

# **Dr. Rajendra Gode College of Pharmacy, Malkapur**

## **Criterion II- Teaching Learning and Evaluation**

### **2.6.1 Programme Educational Objectives (PEOs), Programme Outcomes (POs), Course Outcomes (Cos)**

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#### **PROGRAM EDUCATIONAL OBJECTIVES (PEOs)**

##### **PEO\_01:**

To provide student graduates with solid foundation in Pharmacy knowledge which includes - possessing basic knowledge and comprehensive understanding of Profession of Pharmacy.

##### **PEO\_02:**

To prepare student graduates for a successful career in Pharmacy Profession with effective planning skills, problem analyzing skills, leadership skills, research skills, presentation skills, communication skills and professional ethics.

##### **PEO\_03:**

To train student graduates in learning, selecting, and applying appropriate methods, procedures and resources of modern tools in Pharmacy Profession.

##### **PEO\_04:**

To inculcate in student graduates, ability to gain multidisciplinary knowledge through innovative projects, industrial training, industrial visits, visiting research institutions, health care communities, health promoters, employees and employers.

##### **PEO\_05:**

To develop professional identity, understanding need of life-long learning, sustainable development in student graduates.

## PROGRAM OUTCOMES (POs)

- 1. Pharmacy Knowledge:** Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioural, social, and administrative pharmacy sciences; and manufacturing practices.
- 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.
- 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.
- 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.
- 5. Leadership skills:** Understand and consider the human reaction to change, motivation issues, leadership and team-building when planning changes required for fulfilment of practice, professional and societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and wellbeing.
- 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).
- 7. Pharmaceutical Ethics:** Honour personal values and apply ethical principles in professional and social contexts. Demonstrate behaviour 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.
- 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.

**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.

**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.

**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

### B. Pharmacy I Year

Sr. No.	Course Name with Code	CO No.	Course Outcomes
<b>SEMESTER I</b>			
01	Human Anatomy and Physiology-I (BP101T)	CO1	Understand basic knowledge about cell and tissue of the body.
		CO2	Understand anatomy and physiology of skin.
		CO3	Understand how our body skeleton is made and its complexity with physiology.
		CO4	Understand components of haemopoietic system and its significance in body and its relation to diseases
		CO5	Get concept related to peripheral nervous system and its functioning
		CO6	Understand anatomy and physiology of cardiovascular system and get aware about diseases occurs in it.
02	Human Anatomy and Physiology-I (BP107 P)	CO1	Students would have studied about the gross morphology, structure and functions of cell, skeletal, muscular, cardiovascular system of the human body.
		CO2	They would have understood the various homeostatic mechanisms and their imbalances.
		CO3	Students would able to identify the different types of bones in human body.
		CO4	Students would be able to identify the various tissues of different systems of human body.
		CO5	Students would learn about the various experimental techniques related to physiology.
		CO6	They would have learnt various techniques like blood group determination, blood pressure measurement, and blood cells counting
03	Pharmaceutical Analysis I (BP102T)	CO1	Understand knowledge about basic definitions of analysis, sources of impurities in medicines, errors occur during analytical work.
		CO2	Understand the concept of titration and also get knowledge related to acid, bases, buffers and PH Scale.
		CO3	Understand the concept of solubility, precipitation and complex formation during titration and role of various indicator.
		CO4	Understand the purity of analytic along with conc and composition of substance by the concept of gravimetric and assay method.
		CO5	Able to think regarding chemical process occurs during diazotization and redox titration.
		CO6	Understand the electric and chemical properties of substance by knowing the concept of conductivity, polarography, and potentiometry.

04	Pharmaceutical Analysis I (BP108 P)	CO1	Understand knowledge about basic definitions of analysis, sources of impurities in medicines, errors occur during analytical work.
		CO2	Understand the concept of titration and also get knowledge related to acid, bases, buffers and pH Scale.
		CO3	Understand the concept of solubility, precipitation and complex formation during titration and role of various indicator.
		CO4	Understand the purity of analytic along with conc. and composition of substance by the concept of gravimetric and assay method.
		CO5	Able to think regarding chemical process occurs during diazotization and redox titration.
		CO6	Understand the electric and chemical properties of substance by knowing the concept of conductivity, polarography, and potentiometric.
05	Pharmaceutics-I (BP103T)	CO1	Know the history of profession of pharmacy.
		CO2	Understand the basics of different dosage forms, pharmaceutical incompatibilities and pharmaceutical calculations.
		CO3	Understand the professional way of handling the prescription.
		CO4	Preparation of various conventional dosage forms.
		CO5	Understand the details about suppository dosage form and Different types of pharmaceutical incompatibilities.
		CO6	Understand the different semisolid dosage form.
06	Pharmaceutics-I (BP1096 P)	CO1	Understand the method of preparation of different Powders.
		CO2	Understand the method of preparation of Granules.
		CO3	Understand the method of preparation of different Monophasic liquid dosage form.
		CO4	Understand the method of preparation of different Bi-Phasic liquid dosage form.
		CO5	Understand the method of preparation of different Semisolid Preparations like ointment gels.
		CO6	Understand the method of preparation of different Suppository.
07	Pharmaceutical Inorganic Chemistry (BP104T)	CO1	Explain the sources of impurities and methods to determine the impurities in inorganic pharmaceuticals.
		CO2	Explain the method of preparation, assay, properties, and medicinal uses of acids, bases, buffers, extra and intracellular.
		CO3	Explain the method of preparation, assay, properties, and medicinal uses of dental.
		CO4	Explain the method of preparation, assay, properties, and medicinal uses of acidifiers, antacids and cathartics.
		CO5	Explain the method of preparation, assay, properties, and medicinal uses of antimicrobials.
		CO6	Explain the method of preparation, assay, properties, and medicinal uses of expectorants, emetics and haematinics.

08	Pharmaceutical Inorganic Chemistry (BP110 P)	CO1	Understand practically how can detect and control pharmaceutical impurities.
		CO2	Able to prepare and identify the inorganic pharmaceuticals with predefined procedures.
		CO3	Able to assemble the apparatus and equipment necessary for the practical.
		CO4	Understand the safety procedures for the handling of hazardous chemicals by using protective tools.
		CO5	Able to correlate the theoretical and practical knowledge through lab work.
		CO6	Understand the importance of inorganic pharmaceuticals in preventing and curing the disease.
09	Communication Skills (BP105T)	CO1	Understand the behavioural needs for a pharmacist to function effectively in the areas of pharmaceutical operations.
		CO2	Communicate effectively (verbal and non-verbal).
		CO3	Effectively manage the team as team player.
		CO4	Develop interview skills.
		CO5	Develop leadership qualities and essentials.
		CO6	Developed good communication skills.
10	Remedial Biology (BP106TP)	CO1	Know the classification and silent feature of five kingdom of life.
		CO2	Understand the basic component of anatomy and physiology of plants.
		CO3	Understand the basic components of anatomy and physiology of animal with special reference to human.
		CO4	Understand the essential minerals with nitrogen cycle.
		CO5	Understand the different process followed in plants like photosynthesis and glycolysis.
		CO6	Understand cell and different cell organelles.
11	Remedial Mathematics (BP107TT)	CO1	Students shall be able to understand the role of mathematics in pharmacy.
		CO2	Students shall be able to relate the mathematical tools in the wide professional views and solve problems of trigonometry, calculus and matrices.
		CO3	Students shall be able to solve the different types of problems by applying theory.
		CO4	Students shall be able to adopt both conventional and creative techniques to the solutions of mathematical problems.
		CO5	Students shall be able to apply the range of techniques.
		CO6	Effectively to solve problems including theory deduction, approximation and simulation.

Sr. No.	Course Name with Code	CO No.	Course Outcomes
<b>SEMESTER II</b>			
12	Human Anatomy and Physiology-II (BP201T)	CO1	Understand morphology, anatomy and functioning of nervous system of the body.
		CO2	Determine importance of digestive system in body and understands how digestion occurs.
		CO3	Understand how human need of oxygen fulfills and by which mechanism it happened.
		CO4	Know about the significance of urinary system in body and understands how it works.
		CO5	Gain knowledge about hormones, its origin and their importance in controlling various functions of the body.
		CO6	Acquire knowledge about anatomy and physiology of reproductive systems of both sexes and understand how reproduction occurs.
13	Human Anatomy and Physiology-II BP207P)	CO1	Explain anatomy and physiology different systems include integumentary, sense organs, nervous, endocrine, digestive, respiratory, cardiovascular systems, urinary and reproductive using specimen, models, etc.
		CO2	Demonstrate the general neurological examination and function of olfactory nerve, positive and negative feedback mechanism.
		CO3	Describe to examine the different types of taste, visual acuity and reflex activity
		CO4	Expertise to recording of body temperature basal mass index and family planning devices and pregnancy diagnosis test.
		CO5	Gain knowledge about tidal volume and vital capacity demonstration and calculation.
		CO6	Acquire knowledge about Demonstration of total blood count by cell analyzer and Permanent slides of vital organs and gonads.
15	Pharmaceutical Organic Chemistry I (BP202T)	CO1	Understand the basics and scope of organic chemistry in pharmacy
		CO2	Able to write the structure, IUPAC naming of organic compounds.
		CO3	Understand types of chemical compounds, types of isomerism of the organic compound.
		CO4	Know about the orientation
		CO5	Gain knowledge about hormones, its origin and their importance in controlling various functions of the body.
		CO6	Acquire knowledge about anatomy and physiology of reproductive systems of both sexes and understand how reproduction occurs.
15		CO1	Understand the scope of Biochemistry in pharmacy

	Biochemistry (BP203T)	CO2	Understand role of biochemical processes and cell metabolism.
		CO3	Understand general metabolism process of proteins, lipids, carbohydrates.
		CO4	Understand basics like chemistry, function, classification, biological importance, qualitative tests & applications of various biomolecules.
		CO5	Understand the enzyme structures, their functions, mechanism for enzymatic activity and applications of enzymes.
		CO6	Understand the genetic organization of mammalian genome and functions of DNA in the synthesis of RNAs and proteins.
16	Biochemistry (BP209 P)	CO1	Understand the scope of Biochemistry in pharmacy.
		CO2	Understand the qualitative test for Biomolecules.
		CO3	Understand the scope of determination of glucose, total cholesterol, and creatinine in the blood.
		CO4	Understand the enzyme structures, their functions, mechanism for enzymatic activity and applications of enzymes.
		CO5	Understand the Quantitative analysis of reducing sugar and protein.
		CO6	Understand the preparation of various Physiological buffers and their application.
17	Pathophysiology (BP204T)	CO1	Distinguish environmental factors, physical, psychosocial, cognitive and various stressors that affect disease and conditions.
		CO2	Name the signs and symptoms of the diseases.
		CO3	Describe the mechanisms the body uses to react to stressors and pathogens.
		CO4	Demonstrate a basic understanding of the concepts, principles and elements of disease.
		CO5	Identify the risk factors, etiology, pathophysiology, clinical manifestations, and diagnostic tests related to diseases and conditions.
		CO6	Mention the complications of the diseases.
18	Computer Application in Pharmacy (BP205T)	CO1	Learn about the binary system and its conversion.
		CO2	Learn about the binary system and its conversion.
		CO3	Know the various applications of databases in pharmacy.
		CO4	Know the various types of applications of computer in pharmacy.
		CO5	Studies about various departments like hospital pharmacy, clinical pharmacy, patient monitoring, diagnostic system.
		CO6	Design and develop solutions to analyse pharmaceutical problems using computers.
19	Computer Application in Pharmacy	CO1	Learn about HTML web page.
		CO2	Create database using MS Access.
		CO3	Learn about create, delete, modify database.



	(BP210P)	CO4	Learn about information retrieval of storage drug information using online tools.
		CO5	Able to design a form in MS access and record patient data.
		CO6	Able to use online software for the information of a drug and its adverse effects.
20	Environmental Sciences (BP206T)	CO1	Know the component, multidisciplinary nature, Importance, scope of environmental studies and methods to create public awareness.
		CO2	Understand the Natural resources, their types and associated problem (forest, Water, minerals, food, energy like renewable and non-renewable, land resources) and role of individual in conservation of natural resources.
		CO3	Understand the concept of eco system, energy cycle, food chain and food web.
		CO4	Understand the types, structure and function and conservation of grassland eco system, Desert eco system and aquatic eco system.
		CO5	Understand the details about pollution, pollutant sources, consequences and control air pollution, water pollution, solid pollution.
		CO6	Understand the details about Solid waste management, role of an individual in the prevention of pollution.

## B. Pharmacy II Year

Sr. No.	Course Name with Code	CO No.	Course Outcomes
<b>SEMESTER III</b>			
21	Pharmaceutical Organic Chemistry-II(BP301T)	CO1	Understand the scope of organic chemistry in pharmacy.
		CO2	Understand types of chemical compounds, structure, their nature, properties of organic compounds.
		CO3	Understand general synthesis process of various chemical compound.
		CO4	Understand basics like chemistry, Methods of preparation, classification, synthetics importance qualitative tests & applications of various organic compounds.
		CO5	Understand the structures, their nomenclature, and mechanism of various chemical reactions of organic compounds.
		CO6	Understand the various theories proposed, principle, evaluation and significance of their study.
22	Pharmaceutical Organic Chemistry-II	CO1	To evaluate the quality of fats and oils by determining acid value, saponification value, and iodine value as per pharmacopeia.

	(BP305P)	CO2	To synthesize the various organic compounds and understands the reaction mechanism involved in the synthesis.
		CO3	Calculate the percentage yields of the products obtained by synthesis.
		CO4	To evaluate the synthesized compounds for elements detection and also able to carry out physical constant determination.
		CO5	Purify organic compounds using various procedures like recrystallization and steam distillation.
		CO6	Apply recrystallization and steam distillation methods for the purification of synthesized organic compounds.
23	Physical Pharmaceutics- I (BP302T)	CO1	Understand various physicochemical properties of drug molecules in the designing the dosage forms.
		CO2	Know the phenomenon of solubility and its application.
		CO3	Understand various states of matter along with their physical properties.
		CO4	Understand surface and interfacial phenomena and its application.
		CO5	Know various types of complexation.
		CO6	Demonstrate use of physicochemical properties in the formulation development and evaluation of dosage forms.
24	Physical Pharmaceutics- BP306P)	CO1	Determination of the solubility, Partition co- efficient of benzoic acid in benzene, Iodine in carbon tetrachloride and water.
		CO2	Determination of % composition of NaCl in a solution using phenol-water system by CST method.
		CO3	Determination of surface tension by drop count and drop weight method, HLB number of a surfactant by saponification method.
		CO4	Determination of Freundlich and Langmuir constants
		CO5	Determination of critical micellar concentration of surfactants.
		CO6	Determination of stability constant and donor acceptor ratio of Cupric-Glycine complex by ph titration method.
25	Pharmaceutical Microbiology (BP303T)	CO1	Understand morphology, reproduction and growth, methods of identification, cultivation and preservation of various microorganisms and their roles in pharmacy.
		CO2	Understand the importance and implementation of sterilization and disinfection in pharmaceutical processing and industry.
		CO3	Learn sterility testing of pharmaceutical products and its significance.
		CO4	Understand the microbial spoilage, its causes, types, assessment; preservation of products.
		CO5	Carry out microbiological standardization of Pharmaceuticals.
		CO6	Understand the cell culture technology and its applications in pharmaceutical industries.
26	Pharmaceutical Microbiology	CO1	Understand principles and working of different equipments and instruments e.g. B.O.D. incubator,

	(BP307P)		laminar flow, aseptic hood, autoclave, hot air sterilizer, deep freezer, refrigerator, microscopes used in experimental microbiology.
		CO2	Perform Sterilization of glassware, preparation and sterilization of nutrient media.
		CO3	Isolate and observe pure culture of micro-organisms obtained by multiple streak plate techniques and other techniques.
		CO4	Understand and perform staining methods- Simple, Gram's, Negative staining etc for identification of microorganisms.
		CO5	Perform and interpret microbiological assay of antibiotics by cup plate method and other methods.
		CO6	Perform sterility testing of pharmaceuticals and interpret the results.
27	Pharmaceutical Engineering (BP304T)	CO1	Know about various unit process and unit operation in pharmaceutical industries
		CO2	Understand about different process involved in manufacturing of dosage form (heat transfer, flow nature of fluid).
		CO3	Know about different basic principle and laws, theory of various unit operation.
		CO4	Understand about the principle construction, working, uses advantages and disadvantages of various equipment used in pharmaceutical industries.
		CO5	.Understand the plant layout and material handling system in pharmaceutical industries.
		CO6	Know about concept of corrosion and their preventive measures.
28	Pharmaceutical Engineering (BP308P)	CO1	Know about application of pharmaceutical engineering in pharmaceutical industries.
		CO2	Know about demonstration of practical related to crystallization.
		CO3	Understand about relationship between various factor effecting on different unit operation like evaporation, filtration.
		CO4	Understand and demonstrate practical on the basis of drying, size separation, and distillation.
		CO5	Understand the practical on material handling system in pharmaceutical industries like measurement of flow.
		CO6	Demonstrate practical about various equipment used in pharmaceutical industries.

Sr. No.	Course Name with Code	CO No.	Course Outcomes
<b>SEMESTER IV</b>			
29	Pharmaceutical Organic Chemistry-III (BP401T)	CO1	Understand about basic concepts isomerism.
		CO2	Understand about structural, geometrical isomerism, conformational isomerism, optical activity, nomenclature of organic compounds.
		CO3	Understand about isomerism in alkane's and cycloalkanes
		CO4	Understand the concept of heterocyclic compounds their nomenclature, methods of preparation, reaction mechanisms of various types and medicinal uses.
		CO5	Understand the concept of heterocyclic chemistry and its application in medicinal chemistry.
		CO6	Understand about different types of chemical agents and important synthetic reactions, with their mechanisms of different types of reactions.
30	Medicinal Chemistry-I (BP402T)	CO1	Understand basic knowledge about the history & development medicinal chemistry and physicochemical properties and drug metabolism.
		CO2	Understand basic knowledge about the structure, chemistry and therapeutic value of drug acting on autonomous nervous system.
		CO3	Understand the chemistry of drugs with respect to their pharmacological activity of par sympathomimetic agent.
		CO4	Understand the chemistry of drugs with respect to their pharmacological activity and Structural Activity Relationship (SAR) of drug acting on central nervous system.
		CO5	Understand the chemistry of drugs with respect to their pharmacological activity, drug metabolic pathways of General anaesthetics agent.
		CO6	Understand the Structural Activity Relationship (SAR) of drug, metabolic pathways, adverse effect and therapeutic value and chemical synthesis of Narcotic and non-narcotic analgesics.
31	Medicinal Chemistry-I (BP406P)	CO1	Preparation of drugs/ intermediates e.g. 1,3-pyrazole, 1,3-oxazole, Benzimidazole & Benzotriazole.
		CO2	Preparation of drugs/ intermediates e.g. 2,3-diphenyl quinoxaline, Benzocaine, Phenytoin, Phenothiazine & Barbiturate.
		CO3	Perform assay of drugs like Chlorpromazine, Phenobarbital.
		CO4	Perform assay of drugs like. Atropine, Ibuprofen.
		CO5	Perform assay of drugs like. Aspirin, Furosemide.
		CO6	Understand Determination of Partition coefficient for drugs.
32		CO1	Understand various physicochemical properties of drug molecules in the designing the dosage forms.

	Physical Pharmaceutics- II (BP403T)	CO2	Understand various types of dispersions and their uses in pharmacy.
		CO3	Know the types of flow of liquid and their application.
		CO4	Understand various methods used to measure particle size of powders.
		CO5	Know the principles of chemical kinetics & to use them for stability testing and determination of expiry date of formulations.
		CO6	Demonstrate use of physicochemical properties in the formulation development and evaluation of dosage forms.
33	Physical Pharmaceutics- II (BP407P)	CO1	Determination of particle size, particle size distribution using sieving method, Microscopic method for the given samples.
		CO2	Determination of bulk density, true density, porosity and angle of repose for the powder samples.
		CO3	Determination of viscosity of liquids using Ostwald's viscometer.
		CO4	Determination of sedimentation volume with effect of different concentration of single suspending agents.
		CO5	Determination of sedimentation volume with effect of different suspending agent.
		CO6	Determination of reaction rate constant first order, Second order.
34	Pharmacology- I (BP404T)	CO1	Understand basic knowledge of pharmacokinetics.
		CO2	Understand the pharmacodynamics and drug receptor interaction.
		CO3	Understand drug acting on peripheral nervous system & function.
		CO4	Understand drug acting on central nervous system and mechanism of action.
		CO5	Learning psycho pharmacological drugs & mechanism of action.
		CO6	Understand general anesthetics and pre-anaesthetics.
35	Pharmacology- I (BP408P)	CO1	Handling and restraining of various laboratory animals.
		CO2	To understand the route of drug administration.
		CO3	To understand the guidelines for maintenance of animals, various equipment and apparatus.
		CO4	To observe the effect of drug on animals by simulated experiments.
		CO5	To appreciate correlation of pharmacology with other bio medical sciences.
		CO6	To appreciate correlation of pharmacology with other bio medical sciences.
36	Pharmacognosy and Phytochemistry -I (BP405T)	CO1	Understand sources of drug from various natural sources.
		CO2	Understand about plant taxonomy and cultivation, Collection, Processing, and storage of crude drugs.
		CO3	Understand about plant taxonomy and cultivation, Collection, Processing, and storage of crude drugs.
		CO4	Know the evaluation technique of herbal drugs.
		CO5	Understand carry out the microscopic and morphological evaluation of crude drugs.

		CO6	Understand the plant tissue culture.
37	Pharmacognosy and Phytochemistry-I (BP409P)	CO1	Understand principles and working of different equipments and instruments e.g. B.O.D. incubator, laminar flow, aseptic hood, autoclave, hot air sterilizer, deep freezer, refrigerator, microscopes used in experimental microbiology.
		CO2	Perform Sterilization of glassware, preparation and sterilization of nutrient media.
		CO3	Isolate and observe pure culture of micro-organisms obtained by multiple streak plate techniques and other techniques.
		CO4	Understand and perform staining methods- Simple, Gram's, Negative staining etc for identification of microorganisms.
		CO5	Perform and interpret microbiological assay of antibiotics by cup plate method and other methods.
		CO6	Perform sterility testing of pharmaceuticals and interpret the results.

### B. Pharmacy III Year

Sr. No.	Course Name with Code	CO No.	Course Outcomes
<b>SEMESTER V</b>			
38	Medicinal Chemistry-II (BP501T)	CO1	Understand the chemistry of drugs with respect to their pharmacological activity.
		CO2	Understand the drug metabolic pathways, adverse effect and therapeutic value of Drugs.
		CO3	Know the Structural Activity Relationship of different class of drugs.
		CO4	Study the chemical synthesis of selected drugs.
		CO5	Depict synthetic routes of important medicinal agents.
		CO6	Importance of physicochemical properties and metabolism of drugs.
39	Industrial Pharmacy-I (BP502T)	CO1	Importance of preformulation of drugs, excipients and their role in formulation design.
		CO2	Knowledge on tablet and liquid dosage forms and their processing problem and QC checking.
		CO3	Knowledge on capsules production and pellets with QC tests.
		CO4	Knowledge on sterile preparation and their QC evaluation.
		CO5	Knowledge on formulating various cosmetic products.
		CO6	Knowledge on different types of packaging material.

40	Industrial Pharmacy I (BP506P)	CO1	Carry out assessment of physicochemical properties of drugs as a tool in the optimization of solid and liquid dosage forms.
		CO2	Formulate and prepare tablets, capsules and liquid orals using established procedures and technology.
		CO3	Formulate and prepare different types of parenteral and ophthalmic dosage form.
		CO4	Select ingredients and formulate cosmetics such as lipsticks, shampoos, cold cream and vanishing cream, tooth pastes, hair dyes and sunscreens.
		CO5	Identify containers, closures, valves and propellants for different types of aerosol systems.
		CO6	Select and evaluate appropriate packaging materials for various pharmaceutical dosage forms.
41	Pharmacology II (BP503T)	CO1	Explain the pharmacology of drug acting on cardiovascular system.
		CO2	Discuss the drug acting on urinary system.
		CO3	Explain the pharmacology of drugs acting on endocrine systems.
		CO4	Recognize adverse drug reactions and drug interactions.
		CO5	Describe the principles, applications and types of bioassay.
		CO6	Discuss drug mechanisms and their relevance in the treatment of diseases.
42	Pharmacology II (BP507P)	CO1	Choose physiological salt solutions for isolated tissue preparations.
		CO2	They would have observed the effect of drugs on animals by simulated experiments.
		CO3	They would have observed the various receptor actions using isolated tissue preparation.
		CO4	Interpret the effect of spasmogens and spasmolytics on suitable tissue preparations.
		CO5	Using bioassay methods.
		CO6	Determine $pD_2$ value.
43	Pharmacognosy and Phytochemistry-II (BP504T)	CO1	Understand metabolic pathway and their biogenetic studies.
		CO2	Understand pharmacognostic studies of secondary metabolites like alkaloids, glycosides, tannin, volatile oil etc.
		CO3	Understand isolation, identification and analysis method of phyto constituents.
		CO4	Understand industrial production, their estimation and utilization of phyto constituents.
		CO5	Understand modern techniques of extraction.
		CO6	Know latest technique for analysis of phyto constituents.
44	Pharmacognosy and Phytochemistry-II (BP508P)	CO1	Understand the morphological, microscopically, histological and powder characteristics of crude drugs.
		CO2	Learn about extraction and detection of crude drug.
		CO3	Know the isolation of phyto-constituents.
		CO4	Understand chromatographic techniques.



		CO5	Understand hydro distillation method for isolation of oil from crude drug.
		CO6	Understand analysis of crude drug by chemical test.
45	Pharmaceutical Jurisprudence (BP505T)	CO1	Understand legal definitions of the drug and cosmetic act, 1940 and its rule 1945, schedule, regulatory authorities and agencies governing the manufacture, sale, and import of pharmaceuticals.
		CO2	Students shall be able to access the standard of educational regulations, composition, and functions of various regulatory authorities, committees, and agencies.
		CO3	To understand various act and rules regulating profession and practice of pharmacy in India.
		CO4	To understand pharmaceutical legislation, history, evolution, and growth of the pharmaceutical industry
		CO5	5Students shall be able to implement the code of ethics in their professional activities in pharmacy.
		CO6	Understand Intellectual property rights, the procedure for patent application, and regulatory authorities.

Sr. No.	Course Name with Code	CO No.	Course Outcomes
<b>SEMESTER VI</b>			
46	Medicinal Chemistry-III (BP601T)	CO1	Understand the importance of drug design and different techniques of drug design.
		CO2	Understand the chemistry of drugs with respect to their biological activity.
		CO3	Know metabolism, adverse effects and therapeutic values of drugs.
		CO4	Know the importance of SAR of drugs.
		CO5	Know the Drug design.
		CO6	Effect of structural modification of drug in disease condition.
47	Medicinal Chemistry-III (BP607P)	CO1	Upon completion of the course student shall be able to: Know different grade chemicals, apparatus used in synthetic laboratory and basic unit operations carried out in synthetic laboratory.
		CO2	Carry out synthesis of chemical compounds based on simple chemical reactions.
		CO3	Perform assays of drugs and determination of some physicochemical properties.
		CO4	Know the use of microwave ovens for synthesis of chemical compounds.
		CO5	Know different softwares used for drawing structures of chemical compounds.
48	Pharmacology III (BP602T)	CO1	To appreciate correlation of pharmacology with medical sciences of respiratory and GIT.



		CO2	To comprehend various principles of toxicology as well as chrono-pharmacology.
		CO3	To categorize immune pharmacology as immune-stimulants and immunosuppressant.
		CO4	To explain the chemotherapy of antibiotics.
		CO5	To understand the mechanism of drug action and its relevance in the treatment of different infectious diseases.
		CO6	To assess the chemotherapy of UTI, STDs and malignancy.
49	Pharmacology III (BP608P)	CO1	Dose calculation in pharmacological experiments and ant allergic activity.
		CO2	Study of anti-ulcer activity of a drug and effect of drugs on gastrointestinal motility.
		CO3	Effect of agonist and antagonists and Estimation of serum biochemical parameters.
		CO4	Effect of saline purgative on frog intestine and Insulin hypoglycaemic effect in rabbit.
		CO5	Determination of acute oral toxicity (LD50).
		CO6	Determination of acute skin irritation/eye irritation and Biostatistics methods in experimental pharmacology.
50	Herbal Drug Technology (BP603T)	CO1	Understand raw material as a source of herbal drug from cultivation to the herbal drug product.
		CO2	Understand Indian System of Medicine And preparation and standardization of ayurvedic formulation.
		CO3	Understand herbal cosmetics, natural sweeteners and nutraceuticals.
		CO4	Understand evaluation of drug , patenting and regulatory issues
		CO5	Understand herbal drug industry and GMP.
		CO6	Know the WHO and ICH guidelines for evaluation of herbal drugs. Understand the basic concepts in Biopharmaceutics, Absorption, Distribution, Metabolism, Excretion; and factors affecting these processes.
51	Herbal Drug Technology (BP609P)	CO1	Understand preliminary phytochemical screening of crude drugs.
		CO2	Understand evaluation of herbal excipients
		CO3	Understand preparation and standardization of herbal formulation as per Pharmacopoeia requirement.
		CO4	Understand monograph analysis of herbal drug from pharmacopeia.
		CO5	Understand preparation and standardization of herbal cosmetics as per pharmacopeia requirement.
		CO6	Understand Aldehyde content, Phenol content and total alkaloid.
52	Biopharmaceutics and	CO1	Understand the basic concepts in Biopharmaceutics, Absorption, Distribution, Metabolism, Excretion; and factors affecting these processes.

	Pharmacokinetics (BP604T )	CO2	Basics of Pharmacokinetics, use of plasma drug concentration-time data to calculate the pharmacokinetic parameters to describe the kinetics of drug absorption, distribution, metabolism, excretion, elimination.
		CO3	Understand and use the concept of pharmacokinetic modelling and determination of various parameters
		CO4	To understand the concepts of bioavailability and bioequivalence of drug products and their significance.
		CO5	To understand the concept of dosage regimen, individualization and use of relevant aspects therein in product development.
		CO6	Understand various pharmacokinetic parameters, their significance & applications in designing and development of dosage forms.
53	Pharmaceutical Biotechnology (BP605T)	CO1	Understanding the fundamentals of biotechnology
		CO2	Understand DNA technology, vaccines and hormone therapies.
		CO3	Understand immune products.
		CO4	Understand the use of microorganisms in biotechnology.
		CO5	Understand the process of fermentation and blood related products.
		CO6	Understand future scope of biotechnology products for alleviating diseases.
54	Quality Assurance (BP606T)	CO1	Understand concept of Quality, Quality control and quality assurance in pharmaceutical industries.
		CO2	Understand the responsibilities of QA and QC.
		CO3	Understand the GMP in pharmaceutical industry.
		CO4	Understand the scope of quality certification required in pharmaceutical industries.
		CO5	Learn and understand the importance of documentation.
		CO6	Understand the quality control testing and their importance in term of patient health.

## B. Pharmacy IV Year

Sr. No.	Course Name with Code	CO No.	Course Outcomes
<b>SEMESTER VII</b>			
55	Instrumental Methods of Analysis (BP701T)	CO1	Flame photometry, a Understand basic knowledge about UV visible spectroscopy and fluorimetry and its application.
		CO2	Understand Instrumental method of analysis – IR Spectroscopy absorption spectroscopy and nepheloturbidometry.
		CO3	Understand basic knowledge about chromatography and mechanism involved in column chromatography & thin layer chromatography with its application.
		CO4	Understand Paper chromatography & electrophoresis with different development technique with application.
		CO5	Understand gas chromatography & High-performance liquid chromatography.
		CO6	Understand different chromatography technique its component and application -ion exchange chromatography, gel permeation Chromatography, affinity chromatography.
56	Instrumental Methods of Analysis (BP705P)	CO1	Understand evaluation of absorption maxima & colorimetry of organic compound – UV- Spectroscopy & flame photometry, nephelo turbidometry.
		CO2	Understand Instrumental method of analysis – UV- Spectroscopy & Fluorimetry
		CO3	Understand Instrumental method of analysis.
		CO4	Understand Paper chromatography & Thin layer chromatography.
		CO5	Understand gas chromatography & High-performance liquid chromatography.
		CO6	Understand different chromatography technique its component and application -Column chromatography & affinity chromatography.
57	Industrial Pharmacy II (BP702T)	CO1	Know the process of pilot plant and scale up techniques
		CO2	Understand the process of technology transfer from lab scale to commercial Batch.
		CO3	Understand the regulatory affairs history and different roles and responsibilities of regulatory affairs professional.
		CO4	Understand the approval process and regulatory requirement for drug approval for different country.
		CO5	Understand the Quality management system TQM, QBD, OOS and various certifications like ISO, GLP, and NABL.
		CO6	Understand the Indian regulatory requirement for drug approval.
58	Pharmacy Practice (BP703T)	CO1	Importance of medications and other health care products to make best use of them.
		CO2	Make Hospital Formulae and importance its updates.

		CO3	Know the Hospital and it's types, specialty & functions of specific hospital.
		CO4	Duties of hospital pharmacist, community pharmacist, hospital staff & their duties like Nurses, Doctors, and Pharmacist.
		CO5	Budget & its preparation, zero budget& other types of budget also its importance to organization.
		CO6	This subject also gives idea regarding safe use of drug, toxic effect of drug, drug- drug interaction.
59	Novel Drug Delivery System (BP704T)	CO1	To understand Controlled Drug Delivery Systems and formulation design.
		CO2	To understand the criteria for selection of drugs and polymers for the development of Novel drug delivery systems.
		CO3	To understand various approaches for development of novel drug delivery systems.
		CO4	To understand design, development and evaluation of novel approaches for transdermal, gastro retentive and naso-pulmonary formulation.
		CO5	To understand Various Targeted Drug Delivery Approaches.
		CO6	To understand organ targeted drug delivery systems
60	Practice School (BP706PS)	CO1	To disseminate the advance knowledge in the field of pharmaceutical sciences.
		CO2	To gain practical experience of industrial processes and develop new experimental strategies to tackle industrial problems.
		CO3	To develop intrinsic communication and presentation skills.
		CO4	To develop and built team for successful execution of project task.
		CO5	To understand current requirement in industrial sector and gain maximum knowledge.
		CO6	To develop writing skills and preparation of reports.

Sr. No.	Course Name with Code	CO No.	Course Outcomes
<b>SEMESTER VIII</b>			
61	Biostatistics and Research Methodology (BP801T)	CO1	Learn fundamentals of Biostatistics and measure of central tendency and dispersion.
		CO2	Learn Parametric test with measurement of regression and probability.
		CO3	Compute non parametric test.
		CO4	Fundamentals of research methodology and research design.
		CO5	Regression Modelling and Introduction to software used for pharmaceutical problems.
		CO6	Designing and analyzing experiments using factorial design and response surface methods.

62	Social and Preventive Pharmacy (BP802T)	CO1	To review Concept of Social and health education.
		CO2	To examine general principles of prevention and control of various viral diseases.
		CO3	To assess General principles of prevention and control of various lifestyle related and other diseases.
		CO4	To facilitate information about various National health programs.
		CO5	To assess a critical way of thinking based on current healthcare development.
		CO6	To manage Community services in rural, urban and school health.
63	Pharma Marketing Management (BP803ET)	CO1	Know the concept of marketing and Pharmaceutical marketing.
		CO2	Understand the Product decision.
		CO3	Understand the Promotion.
		CO4	Understand the Pharmaceutical marketing channels role of Professional sales representative.
		CO5	Understand the role of Professional sales representative.
		CO6	Understand the Pricing and Emerging concepts in marketing.
64	Pharmacovigilance (BP805ET)	CO1	Drug safety monitoring importance and History and development of Pharmacovigilance.
		CO2	National and international scenario of Pharmacovigilance.
		CO3	Detection of new adverse drug reactions and their assessment.
		CO4	International standards for classification of diseases and drugs.
		CO5	Pharmacovigilance Program of India (PVPI) requirement for ADR reporting in India 11, ICH guidelines.
		CO6	CIOMS requirements for ADR reporting.
65	Cosmetic Science (BP809ET)	CO1	The basic fundamentals of cosmetics and Key ingredients used in cosmetics and cosmaceuticals.
		CO2	The principles of formulation and building blocks of skin care products.
		CO3	The role of herbs in cosmetics & Various key ingredients develop cosmetics and cosmeceuticals.
		CO4	Knowledge on preparation and evaluation of various cosmetic products.
		CO5	Scientific knowledge to develop cosmetics and cosmaceuticals with desired Safety, stability, and efficacy.
		CO6	Identify various problems related to skin and understand Current technologies in the market.

## M. Pharm. Pharmaceutics

Sr. No.	Course Name with Code	CO No.	Course Outcomes
<b>SEMESTER I</b>			
01	Modern Pharmaceutical Analytical Techniques (MPH101T)	CO1	Know theory, principle and applications of UV Spectroscopy, IR Spectroscopy, Fluorimetry and Flame emission and atomic absorption Spectroscopy.
		CO2	Understand the theory, principle and applications of NMR Spectroscopy.
		CO3	Understand the theory, principle and applications of Mass Spectroscopy.
		CO4	Understand the theory, principle and applications of Chromatography's like paper, TLC, Ion exchange, Column, Gas, HPLC and affinity.
		CO5	Understand the theory, principle and applications of electrophoresis and X-Ray Crystallography.
		CO6	Understand the theory, principle and applications of Immunological Assays like RIA, ELISA and Bioluminescence's.
02	Drug Delivery System (MPH102T)	CO1	Knowledge on SR & CR formulations and their factors. Different polymers & their properties also personalized medicines, bio-electronic medicines, 3D Printing, tele-pharmacy.
		CO2	The principles, fundamentals, and types of Rate Controlled Drug Delivery Systems.
		CO3	Knowledge on design and study on GRDDS & Mucosal DDS.
		CO4	Knowledge on barriers for ocular drug delivery & its overcome methods & Knowledge on transdermal drug delivery systems.
		CO5	Knowledge on barriers, formulation & evaluation of protein drug delivery.
		CO6	Knowledge on vaccine drug delivery systems.
03	Modern Pharmaceutics (MPH103T)	CO1	Elements of preformulation and optimization techniques.
		CO2	Validation of equipments, dosage forms according to regulatory agencies.
		CO3	Products based financial assets and Total quality management.
		CO4	Physical attributes of compression process and solubility.
		CO5	Effect of Consolidation on the solid substrate.
		CO6	Statistical test of designing pharmaceutical formulation.
04	Regulatory Affairs (MPH104T)	CO1	The concepts of innovator and generic drugs, drug development process.
		CO2	The Regulatory guidance and guidelines for filing and approval process.
		CO3	Preparation of Dossiers and their submission to regulatory agencies in different countries.

		CO4	Post approval regulatory requirements for actives and drug products.
		CO5	Submission of global documents in CTD/ eCTD formats.
		CO6	Clinical trials requirements for approvals for conducting clinical trials.

Sr. No.	Course Name with Code	CO No.	Course Outcomes
<b>SEMESTER II</b>			
05	Molecular Pharmaceutics (NT&TDDS) (MPH201T)	CO1	Concept and biological events in drug targeting.
		CO2	Knowledge on preparation and evaluation of nanoparticles and liposomes.
		CO3	Knowledge on preparation and evaluation of microspheres, Monoclonal antibodies, niosomes, aquasomes, phytosomes and electrosomes.
		CO4	Knowledge on propellants, preparation and evaluation of pulmonary and nasal aerosols.
		CO5	Knowledge of Nucleic acid based therapeutic delivery system.
		CO6	Knowledge on gene therapy, antisense molecules and aspartame as drugs of future.
06	Advanced Biopharmaceutics & Pharmacokinetics (MPH202T)	CO1	The basic concepts in Biopharmaceutics and Pharmacokinetics.
		CO2	The use of raw data and derive the pharmacokinetic models and parameters to the best to describe the process of drug absorption, distribution, metabolism and elimination.
		CO3	The critical evaluation of Biopharmaceutics studies involving drug product equivalency.
		CO4	The design and evaluation of dosage regimens of the drugs using pharmacokinetic and biopharmaceutic parameters.
		CO5	The potential clinical pharmacokinetic problems and applications of basics of pharmacokinetics.
07	Computer Aided drug delivery system (MPH203T)	CO1	Historical perspective of computers in pharmaceutical research and development of fundamental programmes for drug development.
		CO2	Understand the modeling techniques of drug disposition and preclinical development.
		CO3	Optimization techniques and various software packages use during formulation development.
		CO4	Use of computers for market analysis and highlights on software packages offered for the same.
		CO5	Use of artificial intelligence and robotics for continuous manufacturing and product development.
		CO6	Understand the computer fluid dynamics and simulation softwares.
08	Cosmetics and Cosmeceuticals (MPH204T)	CO1	Understand key ingredients used in cosmetic and cosmeceuticals.
		CO2	Understand key building blocks for various formulation.



		CO3	Understand current technologies in the market.
		CO4	Understand various key ingredients and basic science to develop cosmetic and cosmeceuticals.
		CO5	Understands scientific knowledge to develop cosmetic and cosmeceuticals with desired safety, stability and efficacy.
		CO6	Understand about the herbal cosmetics used for hair care, skin care, oral care.


### **M. Pharm. Quality Assurance**

Sr. No.	Course Name with Code	CO No.	Course Outcomes
<b>SEMESTER I</b>			
01	Quality Management System (MQA102T)	CO1	Understand the importance of quality.
		CO2	Understand ISO management systems.
		CO3	Understand tools for quality improvement.
		CO4	Understand analysis of issues in quality.
		CO5	Understand quality evaluation of pharmaceuticals.
		CO6	Understand stability testing of drugs and drug substances.
02	Quality Assurance & Quality Control (MQA103T)	CO1	Understand the cGMP aspects in pharmaceutical industry.
		CO2	Understand the concept of GLP.
		CO3	Understand the importance of documentation.
		CO4	Understand ICH guidelines.
		CO5	Understand the scope of quality certifications applicable in pharmaceutical industry.
		CO6	Understand the responsibility of QA and QC department.
03	Product Development and Technology Transfer (MQA104T)	CO1	Understand new product development process.
		CO2	Understand the necessary information to transfer technology from R&D to actual manufacturing by sorting out various information obtained during R&D.
		CO3	Elucidate necessary information to transfer technology of existing product between various manufacturing place.
		CO4	Understand various guidelines asserted by regulatory agencies for transfer of technology.
		CO5	Adapt necessary preformulation skill for before the transfer of product.
		CO6	Understand packaging science.
04	P'ceutical Quality Assurance Practical-I (MQA105P)	CO1	Estimation of process capability.
		CO2	In process and finished product quality control tests for tablets, capsules, parenteral and semisolid dosage forms.
		CO3	Estimation of drug in pharmaceutical by using modern analytical techniques.
		CO4	Development of Stability study protocol for pharmaceuticals.
		CO5	To carry out preformulation study for successful formulation of pharmaceuticals.
		CO6	To prepare different Quality Case studies.



Sr. No.	Course Name with Code	CO No.	Course Outcomes
<b>SEMESTER II</b>			
05	Hazards and safety Measurements (MQA201T)	CO1	Understand about environmental problems among learners.
		CO2	Impart basic knowledge about environment and its allied problems.
		CO3	Develop an attitude of concern for industry environment.
		CO4	Ensure safety standards in pharmaceutical industry.
		CO5	Provide comprehensive knowledge on safety management.
		CO6	Idea about to clear mechanism and management in different kinds of hazard management system.
06	Pharmaceutical Validation (MQA202T)	CO1	Importance of patent and intellectual property rights.
		CO2	Knowledge of qualification aspects of various instruments.
		CO3	Understanding of cleaning validation of equipments employed in the manufacture of pharmaceuticals.
		CO4	Theoretical and practical basis of validation of analytical method for estimation of Drugs.
		CO5	Fundamental aspects of qualification of various equipment and instruments.
		CO6	Understand the concepts of IPR.
07	Audits and Regulatory Compliance (MQA203T)	CO1	Understand the role and importance of auditing.
		CO2	Understand the methodology of auditing.
		CO3	Understand the detail concept of the audit process.
		CO4	Understand preparation of the auditing report.
		CO5	Understand the check list for auditing.
		CO6	Now about auditing of different department.
08	P'ceutical Quality Assurance Practical-II (MQA205P)	CO1	Understand analysis of Organic Contaminant, Metallic contaminant, & antibiotic residue by HPLC, TLC & flame photometer.
		CO2	Understand estimation of Hydrogen Sulphide & Chlorine Sulphur Di hydroxide by colorimetric method.
		CO3	Understand Quantification of Autoclave, Hot Air Oven, Dry mixer & Tablet compression machine.
		CO4	Understand the Validation of an analytical method for drug and Processing Area and Pharmaceutical Equipment.
		CO5	Understand checklist for Pharmaceutical Drug & pharmaceutical Drug Products.
		CO6	Understand Case study on Application of QBD & PAT.



  
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