Shri Vile Parle Kelavani Mandal's
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COURSE OUTCOMES

Course code	Course name	Outcomes
	SEM I	
BP101T	Human Anatomy and Physiology I – Theory	**CO1:** Explain the gross morphology, structure, and functions of various organs of the human body. **CO2:** Describe the various homeostatic mechanisms and their imbalances. **CO3:** Identify the various tissues and organs of different systems of the human body. **CO4:** Perform various experiments related to special senses and the nervous system. **CO5:** Appreciate the coordinated working pattern of different organs of each system.
BP102T	Pharmaceutical Analysis I – Theory	**CO1:** Introduce the learner to the scope and importance of sample preparation and analytical procedures, Pharmacopeial methods of analysis, pharmaceutical errors, and impurities. **CO2:** Acquire knowledge of the principles and applications of volumetric analysis. **CO3:** Understand the principles and applications of electrochemical and gravimetric titrations.
BP103T	Pharmaceutics I – Theory	**CO1:** Know the history of the profession of Pharmacy **CO2:** Understand the basics of different dosage forms, pharmaceutical incompatibilities, and pharmaceutical calculations **CO3:** Gain knowledge of the professional way of handling the prescription **CO4:** Preparation of various conventional dosage forms
BP104T	Pharmaceutical Inorganic Chemistry– Theory	**CO1:** List, and define properties of impurities and know the sources of impurities and methods to determine the impurities in inorganic drugs and pharmaceuticals **CO2:** Integrate the knowledge of the medicinal and pharmaceutical importance of inorganic compounds. **CO3:** Gain basic and core knowledge of the pharmaceutical application of radioactive substances.
BP105T	Communication skills –Theory	**CO1:** List and identify verbs and the passive voice. **CO2:** Apply the skills learnt to confidently stand in a group discussion. **CO3:** Exercise the skills learnt to communicate effectively – technically/businesswise. **CO4:** Appreciate and imbibe the importance of ethics, human values, honesty and integrity.
BP106RBT	Remedial Biology – Theory	**CO1:** Know the classification and salient features of five kingdoms of life. **CO2:** Understand the basic components of anatomy and physiology of plant. **CO3:** Acquire knowledge of the basic components of anatomy and physiology animal with special reference to human.
BP106RMT	Remedial Mathematics – Theory	**CO1:** Know the theoretical concepts of topics and their application in Pharmacy. **CO2:** Solve the different types of problems by applying theoretical concepts. **CO3:** Appreciate the important application of mathematics in Pharmacy.

BP107P	Human Anatomy and Physiology – Practical	**CO1:** Understand haematology and perform related estimations like RBC, WBC, haemoglobin and learn the structure of human skeleton. **CO2:** Comprehend and observe the histological slides (permanent) and learn BP measurements and discussion of other diseases.
BP108P	Pharmaceutical Analysis I – Practical	**CO1:** Employ practice of calibration and proper handling of volumetric apparatus, electronic analytical balance, and safety measures in the laboratory. **CO2:** Demonstrate eye-hand coordination required for titrimetric analysis. **CO3:** Perform and record, calculate, and interpret data obtained for experiments related to volumetric, and gravimetric analysis.
BP109P	Pharmaceutics I – Practical	**CO1:** Understand preparation of various conventional dosage forms **CO2:** Understand preparation of labels for various dosage forms
BP110P	Pharmaceutical Inorganic Chemistry– Practical	**CO1:** Illustrate and experiment with various limit tests for ions, identification tests, and tests of purity of inorganic pharmaceuticals. **CO2:** Demonstrate and examine traditional methods of preparation of inorganic pharmaceuticals.
BP111P	Communication skills –Practical	**CO1:** Practice the Basic Communication attributes required during meeting people, making friends, asking questions using Wordsworth® English language lab software. **CO2:** Learn the Advanced techniques involved in effective communication, writing skills, interview handling skills, presentation skills, E-mail writing using Wordsworth® English language lab software. **CO3:** Plan, execute and conclude the tasks using various methodologies (defined protocol or qualitative or quantitative techniques).
BP112RBP	Remedial Biology– Practical	**CO1:** Understand the handling of microscope and permanent slide preparation techniques. **CO2:** Comprehend and identify tissue organization in plants and animals. **CO3:** Study different diagnostic procedures.
	SEM-II	
BP201T	Human Anatomy and Physiology II – Theory	**CO1:** Explain the organization of the nervous system, electrophysiology, neurotransmitters, structure and function of the brain and spinal cord. **CO2:** Discuss the anatomy and functions digestive system, formation and role of ATP. **CO3:** Define the anatomy of various parts of the respiratory and urinary system and the functions of the respiratory and urinary system. **CO4:** Describe the coordinated working of the endocrine system and Role and function of various endocrine glands and hormones. **CO5:** Explain the anatomy of the reproductive system and the process of spermatogenesis and oogenesis and understand genetic pattern of inheritance.
BP202T	Pharmaceutical Organic Chemistry I – Theory	**CO1:** Write the structure, name and type of isomerism of the organic compound. **CO2:** State the name of reaction, and the orientation of the reactions. **CO3:** Account for reactivity/stability of compounds. **CO4:** Identity/confirm the identification of the organic compound.

BP203T	Biochemistry – Theory	**CO1:** Understand carbohydrate metabolism concerning different pathways, structures of intermediates, enzymes, and cofactors involved, energy requirements/yields, regulation, and drugs affecting metabolism. **CO2:** Discuss lipid metabolism concerning different pathways, structures of intermediates, enzymes, and cofactors involved, energy requirements/yields, regulation, and drugs affecting metabolism. **CO3:** Explain nucleic acid metabolism concerning different pathways, and Understand the genetic organization of mammalian genome and functions of DNA in the synthesis of RNAs and proteins. **CO4:** Describe amino acid metabolism concerning different pathways, structures of intermediates, enzymes, and cofactors involved, energy requirements/yields, regulation, and drugs affecting metabolism.
BP204T	Pathophysiology – Theory	**CO1:** Describe the ethology and pathogenesis of the selected disease states. **CO2:** Understand the signs and symptoms of the diseases. **CO3:** Acquire knowledge of the complications of the diseases.
BP205T	Computer Applications in Pharmacy– Theory	**CO1:** Recognise the number systems and information systems and software. **CO2:** Understand the application of computers in pharmacy and preclinical development **CO3:** Discuss the concept of Bioinformatics and its application.
BP206T	Environmental sciences – Theory	**CO1:** Create awareness about environmental problems among learners. **CO2:** Impart basic knowledge about the environment and its allied products. **CO3:** Motivate learners to participate in environment protection and environment improvement. **CO4:** Acquire skills to help the concerned individuals in identifying and solving environmental problems.
BP207P	Human Anatomy and Physiology II – Practical	**CO1:** Understand the concept of total blood cell count analyser, estimation of taste, body temperature and basal index. **CO2:** Recognise the histological slides(permanent) and to learn and discuss different types of system by using models, charts and specimen. **CO3:** Study the concept of family planning devices and pregnancy diagnosis test
BP208P	Pharmaceutical Organic Chemistry I – Practical	**CO1:** Systematic qualitative analysis of unknown organic compounds. **CO2:** Preparation of suitable solid derivatives from organic compounds. **CO3:** Construction of molecular models.
BP209P	Biochemistry– Practical	**CO1:** Learn the qualitative and quantitative analysis of carbohydrates and proteins. **CO2:** Comprehend the buffer preparation and measurement of its ph. **CO3:** Understand the principle and factors affecting enzyme activity. **CO4:** Study the qualitative and/or quantitate aspects of the pathological analysis of blood and urine.
BP210P	Computer Applications in Pharmacy– Practical	**CO1:** Describe the components of a PC **CO2:** Compare the different operating systems **CO3:** Record simple programs using BASIC and C programming languages **CO4:** Apply knowledge gained for use of computers in the pharmacy

SEM III		
BP301T	Pharmaceutical Organic Chemistry II	**CO1:** Write the structure, name, and type of isomerism of the organic compound. **CO2:** State the reaction, name the reaction, and the orientation of the reactions. **CO3:** Account for reactivity/stability of compounds. **CO4:** Prepare organic compounds.
BP302T	Physical Pharmaceutics I	**CO1:** Understand the various physical phenomena involved in designing various formulations. **CO2:** Determine various physical parameters of drugs and formulations. **CO3:** Predict and anticipate in-process problems based on raw materials and manufacturing methods. **CO4:** Apply the knowledge of physical phenomena in selecting raw materials, including drugs, and inactive ingredients of appropriate quality leading to stable formulations.
BP303T	Pharmaceutical Microbiology	**CO1:** Understand methods of identification, cultivation, and preservation of various microorganisms **CO2:** Understand the importance and implementation of sterilization in pharmaceutical processing and industry. **CO3:** Learn sterility testing of pharmaceutical products. **CO4:** Carry out microbiological standardization of Pharmaceuticals. **CO5:** Understand cell culture technology and its applications in pharmaceutical industries.
BP304T	Pharmaceutical Engineering	**CO1:** Understand various unit operations used in pharmaceutical industries and material handling techniques. **CO2:** Perform various processes involved in the pharmaceutical manufacturing process. **CO3:** Carry out various tests to prevent environmental pollution. **CO4: A**ppreciate and comprehend the significance of plant layout design for optimum use of resources. **CO5:** Appreciate the various preventive methods used for corrosion control in pharmaceutical industries.
BP305P	Pharmaceutical Organic Chemistry II - Practical	**CO1:** Learn the principles and methods of different laboratory techniques like recrystallization and steam distillation. **CO2:** Study and analyze different chemical parameters for testing the quality of fixed oils and fats. **CO3:** Theoretical concepts, design, and synthesis of organic compounds using appropriate starting materials and synthetic methods.
BP306P	Physical Pharmaceutics I - Practical	**CO1: U**nderstand the principles and methods for the determination of various physical parameters of drugs and formulations. **CO2:** Carry out various physical tests involved in the characterization of drugs. **CO3:** Demonstrate the testing of various physical parameters involved in pre-formulation and formulation evaluation.
BP307P	Pharmaceutical Microbiology - Practical	**CO1:** Understand methods of identification, cultivation, and preservation of various microorganisms **CO2:** Understand the importance and implementation of sterilization in pharmaceutical processing and industry and learn sterility testing of pharmaceutical products. **CO3:** Carry out microbiological standardization of Pharmaceuticals. **CO4:** Understand cell culture technology and its applications in pharmaceutical industries.

BP308P	Pharmaceutical Engineering - Practical	**CO1:** Perform various processes involved in the pharmaceutical manufacturing process. **CO2:** Know various unit operations used in pharmaceutical industries.
	SEM IV	
BP401T	Pharmaceutical Organic Chemistry III	**CO1:** Understand the methods of preparation and properties of organic compounds. **CO2:** Explain the stereochemical aspects of organic compounds and stereochemical reactions. **CO3:** Know the medicinal uses and other applications of organic compounds.
BP402T	Medicinal Chemistry - I	**CO1:** Discuss the history and development of medicinal chemistry, to understand the physiochemical properties impacting biological activity, and understand drug metabolism **CO2:** Understand adrenergic drugs, their classification, structures, uses, SAR, and metabolism and apply the principles of organic chemistry to drug synthesis. **CO3:** Explain cholinergic drugs, their classification, structures, uses, SAR, and metabolism and apply the principles of organic chemistry to drug synthesis. **CO4:** State the CNS drugs, their classification, structures, uses, SAR, and metabolism, and apply the principles of organic chemistry to drug synthesis. **CO5:** Define the general anaesthetics, analgesics, and NSAIDs.
BP403T	Physical Pharmaceutics II	**CO1:** Understand various physicochemical properties of drug molecules in designing the dosage forms. **CO2:** Know the principles of chemical kinetics and use them for stability testing and determination of the expiry date of formulations. **CO3:** Demonstrate the use of physicochemical properties in the formulation development and evaluation of dosage forms.
BP404T	Pharmacology I	**CO1:** Understand the pharmacological actions of different categories of drugs. **CO2:** Explain the mechanism of drug action at organ system/sub-cellular/macromolecular levels. **CO3:** Apply basic pharmacological knowledge in the prevention and treatment of various diseases. **CO4:** Appreciate the correlation of pharmacology to other bio-medical sciences.
BP405T	Pharmacognosy and Phytochemistry I	**CO1:** Possess knowledge of quantitative microscopy for quality control of herbal drugs. **CO2:** Carry out physical evaluation of crude drugs. **CO3:** Acquire knowledge of morphological and microscopic characteristics of crude drugs and apply it for identification and standardisation **CO4:** Extract and perform qualitative chemical tests on unorganised drugs.
BP406P	Medicinal Chemistry - I Practical	**CO1:** Synthesize variety of drugs and drug intermediates using appropriate starting materials and synthetic methods. **CO2:** Estimate different types of drugs by using quantitative methods of analysis. **CO3:** Determine the partition coefficient of drugs as one of the physio-chemical parameters of drug-likeness.

BP407P	Physical Pharmaceutics II Practical	**CO1:** Understand various physicochemical properties of drug molecules in designing the dosage forms. **CO2:** Know the principles of chemical kinetics and use them for stability testing and determination of the expiry date of formulations. **CO3:** Demonstrate the use of physicochemical properties in the formulation development and evaluation of dosage forms.
BP408P	Pharmacology I Practical	**CO1:** Introduction to experimental pharmacology. Basics about animal ethics-CPCSEA, routes of administration, and common laboratory techniques. **CO2:** Describe the experimentation involving hepatic microsomal enzyme inducers, and drugs affecting ciliary motility of frog oesophagus and rabbit eye. **CO3:** Discuss and describe the effects of drugs on experimental models such as rota rod, actophotometer, electroconvulsiometer, catatonic, anxiolytic, and local anesthetic effects.
BP409P	Pharmacognosy and Phytochemistry Practical I	**CO1:** Perform quantitative microscopy for leaf constants. **CO2:** Determine different extractive and ash values as per pharmacopeial requirements. **CO3:** Understand the morphological and microscopic features of medicinal plants, and Students will be able to identify diagnostic features of plants such as calcium oxalate, and starch. **CO4:** Identify crude drugs based on the chemical evaluation.
	SEM V	
BP501T	Medicinal Chemistry II	**CO1:** Understand antineoplastic drugs, their classification, structures, uses, SAR, and metabolism and apply the principles of organic chemistry to drug synthesis. **CO2:** Discuss cardiovascular drugs, their classification, structures, uses, SAR, and metabolism and apply the principles of organic chemistry to drug synthesis. **CO3:** Explain the drugs acting on the endocrine system, including steroidal drugs, drugs acting on the thyroid gland, and antidiabetic drugs their classification, structures, uses, SAR, and metabolism, and apply the principles of organic chemistry to drug synthesis. **CO4:** State the antihistaminic drugs and gastric proton pump inhibitory drugs, their classification, structures, uses SAR, and metabolism, and apply the principles of organic chemistry to drug synthesis. **CO5:** Determine the local anaesthetics, their classification, structures, uses, SAR, and metabolism, and apply the principles of organic chemistry to drug synthesis.
BP502T	Industrial Pharmacy I	**CO1:** Know the various pharmaceutical dosage forms and their manufacturing techniques **CO2:** Know various factors involved in the development of pharmaceutical dosage forms **CO3:** Formulate solid, liquid, and semisolid dosage forms and evaluate them for their quality

BP503T	Pharmacology II	**CO1:** Discuss the concept and pharmacology of drugs acting on the cardiovascular system and urinary systems. **CO2:** Understand the concept and pharmacology of drugs acting on the endocrine system. **CO3:** Determine the fundamental knowledge on various aspects (classification, mechanism of action, therapeutic effects, clinical uses, side effects and contraindications) of drugs acting on endocrine system **CO4:** Know the concept of Bioassays.
BP504T	Pharmacognosy and Phytochemistry II	**CO1: S**tudy the biosynthetic pathway involved in the synthesis of secondary metabolites. **CO2:** Discuss the pharmacognosy and phytochemistry of crude drugs belonging to various classes. **CO3:** Perform the isolation and the identification of phytoconstituents and their industrial production. **CO4:** Determine the modern extraction techniques, characterization, and identification of the herbal drugs and phytoconstituents via various analytical techniques.
BP505T	Pharmaceutical Jurisprudence	**CO1:** Gain knowledge about history and development of Indian Pharmaceutical legislations and implications in the development of Pharmaceutical sector. Drug Pricing, Narcotics drug act, Drug magic remedies, Pharmacy and their application, **CO2:** Acquire knowledge about the code of ethics during the pharmaceutical practices. **CO3:** Comprehend the functions of the regulatory authorities and agencies governing the manufacture and sale of pharmaceuticals
BP506P	Industrial Pharmacy I Practical	**CO1:** Understand the pre-formulation aspects of drugs and formulation of various solid/ liquid/ semisolid and sterile dosage forms **CO2:** Evaluate the quality of various solid/ liquid/ semisolid and sterile dosage forms and container and closure systems
BP507P	Pharmacology II Practical	**CO1:** Define Bioassay, list the types, methods, and applications of bioassay, and study in vitro bioassay using ileum and record, calculate, and interpret unknown concentrations of agonist/antagonist/drug. **CO2:** Observe preclinical models which provide evidence of drug/lead pharmacological activity.
BP508P	Pharmacognosy and Phytochemistry II Practical	**CO1:** Identification of crude drug based on morphology and microscopy character. **CO2:** Isolation and detection of phytoconstituents. **CO3:** Apply chromatographic principles for the analysis of phytoconstituents. **CO4:** Extract and perform qualitative chemical tests on the crude drugs containing.
	SEM VI	
BP601T	Medicinal Chemistry III	**CO1:** Understand the chemistry of drugs concerning their biological activity. **CO2:** Know the importance of SAR of drugs. **CO3:** Establish the importance of drug design and different techniques of drug design.

BP602T	Pharmacology III	**CO1:** Educate on different drugs acting on the respiratory system and its associated diseases and provide an understanding of drugs used in GIT-associated disorders. **CO2:** Understand the mechanism of drug action and its relevance in the treatment of different infectious diseases. **CO3:** Educate on immunopharmacology and related drugs. **CO4:** Convey principles of toxicity with a briefing on common toxicants and discuss chrono-pharmacology.
BP603T	Herbal drug technology	**CO1:** Devise the composition of conventional dosage form such as syrups, mixtures, tablets and novel drug formulations such as phytosomes. **CO2:** Evaluate crude drugs and herbal formulations as per the WHO and ICH guidelines and stability testing of herbal drugs. **CO3:** Analyse crude drugs and herbal formulation and determine their quality. **CO4:** Use the analytical techniques to evaluate the quality of crude drugs and herbal formulations. **CO5:** Explain evaluation of Conventional herbal formulations such as syrups, mixtures, tablets and novel dosage forms such as phytosomes. **CO6:** Acquire the knowledge of herbal cosmetics natural sweeteners and nutraceuticals and the regulatory guidelines for the manufacturing and evaluation of herbal drugs.
BP604T	Biopharmaceutics and Pharmacokinetics	**CO1:** Understand the basic concepts in biopharmaceutics and pharmacokinetics and their significance. **CO2:** Comprehend various pharmacokinetic parameters, their significance, and applications. **CO3:** Application of plasma drug concentration-time data to calculate the pharmacokinetic parameters to describe the kinetics of drug absorption, distribution, metabolism, excretion, and elimination. **CO4:** Explain the concepts of bioavailability and bioequivalence of drug products and their significance.
BP605T	Pharmaceutical Biotechnology	**CO1:** Possess basic and core knowledge associated with pharmaceutical biotechnology and understand its role in the pharmaceutical industry. **CO2:** Gain scientific and analytical thinking ability to make key professional decisions in the development of the fermentation process. **CO3:** Communicate effectively their role as a pharmacist in society as stakeholders in the healthcare industry based on the knowledge of vaccines.
BP606T	Pharmaceutical Quality Assurance	**CO1:** Understand the aspects of the Quality Management System. **CO2:** Comprehend organizational structure and requirements. **CO3:** Understand the responsibilities and significance of Quality Assurance, Quality Control, and Good Laboratory Practices. **CO4:** Recognise the calibration and validation in pharmaceutical manufacturing.
BP607P	Medicinal Chemistry III - Practical	**CO1:** Synthesize a variety of drugs and drug intermediates using appropriate starting materials and synthetic methods. **CO2:** Estimate different types of drugs by using quantitative methods of analysis. **CO3:** Illustrate the structures of compounds using computational tools and predict physicochemical properties.

BP608P	Pharmacology III Practical	**CO1:** Introduction to experimental pharmacology and toxicology. **CO2:** Possess knowledge of experimental pharmacology related to the gastrointestinal and respiratory tract. **CO3:** Understand toxicity studies, and biostatistics and apply this knowledge in lifelong learning to be able to adapt to varying technological changes.
BP609P	Herbal drug technology Practical	**CO1:** Possess knowledge of phytochemical evaluation and standardization of crude drugs and excipients. **CO2:** Use scientific and analytical thinking to develop and evaluate herbal formulations. **CO3:** Demonstrate effective planning critical thinking, problem-solving, and decision-making abilities and manage time and resources safely and effectively in the laboratory.
	SEM-VII	
BP701T	Instrumental Methods of Analysis	**CO1:** Understand the principles instrumentation and applications of UV-Vis and fluorescence spectroscopic techniques. **CO2:** Understand the principles instrumentation and applications of IR Spectroscopy, flame photometry, atomic absorption spectroscopy and nepheloturbidometry. **CO3:** Understand the principles of chromatography, instrumentation and applications of planar chromatography and electrophoresis in qualitative and quantitative analysis. **CO4:** Apply the principles of chromatography in HPLC and GC and explain their advantages/disadvantages, and applications in quantitative analysis. **CO5:** Apply the principles of ion exchange, molecular size exclusion and affinity in IEC, SEC and affinity chromatography in quantitative analysis.
BP702T	Industrial Pharmacy II	**CO1:** Know the process of pilot plant and scale up of pharmaceutical dosage forms. **CO2:** Understand the process of technology transfer from lab scale to commercial scale. **CO3:** Know different Laws and Acts that regulate pharmaceutical industry. **CO4:** Understand the approval process and regulatory requirements for drug products.
BP703T	Pharmacy Practice	**CO1:** Student should know various drug distribution methods in a hospital and appreciate the pharmacy stores management and inventory control. **CO2:** Student should learn the skills of monitor drug therapy of patient through medication chart review, clinical review and obtain medication history interview and counsel the patients. **CO3:** Student should be able to identify drug related problems, detect and assess adverse drug reactions, and interpret selected laboratory results (as monitoring parameters in therapeutics) of specific disease states. **CO4:** Students should know pharmaceutical care services, do patient counselling in community pharmacy, appreciate the concept of Rational drug therapy and concepts of pharmacy therapeutic committee.

BP704T	Novel Drug Delivery System	**CO1:** Understand basic concept of NDDS, various approaches for development of controlled drug delivery systems and understand the criteria for selection of drugs and polymers for the development of Novel drug delivery systems. **CO2:** Discus the various multiparticulate systems for targeted drug delivery. **CO3:** Discuss the different NDDS strategies for various routes-oral, gastroretentive transdermal, ocular, transmucosal, pulmonary and implantable devices.
BP705P	Instrumental Methods of Analysis Lab	**CO1:** Record, calculate and interpret data obtained by using UV-VIS spectroscopy, fluorimetry, flame photometry and nephloturbidometry. **CO2:** Develop and optimise mobile phase composition for qualitative analysis by TLC and PC. **CO3:** Illustrate working and application of column chromatography, HPLC and GC.
BP706PS	Practice School	**CO1:** Apply theoretical knowledge learned in classroom in practical setting. **CO2:** Understanding the importance and applications of various subjects and their correlation with practice of Pharmacy. **CO3:** Development of skills in the handling of modern tools Acquire skills of documentation and record keeping Plan academic, career and personal interests via research experience.
	SEM-VIII	
BP801T	Biostatistics and Research Methodology	**CO1:** Understand descriptive statistics, Graphics, Correlation, Regression, logistic regression Probability theory, Sampling technique, Parametric tests, Non-Parametric tests, ANOVA, Introduction to Design of Experiments, Phases of Clinical trials and Observational and Experimental studies. **CO2:** Perform analysis using SPSS, R and MINITAB statistical software 's, analysing the statistical data using Excel. **CO3:** Explain the basics of biostatistics and its role in Pharmacy **CO4:** Evaluate and apply the principles of biostatistics during conduct of basic research
BP802T	Social and Preventive Pharmacy	**CO1:** Acquire high consciousness/realization of current issues related to health and pharmaceutical problems within the country and worldwide. **CO2:** Have a critical way of thinking based on current healthcare development. **CO3:** Evaluate alternative ways of solving problems related to health and pharmaceutical issues.
BP803ET	Pharmaceutical Marketing Management	**CO1:** State the importance of marketing in the pharma industry. Develop an understanding of Indian Pharma industry as well as Global Pharma market. **CO2:** Formulate marketing strategies with respect to Pharmaceutical products. Able to formulate a pricing strategy. **CO3:** Take crucial product related decisions in the business world and create promotion and advertising strategies for Pharmaceutical products. **CO4:** Gain a deeper understanding about pharmaceutical supply chain and logistics through different channels. Understand the role and responsibilities of Medical Representatives and Product Management team.

BP811ET	Advanced Instrumentation Techniques	**CO1:** Describe the principle, instrumentation and applications of 1H- NMR, 13C-NMR spectroscopy and mass spectroscopy Interpret spectral data to predict structure of a given compound. **CO2:** Describe the principle, instrumentation and applications of thermal methods and X-ray diffraction analysis. **CO3:** Understand calibration and validation as per ICH guidelines. **CO4:** Understand the principle, procedure and applications of RIA and extraction techniques. **CO5:** Understand the principle, instrumentation and apply hyphenated techniques in pharmaceutical analysis and other applications.
BP814PW	Project	**CO1:** Apply theoretical knowledge learned in classroom to a solve research problem **CO2:** Understanding the importance and applications of various subjects and their correlation in hypothesizing and solving research problem. **CO3:** Development of critical thinking and analytical skills through hands-on learning. **CO4:** Acquire various skills like Problem solving, data handling, presentation, documentation etc. **CO5:** Plan academic, career and personal interests via research experience. **CO6:** Work collaboratively with other researchers/fellow colleagues.

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COURSE OUTCOMES (M. PHARM SEM I/II)

M. Pharm. Pharmaceutics

Course code	Course name	Outcomes
		SEM I
MPH101T	Modern Pharmaceutical Analytical Techniques	**CO1:** Acquire theoretical and practical skills in analytical techniques such as UV, IR, flame emission, atomic absorption, and fluorescence spectroscopy. **CO2:** Outline the underlying principle, instrumentation, and applications of chromatographic techniques used for the separation, identification, and quantification of the analyte. **CO3:** Describe the principle, instrumentation, and applications of NMR and mass spectroscopy. **CO4:** Explain fundamentals, working principles, and applications of X-ray diffraction and electrophoretic techniques, and immunological assays.
MPH102T	Drug Delivery System	**CO1:** Gain knowledge and apply various design approaches in formulation development of oral sustained and gastroprotective drug delivery systems **CO2**: Discuss the concepts of ocular and transdermal delivery systems and its recent advancements CO3: Understand the strategies of designing protein and peptide and vaccine delivery systems.
MPH103T	Modern Pharmaceutics	**CO1**: Understand the concept of preformulation and optimization studies and its role in formulation development **CO2**: Know the concept of Total Quality Management, different validation and calibration methods as per ICH/WHO Guidelines for the analytical equipment and instruments and GMP Considerations in order to obtain a quality product **CO3**: Understand the fundamental physical concepts and processes involved in tabletting and to comprehend the role of dissolution studies and its interpretation for understanding drug release kinetics.
MPH104T	Regulatory Affair	**CO1**: Understand the approval process of innovator and generic drugs, drug development Process in India, EU and US market **CO2**: Know the chemistry, manufacturing controls and documentation requirements, preparation of Dossiers and their submission to various regulatory agencies **CO3**: Learn the importance of Clinical trials requirements for approvals for conducting clinical trials and process of monitoring clinical trials and Pharmacovigilance and post approval regulatory requirements for actives and drug products
MPH105P	Pharmaceutics Practical I	**CO1**: Understand the principle and interpret the data obtained by analytical methods like UV, HPLC, GC, Fluorimetry and Flame photometry **CO2**: Understand the design, formulate and evaluate various novel drug delivery systems. **CO3**: Understand the fundamental physical concepts and processes involved in tabletting and to comprehend the role of dissolution studies and its interpretation for understanding drug release kinetics.

SEM-II		
MPH201T	Molecular Pharmaceutics (Nano Tech and Targeted DDS)	**CO1**: Gain knowledge of targeting and apply various design approaches in formulation development of colloidal carrier systems **CO2**: Know the design of novel, targeted pulmonary and nasal drug delivery systems. **CO3**: Understand the strategies in development of Nucleic acid-based DDS and to understand their bio distribution and pharmacokinetics
MPH202T	Advanced Biopharmaceutics & Pharmacokinetics	**CO1**: understand the concepts of drug absorption from GIT and biopharmaceutic considerations in drug product design and in vitro drug product performance **CO2:** understand the basic concepts of pharmacokinetics and the calculate and interpret data using pharmacokinetic models for predicting ADME **CO3**: apply the concept of pharmacokinetics in design and evaluation of modified release, targeted and biotechnological products
MPH203T	Computer-Aided Drug Delivery System	**CO1**: Understand the principles and techniques of computational modelling of drug disposition. **CO2:** Comprehend the principles and techniques of computer-aided formulation development. **CO3**: Gain knowledge of the principles and techniques of computer-aided biopharmaceutical characterization and computer Simulations in Pharmacokinetics and Pharmacodynamics. **CO4:** Acquire knowledge of the role and applications of AI, robotics and computational fluid dynamics in pharmaceutical development.
MPH204T	Cosmetic and Cosmeceuticals	**CO1:** Understand the building blocks and development of Cosmetics and cosmeceutical formulations. **CO2:** Understand key considerations in the design and formulation of Herbal cosmetics and cosmeceuticals. **CO3:** Gain knowledge of the Regulatory aspects and desired Safety, stability, and efficacy aspects and guidelines for Cosmetics and cosmeceutical formulations.
MPH205P	Pharmaceutics Practical II	**CO1**: Understand formulation development of colloidal carrier systems **CO2**: comprehend the role of solubility enhancement in dissolution studies and interpretation for understanding drug release kinetics **CO3**: understand and perform bioavailability and PK studies and learn the application of computer-based models in optimization of formulations, biopharmaceutical characterization, PKPD simulations and clinical development **CO4:** understand the formulation and evaluation of cosmeceutical products for haircare, skincare and oral hygiene products

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M. Pharm. Quality Assurance

Course code	Course name	Outcomes
		SEM I
MQA101T	Modern Pharmaceutical Analytical Techniques	**CO1:** Acquire theoretical and practical skills in analytical techniques such as UV, IR, flame emission, atomic absorption, and fluorescence spectroscopy. **CO2:** Comprehend the underlying principle, instrumentation, and applications of chromatographic techniques used for the separation, identification, and quantification of the analyte. **CO3:** State the principle, instrumentation, and applications of NMR and mass spectroscopy. **CO4:** Explain fundamentals, working principles, and applications of X-ray diffraction and electrophoretic techniques, and immunological assays.
MQA102T	Quality Management System	**CO1:** Introduction to Quality **CO2:** Pharmaceutical quality management **CO3:** Six System Inspection model **CO4:** Documentation in the pharmaceutical industry **CO5:** Manufacturing operations and controls
MQA103T	Quality Control and Quality Assurance	**CO1:** Understand the cGMP aspects in the pharmaceutical industry. **CO2:** Appreciate the importance of documentation. **CO3:** Discuss the scope of quality certifications applicable to pharmaceutical industries. **CO4:** State the responsibilities of the QA and QC departments.
MQA104T	Product Development and Technology Transfer	**CO1:** Understand the new product development process. **CO2:** Apply transfer technology from R&D to actual manufacturing by sorting out various information obtained during R&D. **CO3:** Elucidate necessary information to transfer products between various manufacturing places.
MQA105P	Pharmaceutical Quality Assurance Practical I	**CO1:** Apply the principles of analytical techniques like spectroscopy and chromatography in the estimation of pharmacopeial and non-pharmacopeial compounds and their products. **CO2:** Understand quality assurance terminologies, their importance, application, and federal guidelines. **CO3:** Analyse raw materials, finished products, and related substances as a part of quality assessment. **CO4:** Understand the importance and apply the principles of formulation development and analytical method development for the conduct of pre-formulation studies, stability studies, and quality control tests on raw materials, finished products, and packaging materials.
		SEM-II
MQA201T	Hazards and Safety Management	**CO1:** Acquire knowledge of natural resources and ecosystem **CO2:** Learn about sources and types of air, chemical, and fire-based hazard **CO3:** Possess knowledge of Hazard risk assessment, management, and methodology for providing a safe industrial atmosphere.

MQA202T	Pharmaceutical Validation	**CO1:** Understand the concepts of calibration, qualification, validation, and IPR. **CO2:** Recognise the qualification of various equipment and instruments. **CO3:** Understand process validation of different dosage forms. **CO4:** Appreciate knowledge about validation of analytical method estimation of drugs. **CO5:** Possess knowledge about cleaning validation.
MQA203T	Audits and Regulatory Compliance	**CO1:** Understand the principles and methodology of conducting audits in a pharmaceutical industry **CO2:** Comprehend the role of quality systems- GMP regulations, quality systems approach in pharma audits. **CO3:** Apply the audit principles in conducting an audit of vendors and diverse departments of the pharma industry. **CO4:** Evaluate audit checklists and create audit reports and analyze deficiencies.
MQA204T	Pharmaceutical Manufacturing Technology	**CO1:** Discuss various practices in the pharmaceutical industry developments, plant layout, and production planning. **CO2:** Understand the principles and practices of aseptic process technology and non-sterile manufacturing technology. **CO3:** Recognise the various components of pharmaceutical packaging technology. **CO4:** State the principles and implementation of Quality by design (QbD), Process analytical technology (PAT) in manufacturing.
MQA205P	Pharmaceutical Quality Assurance Practical II	**CO1:** Apply the principles of analytical techniques in the estimation of organic and inorganic contaminants in diverse types of samples. **CO2:** Comprehend the principles of qualification and validation of equipment and analytical instruments. **CO3:** Create checklists for audit of processes, vendors, and areas. **CO4:** Describe the principle and application of QbD and PAT in the pharmaceutical industry.

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M. Pharm. Pharmacology

Course code	Course name	Outcomes
		SEM I
MPL 101T	Modern Pharmaceutical Analytical Techniques	**CO1:** Acquire theoretical and practical skills in analytical techniques such as UV, IR, flame emission, atomic absorption, and fluorescence spectroscopy. **CO2:** Comprehend the underlying principle, instrumentation, and applications of chromatographic techniques used for the separation, identification, and quantification of the analyte. **CO3:** Describe the principle, instrumentation, and applications of NMR and mass spectroscopy **CO4:** Explain fundamentals, working principles, and applications of X-ray diffraction and electrophoretic techniques, and immunological assays.
MPL 102T	Advanced Pharmacology-I	**CO1:** Discuss the basic principles of Pharmacokinetics and Pharmacodynamics of drug **CO2:** Develop adequate knowledge of neurotransmission, systemic and autonomic pharmacology level principles with adverse effects, contraindications, and clinical uses of drugs used in the treatment of disease **CO3:** Develop adequate knowledge of CNS, CVS, and Autacoid Pharmacology principles with adverse effects, contraindications, and clinical uses of drugs used in the treatment of disease
MPL 103T	Pharmacological and Toxicological Screening Methods-I	**CO1:** Appraise the regulations and ethical requirements for the usage of experimental animals. **CO2:** Describe the various animals used in the drug discovery process and good laboratory practices in the maintenance and handling of experimental animals **CO3:** Describe the various newer screening methods involved in the drug discovery process **CO4:** Understand and correlate the preclinical data to humans
MPL 104T	Cellular and Molecular Pharmacology	**CO1:** Impart fundamental knowledge on the structure, and functions of cellular components. **CO2:** Explain the receptor signal transduction processes **CO3:** Understand the pharmacogenomics and immunotherapeutic role in clinical practice. **CO4:** Explain the applicability of genomics and proteomics tools, recombinant DNA technology, DNA therapy, and cell culture techniques involving molecular pharmacology and biomarkers and biosimilars in the drug discovery process.
MPL 105P	Pharmacology Practical I	**CO1:** Develop basic understanding and adequate skills in students related to analytical experiments, extraction, Isolation, and identification of DNA from various sources and RNA and all biotechnological tests. **CO2:** Perform and learn various routes of drug administration and techniques of blood sampling, anaesthesia, euthanasia, and Oral glucose tolerance test in experimental animals. To understand the concept of apoptosis PK studies and enzyme inhibition and induction activity. **CO3:** Perform and develop a basic understanding of screening of drugs in the animal model.

SEM-II		
MPL 201T	Advanced Pharmacology II	**CO1:** Know the process of drug discovery and development with a focus on high throughput screening and toxicological studies. **CO2:** Possess applicative knowledge of chrono pharmacology and stem cell therapy. **CO3:** Understand the potential of novel therapeutic targets and the processes for their development. **CO4:** Develop an understanding of transporter proteins in the drug resistance process and biogenic molecules in immunology and inflammation.
MPL 102T	Pharmacological and Toxicological Screening Methods-II	**CO1:** Explain the various types of toxicity studies. **CO2:** Appreciate the importance of ethical and regulatory requirements for toxicity studies. **CO3:** Demonstrate the practical skills required to conduct the preclinical toxicity studies
MPL 203T	Principles of Drug Discovery	**CO1:** Understand the importance of the role of genomics, proteomics, and bioinformatics in drug discovery and various targets for drug discovery **CO2:** Know the various lead-seeking methods and lead optimization and Rational Drug Design. **CO3:** Develop an understanding of Molecular docking and the QSAR Statistical method
MPL 204T	Clinical Research and Pharmacovigilance	**CO1:** Explain the regulatory requirements, clinical trial designs for conducting the clinical trial process, the concept of safety monitoring, reporting, and close-out activities procedure, and the role of key players involved in the clinical trials conduction process. **CO2:** Develop adequate knowledge and basics of the principles of Pharmacovigilance, knowledge, and skills to understand and detect new adverse drug reactions and their assessment. **CO3:** Develop and understand the adverse drug reaction reporting systems and communication in Pharmacovigilance with the conceptualization of Pharmacoepidemiology, Pharmacoeconomics, safety pharmacology.
MPL 205P	Pharmacology Practical II	**CO1:** Understand the concept of agonists and antagonists using in vitro isolated tissue experiments. **CO2:** Learn measurement techniques of the hemodynamic parameter **CO3:** Determine the concept of toxicities studies. **CO4:** Recognise in-silico studies, clinical trials, and adverse drug reactions.

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Department of Pharmaceutical analysis

Course code	Course name	Outcomes
		SEM I
MPL 101T	Modern Pharmaceutical Analytical Techniques	**CO1:** Acquire theoretical and practical skills in analytical techniques such as UV, IR, flame emission, atomic absorption, and fluorescence spectroscopy. **CO2:** Comprehend the underlying principle, instrumentation, and applications of chromatographic techniques used for the separation, identification, and quantification of the analyte. **CO3:** Describe the principle, instrumentation, and applications of NMR and mass spectroscopy **CO4:** Explain fundamentals, working principles, and applications of X-ray diffraction and electrophoretic techniques, and immunological assays.
MPA102T	Advanced Pharmaceutical Analysis	**CO1:** Learn appropriate analytical skills required for the analytical method development. **CO2:** Principles of various reagents used in functional group analysis that renders necessary support in research methodology and demonstrates its application in the practical related problems. **CO3:** Analysis of impurities in drugs, residual solvents and stability studies of drugs and biological products
MPA103T	Pharmaceutical Validation	**CO1:** Understand the concepts of calibration, qualification, validation. **CO2:** Possess knowledge about qualification of various equipment's, instruments and validation of utilities. **CO3:** Possess knowledge about validation of analytical method, computer systems and cleaning of equipment and facilities. **CO4:** Acquire knowledge of general principles of intellectual property.
MPL 104T	Cellular and Molecular Pharmacology	**CO1:** Impart fundamental knowledge on the structure, and functions of cellular components. **CO2:** Explain the receptor signal transduction processes **CO3:** Understand the pharmacogenomics and immunotherapeutic role in clinical practice. **CO4:** Explain the applicability of genomics and proteomics tools, recombinant DNA technology, DNA therapy, and cell culture techniques involving molecular pharmacology and biomarkers and biosimilars in the drug discovery process.
MPA104T	Food Analysis	**CO1:** Understand various analytical techniques in the determination of food constituents. **CO2:** Understand various analytical techniques in the determination of food additives. **CO3:** Understand various analytical techniques in the determination of finished food products. **CO4:** Understand various analytical techniques in the determination of Pesticides in food. **CO5:** Acquire knowledge on food regulations and legislations.
MPA105P	Pharmaceutical Analysis Practical I	**CO1:** Apply theoretical principles of UV - Visible Spectroscopy to single component and multi component analysis of drugs. **CO2:** Learn application of chromatographic methods of analysis such as HPLC, Gas Chromatography, and emission techniques such as fluorimetry and flame photometry.

		CO3: Acquire knowledge of calibration of various analytical instruments, pH meter, UV – Visible spectrophotometer, FTIR spectrophotometer, GC, HPLC & glass wares. **CO4:** Analyse various drug and food products by different analytical techniques such as titrations.
	SEM-II	
MPA 201T	Advanced Instrumental Analysis	**CO1:** Interpret the NMR, Mass and IR spectra of various organic compounds. **CO2:** Know theoretical and practical skills of the hyphenated instruments. **CO3:** Know identification of organic compounds.
MPA 202T	Modern Bio-Analytical Techniques	**CO1:** Understand extraction of drugs from biological samples. **CO2:** Understand separation of drugs from biological samples using different techniques. **CO3:** Understand Guidelines for BA/BE studies.
MPA 203T	Quality Control and Quality Assurance	**CO1:** Know the cGMP aspects in a pharmaceutical industry. **CO2:** Know to appreciate the importance of documentation. **CO3:** Know to understand the scope of quality certifications applicable to Pharmaceutical industries. **CO4:** Know to understand the responsibilities of QA & QC departments.
MPA 204T	Herbal and Cosmetic Analysis	**CO1:** Understand determination of herbal remedies and regulations. **CO2:** Understand analysis of natural products and monographs. **CO3:** Understand determination of Herbal drug-drug interaction. **CO4:** Understand Principles of performance evaluation of cosmetic products.
MPA 205P	Pharmaceutical Analysis Practical II	**CO1:** To identify organic compound by FTIR, NMR, CNMR and Mass Spectra techniques. **CO2:** Learn separation and quantification of biomolecules by various analytical techniques such as HPLC. **CO3:** Acquire knowledge of good documentation practices for preparation of protocols, batch records and master records. **CO4:** Evaluation and testing of various raw material, formulations, packaging material.