinal chemistry in drug research, different techniques for drug discovery
		CO 2	Understand the prodrug design and analog design
		CO 3	Study the systematic study, SAR, mechanism of action and synthesis of new generation molecules of various class of drugs and stereochemistry and drug action
		CO 4	Study the rational design of enzyme inhibitors in basic research
		CO 5	Learn the peptidomimetics, chemistry of prostaglandins, leukotrienes and thromboxanes
4.	CHEMISTRY OF NATURAL PRODUCTS –Theory (MPC104T)	CO 1	Study of natural products as leads for new pharmaceuticals for the various class of drugs
		CO 2	Learn the general introduction, classification, isolation, purification, molecular modification and biological activity of alkaloids, flavonoids, steroids
		CO 3	Understand the general introduction, classification, isolation, purification, molecular modification and biological activity of terpenoids, vitamins
		CO 4	Study the recombinant DNA technology, drug discovery and active constituent of certain crude drugs used in Indigenous system
		CO 5	Study the structural characterization of natural compounds using Spectroscopic techniques.

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5.	PHARMACEUTICAL CHEMISTRY PRACTICAL - I (MPC 105P)	CO 1	Learn and estimate pharmacopoeial compounds and their formulations by UV-Vis, HPLC,Gas, fluorimetry and flame photometry
		CO 2	Study the purification of organic solvents, column chromatography
		CO 3	Learn and prepare organic compounds by various named reactions
		CO 4	Understand synthesisof medicinally important compounds involving more than one step along with purification and characterization using TLC, melting point and IR spectroscopy
		CO 5	Study the Isolation, characterization like melting point, mixed melting point, molecular weight determination, functional group analysis, co-chromatographic technique for identification of isolated compounds and interpretation of UV and IR data
			SECOND SEMESTER
6.	ADVANCED SPECTRAL ANALYSIS)–Theory (MPC 201T)	CO 1	Learn about the advance theory of UV,IR spectroscopy and interpretation of organic compounds
		CO 2	Understand about the advance theory of NMR spectroscopy such as 1-D and 2-D NMR, NOESY and COSY, HETCOR, INADEQUATE and interpretation of organic compounds
		CO 3	Study the theory of mass fragmentation, rules, fragmentation of important organic compounds and interpretation of organic compounds
		CO 4	Learn about the Principle, Instrumentation and Applications of advance chromatography
		CO 5	Understand the principle, instrumentation and application of Thermal methods of analysis, Raman Spectroscopy and Radio immuno assay
7.	ADVANCED ORGANIC CHEMISTRY - II – Theory (MPC 202T)	CO 1	Study the introduction, principles of green chemistry, reactions of green chemistry such as microwave assisted reactions, ultrasound assisted reactions, continuous flow reactors:
		CO 2	Learn the concept of peptide chemistry and it types
		CO 3	Study the basic principles and reactions of photochemical and pericylic reactions
		CO 4	Study the basic concept of catalysis, types such as heterogeneous, homogenous catalysis, transition-metal and organo, biocatalysis and phase transfer catalysis
		CO 5	Learn the basic concepts in stereochemistry and methods of asymmetric synthesis

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8.	COMPUTER AIDED DRUG DESIGN – Theory (MPC 203T)	CO 1	Study the history, different techniques and applications of computer aided drug design
		CO 2	Understand the basic concept of quantitative structure activity relationships and types and importance of QSAR
		CO 3	Learn the concepts of molecular modeling and docking
		CO 4	Understand the molecular properties, de-novo drug design and homology modeling
		CO 5	Study the basic knowledge of Pharmacophore Mapping and Virtual Screening
9.	PHARMACEUTICAL PROCESS CHEMISTRY –Theory (MPC204T)	CO 1	Understand the introduction, synthetic strategy, stages of scale up process in process chemistry
		CO 2	Study the various unit operations such as extraction, filtration, distillation and evaporation in process chemistry
		CO 3	Study the various reactions like nitration, halogenation, oxidation in process chemistry
		CO 4	Learn the reduction reaction, fermentation and reaction progression kinetic analysis in process chemistry
		CO 5	Understand the various industrial safety programs and its documentation for development of drug molecule
10.	PHARMACEUTICAL CHEMISTRY PRACTICALS-II (MPC205P)	CO 1	Study and synthesis of organic compounds by adapting different approaches involving oxidation, reduction/hydrogenation and nitration
		CO 2	Learn and determine comparative study of synthesis of APIs/intermediates by different synthetic routes, interpretation of organic compounds by FT-IR,NMR,MS and purity by DSC in pharmaceuticals
		CO 3	Carry out the preparation of4-chlorobenzhydrylpiperazine,4-iodotolene from p-toluidine, vanillyl alcohol, umbelliferone, triphenyl imidazole and microwave irradiated reactions of synthetic importance
		CO 4	Study and determination of log P, MR, hydrogen bond donors , acceptors and ADMET properties of selected drugs
		CO 5	Understand the pharmacophore modeling based experiments such as 2D-QSAR, 3D-QSAR,docking study and virtual screening

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THIRD SEMESTER			
11.	RESEARCH METHODOLOGY & BIOSTATISTICS– Theory (MPH 301T)	CO 1	Ability to design research projects and proposals to test the candidate in preclinical and Clinical testing.
		CO 2	To understand the basic principles and guidelines to conduct clinical trials/clinical research.
		CO 3	To establish, understand, functioning, utilization of laboratory animals and facilities as per CPCSEA guidelines.
		CO 4	To understand the basic principles of medical research, necessity and medicinal care as per International guidelines.
		CO 5	To apply proper statistical method for data interpretation and data management to have quality Research outcome.

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PROGRAMME OUTCOMES – M.PHARM (PHARMACOLOGY)

PO Nos.	Program Objectives	Program Outcomes
PO 1	Scientific knowledge	Apply the knowledge of basic and clinical pharmacology and pharmacotherapeutics for the treatment of diseases using modern scientific approach
PO 2	Planning abilities	Apply the principles of pharmacokinetics for finding effective doses and dosage regiments for effective treatment of special populations using appropriate models.
PO 3	Problem analysis	Develop scientific temperament and critical reasoning abilities to evaluate challenges and gaps in the drug therapy and formulate solutions for the effective pharmacological management of disease using inter and multidisciplinary approaches.
PO 4	Modern tool usage	Demonstrate understanding of drug discovery process and clinical research and carry out experiments for preclinical and clinical evaluation of new drugs using contemporary technology.
PO 5	Leadership skills	Participate effectively and demonstrate leadership skills in multidisciplinary and multicultural teams.
PO 6	Professional identity	Appreciate and analyze the role of medicines in improving public health and understand the responsibility of pharmacologists in the same through scientific research and community engagement.
PO 7	Communication	Demonstrate ability to effectively communicate on challenges and solution of pharmacological aspects of healthcare using available verbal and written media at local as well as global level.
PO 8	Pharmaceutical ethics	Demonstrate ethics in one's practices in personal, professional, and social spheres of life.
PO 9	The Pharmacist and society	Demonstrate skills of analyzing and promoting rational use of drugs on the basis of scientific as well as economic factors.
PO 10	Environment and sustainability	Understand the importance of sustainable development and develop perspective on role of pharmacologists towards sustainable development.
PO 11	Life-long learning	Understand the importance of and use available resources for lifelong learning and continuing professional development for advancement of science in general and pharmacology for the benefit of mankind.

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COURSE OUTCOMES OF M.PHARM (PHARMACOLOGY)

Sl. No	Course Name With Code	CO Number	Course Outcome
	FIRST SEMESTER		
1.	MODERN PHARMACEUTICAL ANALYTICAL TECHNIQUES –Theory (MPL 101T)	CO 1	Deep understanding about various spectroscopic methods
		CO 2	Detailed study about various chromatographic methods
		CO 3	To understand various electrophoretic techniques
		CO 4	Understand the principle, working and applications of Potentiometry and different thermal techniques.
		CO 5	Understand the immunological assay methods such as RIA, ELISA and Bioluminescence assays
2.	ADVANCED PHARMACOLOGY – I – Theory (MPL 102T)	CO 1	Understand the general pharmacology regarding pharmacokinetics and pharmacodynamics
		CO 2	Learn the basic knowledge of neuronal transmission in ANS,CNS and non-adrenergic non cholinergic transmission
		CO 3	Knowledge on pathophysiology of diseases, mechanism of action, pharmacology and toxicology of drugs acting on autonomic and central nerve systems
		CO 4	Understand the pathophysiology of diseases, mechanism of action, pharmacology and adverse effect of drugs acting on cardiovascular systems
		CO 5	Kmowledge on pathophysiology of diseases, mechanism of action, pharmacology and toxicology of drugs acting on cardiovascular systems
3.	PHARMACOLOGICAL AND TOXICOLOGICAL SCREENING METHODS - I –Theory (MPL103T)	CO 1	Understand the regulations, ethical requirements for the usage of experimental animals, good laboratory practice and bioassay studies
		CO 2	Learn the general principle of preclinical screening and pharmacology of ANS and CNS agents
		CO 3	Understand the pathophysiology of diseases, mechanism of action, pharmacology and adverse effect of drugs acting on respiratory systems, cardiovascular systems and for metabolic disorder, cancer
		CO 4	Learn the detailed pharmacology of immunology and general principles of immunoassays
		CO 5	understand the limitations of animal experimentation and exploration of in-vitro data from preclinical to clinical data

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4.	CELLULAR AND MOLECULAR PHARMACOLOGY– Theory (MPL104T)	CO 1	Understand the fundamental knowledge of structure and functions of cellular components
		CO 2	Learn the basic knowledge of receptor signal transduction process and molecular pathywats affected by drugs
		CO 3	Understand the principles , applications of genomics,proteomics, gene therapy and recombinant DNA technology
		CO 4	Learn about prinicples, applications of pharmacogenomics and immunotherapeutis
		CO 5	Understand the basic knowledge of cell culture techniques,application and biosimilars
5.	PHARMACOLOGY PRACTICAL –I (MPL105P)	CO 1	Learn and estimate pharmacopoeial compounds and their formulations by UV-Vis, HPLC,Gas, fluorimetry and flame photometry
		CO 2	Understand and evaluation of various drugs activity carried out on laboratory animals
		CO 3	Learn DNA damage, DNA fragmentation, apoptosis, protein quatification by various biotechnological methods
		CO 4	Understand and determine pharmacokinetic studies, enzyme inhibition,induction activity using softwares
		CO 5	Learn the extraction of drugs from various biological samples using different analytical techniques
SECOND SEMESTER			
6.	ADVANCED PHARMACOLOGY – II – Theory (MPL 201T)	CO 1	Learn the pharmacology of drugs used in endocrine system
		CO 2	Study cellular and molecular mechanism of actions and resistance of antimicrobial agents
		CO3	Understand the drugs used in protozoal infections, helminthiasis, cellular and biochemical mediators of inflammation, allergic creaction and pharaotherapy of astha and COPD
		CO 4	Understand the drugs used in GIT systems and chronopharmacology and its applications
		CO 5	Understand the generation, etiopathology of free radicals and recent advance in treatments in Alzheimer's, Parkinson, cancer and diabetes mellitus

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7.	PHARMACOLOGICAL AND TOXICOLOGICAL SCREENING METHODS-II–Theory (MPL202T)	CO 1	Understand basic knowledge of, types, regulatory guidelines of toxicology
		CO 2	Learn various types of toxicity studies and importance methods in regulatory studies
		CO 3	Understand the different toxicity studies such as reproductive,teratogenicity, genotoxicity and in vivo carcinogenicity
		CO 4	Understand the importance of IND enabling studies and safety pharmacology studies
		CO 5	Learn about the toxicokinetics and alternative methods to animal toxicity testing
8.	PRINCIPLES OF DRUG DISCOVERY–Theory (MPL203T)	CO 1	Learn about an overview of modern drug discovery process
		CO 2	Understand the lead identification of discovery process, protein structure levels and its applications
		CO 3	Understand rational drug design traditional Vs rational drug design and design methods
		CO 4	Learn about the importance of molecular docking, de novo drug design
		CO 5	Understand the importance of QSAR analysis in drug discovery
9.	CLINICAL RESEARCH AND PHARMACOVIGILANCE –Theory (MPL204T)	CO 1	Learn about the regulatory requirements for conducting clinical trials
		CO 2	Understand the types and responsibilities of clinical trials
		CO 3	Understand the clinical trial documentation , monitoring and adverse drug actions
		CO 4	Study the principles of pharmcovigilance, roles, responsibilities
		CO 5	Understand the adverse drug reaction reporting systems and communication in pharmacovigilance and pharmacoepidemology
10.	PHARMACOLOGY PRACTICALS-II (MPL205T)	CO 1	Learn and determine the DRC of agonist/antagonist using suitable isolated tissue preparation
		CO 2	Understand and determine the DRC of unknown samples using suitable isolated tissue preparation
		CO 3	Learn and determine BP, heart rate, ECG in rat
		CO 4	Understand and determine oral,dermal,mutagenicity toxicity studies
		CO 5	Learn and determine in-silico docking, pharmacophore,QSAR studies

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THIRD SEMESTER			
11.	RESEARCH METHODOLOGY & BIOSTATISTICS–Theory (MPH 301T)	CO 1	Ability to design research projects and proposals to test the candidate in preclinical and Clinical testing.
		CO 2	To understand the basic principles and guidelines to conduct clinical trials/clinical research.
		CO 3	To establish, understand, functioning, utilization of laboratory animals and facilities as per CPCSEA guidelines.
		CO 4	To understand the basic principles of medical research, necessity and medicinal care as per International guidelines.
		CO 5	To apply proper statistical method for data interpretation and data management to have quality Research outcome.

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PROGRAMME OUTCOMES – PHARM.D

PO Nos.	Program Objectives	Program Outcomes
PO 1	Pharmacy Knowledge	Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.
PO 2	Planning Abilities	Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.
PO 3	Problem analysis	Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate and apply information systematically and shall make defensible decisions.
PO 4	Modern tool usage	Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations
PO 5	Leadership skills	Understand and consider the human reaction to change, motivation issues, leadership and team-building when planning changes required for fulfillment of practice, professional and societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and wellbeing.
PO 6	Professional Identity	Understand, analyze and communicate the value of their professional roles in society (e.g. health care professionals, promoters of health, educators, managers, employers, employees).
PO 7	Pharmaceutical Ethics	Honor personal values and apply ethical principles in professional and social contexts. Demonstrate behavior that recognizes cultural and personal variability in values, communication and lifestyles. Use ethical frameworks; apply ethical principles while making decisions and take responsibility for the outcomes associated with the decisions.
PO 8	Communication	Communicate effectively with the pharmacy community and with society at large, such as, being able to comprehend and write effective reports, make effective presentations and documentation, and give and receive clear instructions.
PO 9	The Pharmacist and society	Apply reasoning informed by the contextual knowledge to assess societal, health, safety and legal issues and the consequent responsibilities relevant to the professional pharmacy practice.
PO 10	Environment and sustainability	Understand the impact of the professional pharmacy solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development

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PO 11	Life-long learning	Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self assess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis

1. COURSE OUTCOMES OF PHARM.D

Sl. No	Course Name With Code	CO Number	Course Outcome
			FIRST YEAR
1.	HUMAN ANATOMY & PHYSIOLOGY – Theory (1.1)	CO 1	Understand the scope of anatomy and physiology, the structure of cells, the elementary tissues of the human body, the osseous system, the classification of joints, and their types and functions in various organ systems like the hemopoetic system, lymphatic and lymphatic systems, and cardiovasucular systems
		CO 2	Learn about structure and functions of various organ system including Respiratory system, Digestive system, Nervous system
		CO 3	Study the anatomy and physiology of the reproductive, endocrine, and urinary systems, among other organ systems.
		CO 4	comprehend the anatomy and physiology of the sense organs
		CO 5	Understand the history, physiological properties of muscle and sports physiology
2.	HUMAN ANATOMY & PHYSIOLOGY – Practical (1.1)	CO 1	Learn about various tissues of human body, appliances used in hematological experiments, hematological tests and also record blood pressure, heart rate, pulse and respiratory volumes
		CO 2	Understand various organ systems with the help of charts, models & specimens
		CO 3	Study the different family planning appliances, pregnancy diagnosis test
		CO 4	Learn about the appliances used in experimental physiology
		CO 5	Understand and determine simple muscle curve , summation curve, effect of load & after load, effect of temperature and fatigue curve using gastrocnemius sciatic nerve preparation

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3.	PHARMACEUTICS - Theory (1.2)	CO 1	Learn the introduction to dosage forms, prescription, posology, historical background, and development of the profession of pharmacy and pharmaceutical industry, the development of Indian Pharmacopoeia, and an introduction to other Pharmacopoeias
		CO 2	Study the Weights, measure and calculations involved in formulations
		CO 3	Know the formulation aspects of different dosage forms like powders and granules, monophasic, biphasic, suppositories and pessaries ,galenicals and Surgical aids
		CO 4	Study the pharmaceutical calculations involved in pharmaceutical formulations
		CO 5	Learn introduction,classification and prevention of incompabilities
4.	PHARMACEUTICS - Practical (1.2)	CO 1	Learn the formulation of various dosage forms such as syrups, elixir, linctus and solutions
		CO 2	Understand the formulation of various dosage forms like Liniments
		CO 3	Learn the formulation of biphasic dosage for such as suspensions and emulsion
		CO 4	Learn the formulation of powders and suppositories
		CO 5	Understand the chemical and physical incompatabilities of dosage forms
5.	MEDICINAL BIOCHEMISTRY- Theory (1.3)	CO 1	Study the introduction to biochemistry, enzymes, carbohydrate metabolism, lipid metabolism
		CO 2	Understand the biological oxidation, protein and amino acid metabolism, nucleic acid metabolism
		CO 3	Learn about the introduction to clinical chemistry of Cell, composition and its malfunction
		CO 4	Know the biochemical principles of organ function tests of kidney, liver and endocrine gland
		CO 5	Understand the immunochemical techniques and electrolytes in body fluids
6.	MEDICINAL BIOCHEMISTRY- Practical (1.3)	CO 1	Understand and determine normal constituents of urine, abnormal constituents of urine, urine sugar, urine chlorides, urine creatinine, urine calcium and serum cholesterol.
		CO 2	Study and determine blood creatine, blood sugar and preparation of Folin Wu filtrate from blood
		CO 3	Understand and determine SGOT in serum, SGPT in serum, urea in Serum, proteins in Serum and serum bilirubin
		CO 4	Understand and determine the glucose by means of glucose oxidase, enzymatic hydrolysis of glycogen/starch by amylases
		CO 5	Learn and determine factors affecting Enzyme activity , preparation of standard buffer solutions and its pH measurements, lipid profile tests and sodium, calcium and potassium in serum

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7.	PHARMACEUTICAL ORGANIC CHEMISTRY - Theory (1.4)	CO 1	Study some important physical properties of organic compounds, nomenclature of organic compound, free radicals chain reactions of alkane and theories and reactions of alicyclic compounds
		CO 2	Understand nucleophilic aliphatic substitution mechanism, dehydro halogenation of alkyl halides, electrophillic and free radicals addition, Carbon-carbon double bond as substituents and theory of resonance
		CO 3	Learn elecrophilic aromatic substitution, nucleophilic addition reaction, nucleophilic aromatic substitution, hoffman rearrangement and various named reactions
		CO 4	Learn about the oxidation reduction reaction of organic compounds
		CO 5	Study the preparation, test for purity, assay and medicinal uses of official compounds
8.	PHARMACEUTICAL ORGANIC CHEMISTRY - Practical (1.4)	CO 1	Introduction to the various laboratory techniques in wet labs
		CO 2	Learn and synthesise the various organic compounds by acetylation, benzoylation, bromination, condensation diazotisation and coupling, hydrolysis, oxidation and reduction
		CO 3	Understand learn systematic analysis of oranic compounds
		CO 4	Study the identification and preparation of derivatives organic compounds
		CO 5	Learn the use of stereo models of hydrocarbons
9.	PHARMACEUTICAL INORGANIC CHEMISTRY- Theory (1.5)	CO 1	Understand the errors, volumetric analysis, acid-base, redox, non-aqueous, precipitation and complexometric titrations
		CO 2	Learn about theory of indicators, gravimetry, limit tests and medicinal gases
		CO 3	Understand the acidifiers, antacids, cathartics and electrolyte replenishers
		CO 4	Understand the essential trace elements, antimicrobials pharmaceutical aids and dental product
		CO 5	Learn about miscellaneous compounds radio Pharmaceuticals
10.	PHARMACEUTICAL INORGANIC CHEMISTRY- Practical (1.5)	CO 1	Understand and determine the various limit tests of inorganic compounds
		CO 2	Learn different assays and mixture used as inorganic compounds
		CO 3	Understand test for identification of Sodium bicarbonate, Barium sulphate, Ferrous sulphate, Potassium chloride.
		CO 4	Understand and determine the test for purity of inorganic compounds
		CO 5	Learn the preparation of Boric acid ,Potash alum, calcium lactate, magnesium suphate

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11.	REMEDIAL MATHEMATICS - Theory (1.6)	CO 1	Learn about the algebra, trigonometry, analytical geometry
		CO 2	Study differential calculus, integral calculus, 6. differential equations, laplace transform
		CO 3	Understand the introduction, general organization of plants and its inclusions, plant tissues, plant kingdom and its classification morphology of plants
		CO 4	Learn about root, stem, leaf and its modifications 7. inflorescence and pollination of flowers 8. morphology of fruits and seeds
		CO 5	Understand Plant physiology ,Taxonomy of various families of plants, Study of Fungi, Yeast, Penicillin and Bacteria
SECOND YEAR			
12.	PATHOPHYSIOLOGY - Theory (2.1)	CO 1	Study about basic principles, types and pathogenesis of cell injury, inflammation and cancer,
		CO 2	Understand the cells and antigens in immunity and about hypersensitivity and autoimmunity.
		CO 3	Understand about types, mechanism and management of shock.
		CO 4	Study about radiations and diseases related to environment and nutrition.
		CO 5	Study about the causes and occurrence of common diseases and infectious diseases.
13.	PHARMACEUTICAL MICROBIOLOGY - Theory (2.2)	CO 1	Understand about microbes, their divisions, and methods of identifying bacteria.
		CO 2	Understand requirements for the growth of bacteria, virus and fungi.
		CO 3	Learn about methods of sterilizing pharmaceutical product and study of disinfectants.
		CO 4	Study about types of immunity, antigens and antibodies and immunization programs.
		CO 5	Learn about infectious diseases, diagnostic tests and microbiological assays.
14.	PHARMACEUTICAL MICROBIOLOGY - Practical (2.2)	CO 1	Learn about media preparation, staining techniques and apparatus used in microbiology.
		CO 2	Understand methods to isolate the pure culture, microbiological assay of antibiotics and vitamins.
		CO 3	Understand ways to perform test for sterility in pharmaceutical dosage form.
		CO 4	Learn about diagnostic tests for certain diseases.
		CO 5	Study identification methods of microorganisms.

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15.	PHARMACOGNOSY & PHYTO PHARMACEUTICALS -Theory (2.3)	CO 1	Study about history and scope of pharmacognosy,
		CO 2	Learn about cultivation, processing, storage and microscopy of crude drugs.
		CO 3	Study about pesticides, oils methods of adulteration in crude drugs.
		CO 4	Learn about carbohydrates and drugs containing carbohydrates.
		CO 5	Understand source, chemistry and analysis of lipids, proteins, fibers used in surgical products.
16.	PHARMACOGNOSY & PHYTO PHARMACEUTICALS - Practical (2.3)	CO 1	Understand about cell and cell inclusions.
		CO 2	Carry out and understand macroscopy and microscopy of crude drugs.
		CO 3	Study about the determination of quantitative characters of oils.
		CO 4	Understand and perform identification tests for acacia, tragacanth and agar.
		CO 5	Understand and perform identification tests for starch, lipid and gelatin.
17.	PHARMACOLOGY – I - Theory (2.4)	CO 1	Study about administration of drugs, Pharmacokinetics, Pharmacodynamics, drug toxicity and drug interactions.
		CO 2	Study about classification, mechanism of action, pharmacokinetics, pharmacodynamics, adverse effects, contraindications, Therapeutic uses, interactions and dose and route of administration of drugs acting on ANS and CVS.
		CO 3	Study about classification, mechanism of action, pharmacokinetics, pharmacodynamics, adverse effects, contraindications, Therapeutic uses, interactions and dose and route of administration of CNS and respiratory tract.
		CO 4	Study about classification, mechanism of action, pharmacokinetics, pharmacodynamics, adverse effects, contraindications, Therapeutic uses, interactions and dose and route of administration of hormones and their antagonists.
		CO 5	Study about classification, mechanism of action, pharmacokinetics, pharmacodynamics, adverse effects, contraindications, Therapeutic uses, interactions and dose and route of administration of autocoids and their antagonists.

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18.	COMMUNITY PHARMACY- Theory (2.5)	CO 1	Study about responsibilities and management of community pharmacist.
		CO 2	Study about parts and legalities of prescription, different inventory control techniques in community pharmacy.
		CO 3	Understand about pharmaceutical care, patient counselling and medication errors.
		CO 4	Study about various health screening services and health education.
		CO 5	Understand about the Over the Counter medications, essential drug concept and code of ethics.
19.	PHARMACO THERAPEUTICS – I - Theory (2.6)	CO 1	Study the causes, drug therapy and management of drugs acting on CVS.
		CO 2	Study about causes, drug therapy and management of drugs acting on Respiratory system.
		CO 3	Learn general prescribing guidelines for special populations.
		CO 4	Study about causes, drug therapy and management of drugs acting on eye.
		CO 5	Understand the role of pharmacist in rational drug use.
20.	PHARMACO THERAPEUTICS –I - Practical (2.6)	CO 1	Understand drug therapy by attending ward rounds in hospital postings.
		CO 2	To present cases of allotted patients.
		CO 3	Learn following up of progress in drug therapy.
		CO 4	Understand recent developments in drug therapy of diseases by submitting written assignments.
		CO 5	Learn the maintenance of records of cases presented.
THIRD YEAR			
21.	PHARMACOLOGY – II - Theory (3.1)	CO 1	Study about mechanism of action, classification, pharmacological action, uses and adverse drug reactions of drugs acting on Blood and blood forming agents
		CO 2	Study about mechanism of action, classification, pharmacological action, uses and adverse drug reactions of drugs acting on Renal system
		CO 3	Study about mechanism of action, classification, pharmacological action, uses and adverse drug reactions of various chemotherapeutic agents and chemotherapy of certain diseases
		CO 4	Study about drugs stimulating and suppressing immunity
		CO 5	Study about different types of animal toxicology
22.	PHARMACOLOGY – II - Practical (3.1)	CO 1	Understand about laboratory animals , laboratory appliances and use of anesthetics in laboratory animals
		CO 2	Learn about various bioassays of acetyl choline
		CO 3	Study about dose response curve
		CO 4	Understand drug administration routes in animals
		CO 5	Learn various activities using animals and laboratory equipment.

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23.	PHARMACEUTICAL ANALYSIS - Theory (3.2)	CO 1	Study about quality control and quality assurance in pharmaceutical laboratories
		CO 2	Study about different chromatographic techniques, their principles, types, methodology and applications
		CO 3	Study about various electro analytical methods like potentiometry, and conductometry
		CO 4	Understand the theory, instrumentation and applications of different spectroscopic techniques.
		CO 5	Study about various electro analytical methods like Polarography and amperometry
24.	PHARMACEUTICAL ANALYSIS - Practical (3.2)	CO 1	Study about separation of mixtures by chromatographic techniques
		CO 2	Learn about UV spectrum of compounds
		CO 3	Study about fluorescence and quenching
		CO 4	Perform assay of compounds by spectroscopic methods
		CO 5	Demonstration of sophisticated analytical techniques
25.	PHARMACO THERAPEUTICS – II-Theory (3.3)	CO 1	Study about various infectious diseases, their causes and management
		CO 2	Understand the cause, drugs used and management of disorders affecting musculoskeletal system
		CO 3	Study about e diseases affecting renal system and their therapy
		CO 4	Understand about cancer and therapy of different types of cancer
		CO 5	Learn about diseases affecting skin and their treatment
26.	PHARMACO THERAPEUTICS – II-Practical (3.3)	CO 1	Understand about drug therapy by attending ward rounds in hospital postings.
		CO 2	Present cases of allotted patients.
		CO 3	Learn following up of progress in drug therapy.
		CO 4	Understand recent developments in drug therapy of diseases by submitting written assignments.
		CO 5	Learn maintenance of records of cases presented.
27.	PHARMACEUTICAL JURISPRUDENCE-Theory (3.4)	CO 1	Understand about laws regarding the profession of pharmacy
		CO 2	Understand the ethics in pharmacy according to PCI
		CO 3	Study about different schedules of drugs and cosmetics and rules and regulations underlying them.
		CO 4	Learn briefly about the rules and regulations of Pharmacy Act and about pharmacy councils.
		CO 5	Study about acts and policies regarding narcotic drugs, cruelty to animals, patents, magic remedies and drug price control.

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28.	MEDICINAL CHEMISTRY- Theory (3.5)	CO 1	Study about designing of drug, prodrug, and concept of antisense molecules.
		CO 2	Study about SAR, mechanism of action, synthesis and brand names of drugs like anti-infective, antimalarial and antineoplastic.
		CO 3	Study about SAR, mechanism of action, synthesis and brand names of drugs like sulphonamides, drugs acting on cardiovascular system and hypoglycemic agents.
		CO 4	Understand the chemistry, mechanism and synthesis of thyroid and antithyroid agents and diuretics.
		CO 5	Study about SAR, mechanism of action, synthesis and brand names of drugs like diagnostic agents and hormonal drugs.
29.	MEDICINAL CHEMISTRY- Practical (3.5)	CO 1	Study about assay of important medicinal drugs.
		CO 2	Learn about preparation of medicinally important compounds.
		CO 3	To analyse monographs of medicinal agents.
		CO 4	Understand and carryout QSAR analysis.
		CO 5	Determination of partition coefficients of compounds.
30.	PHARMACEUTICAL FORMULATIONS - Theory (3.6)	CO 1	Understand the concept of pharmaceutical dosage forms.
		CO 2	Study about formulation, excipients, evaluation and quality control of tablets and capsules.
		CO 3	Study about formulation, evaluation and stability of liquid dosage forms.
		CO 4	Learn about parenterals, their formulation and methods of sterilization.
		CO 5	Learn about different types of ophthalmic preparations, suppositories, and novel drug delivery system.
31.	PHARMACEUTICAL FORMULATIONS - Practical (3.6)	CO 1	Understand about manufacturing of different types of tablets and preparation of cosmetics.
		CO 2	Learn about manufacturing of certain injectable preparations.
		CO 3	Study about formulation and evaluation of semisolid dosage form and liquid oral preparations.
		CO 4	Understand the quality control test for pharmaceutical dosage forms.
		CO 5	Understand about filling of capsules and coating of tablets.

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FOURTH YEAR			
32.	PHARMACO THERAPEUTICS – III- Theory (4.1)	CO 1	Understand the pathophysiology and pharmacotherapy of gastrointestinal system
		CO 2	Learn the pathophysiology and pharmacotherapy of haematological system
		CO 3	Study the pathophysiology and pharmacotherapy of nervous system
		CO 4	Learn the pathophysiology and pharmacotherapy ofpsychiatry disorders
		CO 5	Understand the pain management including pain pathways, neuralgias, headaches and evidence based medicine
33.	HOSPITAL PHARMACY- Theory (4.2)	CO 1	Understand basic knowledge of hospital organisation
		CO 2	Learn the hospital pharmacy, its organisation and management
		CO 3	Understand the importance the budget preparation and implementation
		CO 4	Study the importance of hospital drug policy, hospital pharmacy services
		CO 5	Learn about the Manufacture of Pharmaceutical preparations, Radio Pharmaceuticals – Handling and packaging, Professional Relations and practices of hospital pharmacist and Education and training
34.	HOSPITAL PHARMACY- Practical (4.2)	CO 1	Learn and design the management of hospital pharmacy department for a 300 bedded hospital patients
		CO 2	Understand the pharmacy and therapeutics committee organization, functions, and limitations in hospital
		CO 3	Study development of a hospital formulary for 300 bedded teaching hospital
		CO 4	Preparation of ABC analysis of drugs sold in one month from the pharmacy and different phases of clinical trials with elements to be evaluated
		CO 5	Learn the various sources of drug information and systematic approach to provide unbiased drug information and evaluation of prescriptions generated in hospital for drug interactions and find out the suitable management
35.	CLINICAL PHARMACY- Theory (4.3)	CO 1	Learn about the definitions, development and scope of clinical pharmacy
		CO 2	Study the introduction to daily activities of a clinical pharmacist, patient data analysis, clinical laboratory tests used in the evaluation of disease states, and interpretation of test results
		CO 3	Understand the drug & poison information, pharmacovigilance
		CO 4	Study the communication skills, including patient counselling techniques, medication history interview, presentation of cases
		CO 5	Understand the pharmaceutical care concepts, critical evaluation of biomedical literature and medication errors

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36.	CLINICAL PHARMACY-Practical (4.3)	CO 1	Learn and perform answering the drug information questions
		CO 2	To perform the patient medication counselling
		CO 3	Learn and develop the case studies related to laboratory investigations
		CO 4	To perform patient medication history interview
37.	BIOSTATISTICS AND RESEARCH METHODOLOGY-Theory (4.4)	CO 1	Study the basic aspects of research methodology, types of clinical study designs, designing the methodology, sample size determination and power of a study and report writing and presentation of data
		CO 2	Learn the basic aspects of biostatistics such as introduction, types of data distribution , measures describing the central tendency distributions and measurement ofthe spread of data
		CO 3	Learn Data graphics, Basics of testing hypothesis
		CO 4	Understand the Statistical methods in epidemiology
		CO 5	Study the computer system in hospital pharmacy, community pharmacy and drug information retrieval & storage
38.	BIO-PHARMACEUTICS AND PHARMACOKINETICS- Theory (4.5)	CO 1	Study the introduction to biopharmaceutics
		CO 2	Understand introduction to pharmacokinetics
		CO 3	Study the one compartment open model, multicompartment models, multiple dosage regimens
		CO 4	Learn the nonlinear pharmacokinetics, noncompartmental pharmacokinetics
		CO 5	Learn the bioavailability and bioequivalence
39.	BIO-PHARMACEUTICS AND PHARMACOKINETICS- Practical (4.5)	CO 1	Study and determine the improvement of dissolution characteristics of slightly soluble drugs and comparison of dissolution studies of two different marketed products of same drug by different methods
		CO 2	Learn and perform the extent of plasma-protein binding, highly protein bound drug and poorly protein bound drug
		CO 3	Understand and perform the bioavailability studies of some commonly used drugs on animal/human model, calculation of ka, ke, t1/2, cmax, auc, aumc, mrt etc. from blood profile and urinary excretion datas for two drugs, calculation of AUC and bioequivalence from the given data for two drugs
		CO 4	Learn and determine the bioequivalency studies on the different drugs marketed such as Tetracycline, Sulphamethoxazole, Trimethoprim, aspirin on animals and human volunteers, absorption studies in animal inverted intestine using various drugs,
		CO 5	Study effect on contact time on the plasma protein binding of drugs, metabolic pathways for different drugs based on elimination kinetics data, calculation of elimination half-life,and renal clearance for different drugs by using urinary elimination data and blood level data

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40.	CLINICAL TOXICOLOGY-Theory (4.6)	CO 1	Learn general principles involved in the management of poisoning, antidotes and the clinical applications, supportive care in clinical toxicology and gut decontamination
		CO 2	Study the elimination enhancement and toxicokinetics
		CO 3	Learn the clinical symptoms and management of acute poisoning of various therapeutic agents
		CO 4	Understand the clinical symptoms and management of chronic poisoning of metals, plants poisoning,food poisoning and envenomations
		CO 5	Study the signs and symptoms of substance abuse and treatment of dependence
FIFTH YEAR			
41.	CLINICAL RESEARCH-Theory (5.1)	CO 1	Learn drug development process, various approaches to drug discovery such aspharmacological, toxicological IND application, drug characterization dosage form
		CO 2	Understand the overview of regulatory environment in USA, Europe and India and role and responsibilities of clinical trial personnel as per ICH GCP
		CO 3	Study the designing of clinical study documents such as protocol, CRF, ICF, PIC
		CO 4	Learn about informed consent processand data management and its component
		CO 5	Study the basic concept of safety monitoring in clinical trials
42.	PHARMACO EPIDEMIOLOGY AND PHARMACO ECONOMICS-Theory (5.2)	CO 1	Learn the definition, scope, measurement of outcomes, concept of risk and methodsin pharmacoepidemiology
		CO 2	Study the sources of data and selected special applications of pharmacoepidemiology
		CO 3	Learn the definition, history, needs of pharmacoeconomic evaluations
		CO 4	Understand the importance and types ofpharmacoeconomic evaluation
		CO 5	Learn the applications of Pharmacoeconomics such as softwares and case studies
43.	CLINICAL PHARMACO KINETICS AND PHARMACO THERAPEUTIC DRUG MONITORING - Theory (5.3)	CO 1	Understand the introduction to clinical pharmacokinetics,design of dosage regimens
		CO 2	Learn about pharmacokinetics of drug Interaction
		CO 3	Study detailed information of therapeutic drug monitoring
		CO 4	Learn about dosage adjustment in renal and hepatic Disease
		CO 5	Understand the basic knowledge of cell culture techniques, application and biosimilars

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