Matoshri College of Pharmacy, Eklahare,Nashik

B. Pharmacy

#	Type	ID	Program Outcome
1	PO	PO1	Pharmacy Knowledge: Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.
2	PO	PO2	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	PO	PO3	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	PO	PO4	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	PO	PO5	Leadership skills: Understand and consider the human reaction to change, motivation issues, leadership and team-building when planning changes required for fulfillment of practice, professional and societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and wellbeing.
6	PO	PO6	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	PO	PO7	Pharmaceutical Ethics: Honour personal values and apply ethical principles in professional and social contexts. Demonstrate behavior that recognizes cultural and personal variability in values, communication and lifestyles. Use ethical frameworks; apply ethical principles while making decisions and take responsibility for the outcomes associated with the decisions

#	Type	ID	Program Outcome
8	PO	PO8	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	PO	PO9	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	PO	PO10	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	PO	PO11	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. Selfassess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis

Principal
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Eklahare. Nasik - 422 105

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COURSE OUTCOMES

Year/SEM	Subject with Subject code	Course outcomes
FIRST YEAR B.PHARM (2019 PATTERN)		
SEM-I	**BP101T Human Anatomy and Physiology I (Theory)**	CO1: Apply concepts and knowledge of the general terminology, cell structure and function, histology, gross anatomy, and physiology related to the integumentary, skeletal, muscular and nervous systems to novel technical and/or clinical scenarios. CO2: Understand the relationship between a cell's structure and its function. CO3: To understand differentiate between the types of joints found in the human body and identify the types of joint movement. CO4: able to explain the role of the nervous system in homeostasis of the human body.
	BP107P Human Anatomy and Physiology I (Practical)	CO1: Understand the construction, working, care and handling of instruments, glassware's and equipment's required for practical. CO2: Knowledge of mechanism of Differential Blood Cell Count and Reticulocyte Count of blood sample. CO3: Demonstration of human axial and appendicular skeleton system with the help of bones. CO4:Knowledge of construction and working of Spirometer for the measurement of lung volume and capacities.
	BP102T Pharmaceutical Analysis I (Theory)	CO1: To understands the concept of pharmaceutical analysis, its scope and methods of expressing concentration. CO2: To acknowledge the basic principle of acid base titration, redox titration, precipitation titration, conductometric titration, non-aqueous titration and gravimetry. CO3: To understands the electrochemical methods of analysis including potentiometry and polarography. CO4: To acquire the knowledge of principle and theory of refractometry, refractive index, and instruments used in determination

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		of refractometry
	BP108P Pharmaceutical Analysis I (Practical)	CO1: Clarify basic principles of data treatment and data handling. CO2: Explain basic concepts and principles of aqueous acid base titrations and clarify need of non-aqueous acid base titrations. CO3: Clarify different terms, basic principles and reaction conditions of precipitation, Complexation and redox reaction. CO4:Understand and explain the difference between precipitation and gravimetric analysis
	BP103T Pharmaceutics I (Theory)	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: To know the Preparation of various conventional dosage forms CO5: to know and formulate biphasic liquid dosage forms such as emulsion and suspensions.
	BP109P Pharmaceutics I (Practical)	CO1: Explain formulation, evaluation and labelling of aromatic water, glycerides, syrups,elixirs and powder preparations CO2: Perform pharmaceutical calculations to determine evaluation parameters like density, viscosity, specific gravity, angle of repose, Carr's index, Hausner ratio of preparations. CO3: Describe use of ingredients in formulation and category of formulation. CO4: Compare various monophasic preparations depending upon their formulation. CO5: Selection of suitable packaging material (container-closure) for the preparation

	BP104T Pharmaceutical Inorganic Chemistry	CO1: The sources of impurities and methods to determine the impurities in inorganic drugs and pharmaceuticals. CO2: Understand the medicinal and pharmaceutical importance of inorganic compound. CO3: To study various major intra and extra cellular fluids and

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	(Theory)	electrolytes and their role. CO4: To study various aspects of radiopharmaceuticals. CO5: To understands the procedure to perform specific test and limit test of inorganic medicinal compound as per official pharmacopoeia. CO6: To understand the procedure to perform specific test and limit test of inorganic medicinal compound as per official pharmacopoeia.
	BP110P Pharmaceutical Inorganic Chemistry (Practical)	CO1: Perform qualitative analysis of given inorganic mixtures. CO2: Cary out identification test of given inorganic compounds CO3: Perform limit test for chlorides, sulphates etc. CO4:Prepare inorganic compounds.
	BP105T Communication skills (Theory)	CO1: Comprehend the concept of communication. CO2: Understand the concept of teamwork, leadership, personal development skills CO3: Acquire the knowledge of body language and presentation skill. CO4: Develop Leadership qualities and essentials.
	BP 111P Communication skills (Practical)	CO1: Demonstrating understanding basic communication like meeting people, asking questions, Do and Don't's etc. CO2: Explain consonant sounds and vowel sounds CO3: Demonstrate understanding of listening comprehension, effective writing skills, interview handling skills and presentation skills.
	BP106RBT Remedial Biology (Theory)	CO1: Understanding of living organism. CO2: Ability to analyze international classification system for living things. CO3: Ability to discriminate structure of living cells and their significance. CO4: Students learn the basic aspects of botany and zoology and their relation with pharmaceutical sciences.
	BP112RBP Remedial Biology (Practical)	CO1: Handle microscope independently CO2: Demonstrate understanding of section cutting techniques, mounting and staining, permanent slide preparation. Identify tissues by microscopic study

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		CO3: Explain stem, root, leaf and its modification CO4: Determine Blood Group, Blood Pressure and Tidal Volume.
	BP106RMT Remedial Mathematics (Theory)	CO1: Know the theory and their applications in Pharmacy CO2: Solve different types of problems by applying theory CO3: Apply mathematical concepts and principles to perform computations for Pharmaceutical Sciences.
SEM-II	**BP201T Human Anatomy and Physiology-II (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 human body. CO4: Explain physiology of cardiovascular, digestive, respiratory, urinary and reproductive system.
	BP207P Human Anatomy and Physiology II (Practical)	CO1: Perform the hematological tests like blood cell counts, hemoglobin estimation, bleeding/clotting time etc and also record blood pressure, heart rate, pulse and respiratory volume. CO2: Explain working pattern of different organs of each system CO3: Describe the interlinked mechanisms in the maintenance of normal functioning (homeostasis) of human body.
	BP202T Pharmaceutical Organic Chemistry-I (Theory)	CO1: To study the basic principles of organic chemistry. like hybridization, bond fission etc. CO2: To acquire the knowledge of IUPAC nomenclature system. CO3: To acquire the knowledge of different functional group and there chemical reactions. CO4: To acquire the knowledge of different qualitative test for the different functional group and also study the name reactions.
	BP208P Pharmaceutical Organic Chemistry I–	CO1: Explain and understand the principal behind various qualitative tests and analyze the given unknown organic compound having different functional groups.

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	(Practical)	CO2: Explain and understand the principal, reaction mechanism and illustrate application of every experiment in the pharmacy CO3: Understand, explain and apply various laboratory techniques for the synthesis of organic compounds, various techniques of purification of the synthesized compounds using precipitation or recrystallization.
	BP203T Biochemistry	CO1: To acquires the knowledge of catalytic enzymatic reactions and pathways with its diseases. CO2: To understand the metabolism of nutrient molecules in physiological and pathological conditions. CO3: To study the concept of genetic organization of genome and functions of DNA in synthesis of RNAs. CO4: To understand the lipid metabolism and disorders of lipid metabolism. CO5: To understand the catalytic role of enzymes and importance of enzyme in biochemical process.
	BP209P Biochemistry – Practical	CO1: Detect and identify proteins, amino acids and carbohydrates by various qualitative as well as quantitative tests CO2: Separate, identify and characterize proteins from various samples like egg, milk, etc and understand principle behind the technique. CO3: Isolate of starch from potato and understand techniques as well as mechanism involved CO4: Estimate quantity of ascorbic acid in a given sample. CO 5: Demonstrate action of salivary amylase on starch.
	BP204T Pathophysiology	CO1: Classify etiopathogenesis of cell injury, pain and inflammation. CO2: Categorize different types of cardiovascular disorders. CO3: Explain Pathophysiology of various neurodegentative diseases. CO4: Importance of cell cycle in the pathogenesis of malignancy CO5: Elaborate the development of infectious and parasitic diseases.
	BP205T Computer Applications in	CO1: To Know the various types of application of computers in pharmacy. CO2: To Know various types of databases.

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	Pharmacy	CO3: To Know various applications of databases in Pharmacy.
	BP210P Computer Applications in Pharmacy – Practical	CO1: Create a HTML web page to show personal information. CO2: Retrieve the information of a drug and its adverse effects using online tools CO3: Create mailing labels Using Label Wizard , generating label in MS WORD CO4: Design a form in MS Access to view, add, delete and modify the patient record in the database. CO5: Exporting Tables, Queries, Forms and Reports to web pages and XML pages.
	BP206T Environmental sciences	CO1: Understand basics of environment like ecology, ecosystem, food chain, food web and ecological pyramids. CO2: Acquire skills to help the concerned individuals in identifying and solving environmental problems. CO3:Aware about hazards of disposal wastes from hospitals and pharmaceutical industries CO4: endeavor to attain harmony with Nature.
S.Y.B.PHARM (2018 PCI PATTERN)		
SEM-III	**BP301T Pharmaceutical Organic Chemistry II (Theory)**	CO1: To study the structure, name and the type of isomerism of the organic compound. CO2: Understand and able to write the reaction, name the reaction and orientation of reactions. CO3: Understand the reactivity and stability of different organic compounds. CO4: Students can able prepare different organic compounds.
	BP305P Pharmaceutical Organic Chemistry II (Practical)	CO1: To study different laboratory techniques including recrystallisation, distillation. CO2: To understand the separation of different Binary Mixtures. CO3: Understand saponification value and its determination of different oil samples. CO4: Understand how to prepare small organic compound.

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	BP302T Physical Pharmaceutics I (Theory)	CO1: Understand the basics of chemical and physical phenomena that govern the in vivo and in vitro actions of pharmaceutical products. such as solubility, refractive index, optical rotation, dielectric constant etc. CO2: Articulate the interrelationships between the physiochemical properties of a drug, its dosage form, route of administration and bioavailability CO3: To know various gases laws and theories in correlation with formation of aerosols, crystallization & is parameters, colligative properties of non-electrolytic and electrolytic solutions, solubility and distribution phenomenon and apply them in the pharmaceutical practices.. CO4: To understand the various methods for the determination of surface &i interfacial tension of liquids CO5: To acquire knowledge of the methods of detection of complexes and describe the properties and applications of polymers. CO6: To analyze the Buffer solution, buffer equations and buffer capacity, isotonicity.
	BP306P Physical Pharmaceutics-I (Practical)	CO1: To analyze the physicochemical proerties such as solubility, pH, refractive index, partition coefficient etc by experimentally. CO2: To study the effect of electrolyte on upper consolute temperature in phase diagram CO3: To demonstrate the various adsorption isotherm by experimentally. CO4: To determine the surface tension, critical micellar concentration, HLB value of various surfactant. CO5: Analyze the complex formation of drug by using various methods.
	BP303T Pharmaceutical Microbiology (Theory)	CO1: To study what is mean by microbiology, study of bacteria and its different parts and also study the how to isolate and preserve the pure culture and study of different type of microscope. CO2: To understand the importance of sterilization and different type of sterilization method and to study the different type of staining technique for bacteria (to study the morphology of bacteria). CO3: Study the viruses and fungi also study of antiseptic and disinfectant and their evaluation test and different sterility test for solid, liquid, ophthalmic and sterile product as per IP,BP,USP. CO4: Designing of aseptic area and study laminar air flow, Clean are classification. CO5: To gain knowledge of spoilage their type and factors affecting microbial spoilage of pharmaceutical product. Know the sources & types of microbial contamination and able to identify the causes and basis of microbial spoilage.

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	BP307P Pharmaceutical Microbiology (Practical)	CO1: Know the principle, construction and working of various instruments and perform their operations and Skill to handle microscope for observation of microbes.. also to study how to prepare nutrient media and how to sterilization of the the media and equipment. CO2: To study Morphology of bacteria by using different staining technique. CO3: To study isolation of pure culture by using sterak plate and poure plate method. CO4: To study motility of bacteria by using hanging drop technique. CO5: To study microbial assay by using antibiotics by different method. CO6: To study sterility test of pharmaceutical product.
	BP304T Pharmaceutical (Theory)	CO1: To gain knowledge about various unit operations used in Pharmaceutical industries CO2: To procure knowledge about the basics of various material handling techniques in pharmaceutical industry and the various processes involved in manufacturing of pharmaceutical dosage forms. CO3: To understand the significance of plant lay out design for optimum use of resources and gain the knowledge of various materials used for pharmaceutical plant construction. CO4: To understand the various types of corrosion and the preventive methods that can be adopted for corrosion control in Pharmaceutical industries.
	BP308P Pharmaceutical Engineering (Practical)	O1: To study various pharmaceutical machines and the equipments used in pharmaceutical industry. CO2: To perform various processes used in pharmaceutical manufacturing process. CO3: To study the different methods used for determination of humidity. CO4: To study various unit operations used in pharmaceutical industry and the effect of factors influencing them.
SEM-IV	**BP401T Pharmaceutical Organic Chemistry III (Theory)**	CO1: To study the basic principles of organic chemistry. like hybridization, bond fission etc. CO2: To acquire the knowledge of IUPAC nomenclature system. CO3: To acquire the knowledge of different functional group and there chemical reactions. CO4: To acquire the knowledge of different qualitative test for the different functional group and also study the name reactions.
	BP402T	CO1: Understand the chemistry of drugs with respect to their pharmacological activity.

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	Medicinal Chemistry I (Theory)	CO2: Understand the drug metabolic pathways, adverse effect and therapeutic value of Drugs. CO3: Understand the Structural Activity Relationship (SAR) of different class of drugs. CO4: Able to write the chemical synthesis of some drugs.
	BP406P Medicinal Chemistry I – (Practical)	CO1: To study the different purification technique including Recrystallization,TLC. CO2: Able to prepare small organic drugs// intermediates. CO3: Understand and able to perform Purification of synthesized compounds by Column chromatography. CO4: Understand and able to Determine the Partition coefficient and Ionisation constants.
	BP403T Physical Pharmaceutics II (Theory)	CO1: Define and recall fundamental physical properties of matter like viscosity, flow properties of powder, particle size etc in the development of dosage forms. CO2: Distinguish the principle of chemical kinetics and to use them for stability testing and determination of expiry date of formulation. CO3: Study the basic knowledge of pharmaceutical suspensions and colloids. CO4: Demonstrate the behavior and mechanism of drug and excipients in the formulation development and evaluation of dosage form.
	BP407P Physical Pharmaceutics II (Practical)	CO1: Demonstrate the physical characteristics of powders such as particle size, surface area, flow property etc. CO2: Determination of type of flow of liquid and semisolid dosage form. CO3: To study the principle of chemical kinetics and to use them for stability testing. CO4: Calculate expiry date of different dosage form by accelerated stability study.
	BP404T Pharmacology I (Theory)	CO1: Students would have understood the pharmacological actions of different categories of drugs. CO2: They would have studied in detailed about mechanism of drug action at organ system/sub cellular/ macromolecular levels. CO3: They would have understood the application of basic pharmacological knowledge in the prevention and treatment of various diseases. CO4: They would have observed the effect of drugs on animals by simulated experiments. CO5: They would have understood the signal transduction mechanism of various receptors.

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	BP408P Pharmacology I (Practical)	CO1: Students would have understood the basic instruments used in experimental pharmacology. CO2: Students would have understood the maintenance of laboratory animals as per CPCSEA guidelines. CO3: They would have studied common laboratory animals. CO4: They would have studied different routes of drug administration.
	BP405T Pharmacognosy and Phytochemistry I	CO1: To know history, scope and the techniques in the cultivation and production of crude drugs CO2: To know the crude drugs, their uses and chemical nature CO3: To know the different evaluation techniques for the herbal drugs CO4: To carry out the microscopic and morphological evaluation of crude drugs.
	BP409P Pharmacognosy and Phytochemistry (Practical)	CO1: To generate micrometric data: Leaf constants, Length & width of fibers, diameter of starch grains CO2: Determination of Ash values, moisture content, extractive values, swelling index, foaming index, crude fiber content CO3: To study the qualitative analysis of unorganized crude drugs.
T.Y.B. PHARM (2015 PATTERN)		
SEM-V	**351 T Industrial Pharmacy-I (Theory)**	CO1: Understand the concepts of dosage form design & formulation strategies. CO2: Explain tablets as a dosage form, physico-chemical principles guiding tablet formulation, various tablet additives, manufacture & evaluation, equipments, defects in tableting & remedies. CO3: Learn the concept, types, pharmacopoeial specifications, techniques & equipments used in tablet coating. CO4: Describe capsules, types, additives, size selection, manufacturing & evaluation, equipments, & defects.
	351P Industrial Pharmacy-I (Practical)	CO1: State the correct use of various equipments in Pharmaceutics laboratory relevant to tablets, capsules & coating CO2: Explain formulation, evaluation and labeling of tablets & capsules. CO3: To understand rational behind use of formulation ingredients.

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		CO4: Prepare labels to suit regulatory requirements, to learn the conduct survey and report its finding.
	352 T Pharmaceutical Analysis –III (Theory)	CO1:To understand instrumental method of analysis CO2: To understand Analytical sample preparation techniques- sampling plan, separation techniques based on size, density, complexation, liquid-liquid extraction. CO3: To understand UV-Visible instrumentation- Beer lambert law, its deviation and limitation, Woodward rule calculations. Also spectroscopy based on scattering of light in suspended particles. CO4: To study of emission, absorption of atomic and ions. CO5: To study and understand of excitation and emission spectra, molecular luminescence and measurements of luminescence.
	352 P Pharmaceutical Analysis –III (Practical)	CO1: To understand and study of UV-Visible spectrophotometer by calibration graph method, molar absorptive value, single and doubled point standardization method. CO2: To study emission spectra by flame photometer. CO3: To understand measurements of luminescence by photoflurimeter. CO4: To understand and study of scattering of light by nephelometry. CO5: To understand how to measure absorbance by colorimeter.
	353T Medicinal chemistry-I (Theory)	CO1: Explain and relate physicochemical properties with action of drug. CO2: Discuss receptor types and forces involved in drug receptor interactions CO3: Discuss biosynthesis of Adrenaline and Acetyl choline CO4: Understand the classification of anti-muscarinic agents. CO5: Write structure activity relationship and mechanism of action of acetylcholine and sympathomimetics.
	353P Medicinal chemistry-I (Practical)	CO1: Techniques of purification of solvents by fractional distillation and vacuum distillation. CO2: Find out partition coefficient and dissociation constant of medicinal compounds CO3: Perform synthesis and purification by recrystallization of medicinal compounds for ex sulfanilamide, 1, 2, 3, 4-tetrhydrocarbazole etc.
		CO1: Explain the neurotransmitters involved in the autonomic nervous

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	354 T Pharmacology - II(Theory)	system, their synthesis and Metabolism, various adrenoreceptors and cholinoceptor, their subtypes and the clinical spectrum of their general and selective agonist and antagonist. CO2: Describe the agents that stimulate or relax skeletal muscle, including the cholinergic neuromuscular agonists and antagonists as well as the neuromuscular agents acting at non cholinergic sites. CO3: Explain the essential pharmacotherapy and pharmacological features of common and important drugs used in cardiovascular diseases and respiratory disorders.
	354 P Pharmacology - II(Practical)	CO1: Demonstrate the understanding of guidelines for animal experimentations, various routes of drug administration, methods for blood collection from experimental animals. CO2: Describe the composition of physiological salt solutions and basic instruments used in experimental pharmacology. CO3: Perform experiments using various isolated preparation and describe the effect of different drugs on the concentration response curves, interpret the action of various drugs using preclinical models/computer simulations.
	355T Analytical Pharmacognosy & Extraction Technology (Theory)	**CO1:** To understand the various extraction technologies, their instrumentation, principle and working for isolation of phytoconstituents. **CO2:** To understand the various chromatographic and non-chromatographic separation techniques for isolation of active biomolecules. **CO3:** To study the sources, chemistry, application of extraction technologies evaluation and therapeutically uses of isolated phytoconstituents. **CO4:** To study the WHO guidelines for quality efficacy, safety and purity for herbal drug analysis. **CO5:** Overview of WHO guidelines for 'Good practices for pharmaceutical quality control laboratories. **CO6**: To understand the various biological approaches and DNA fingerprinting for standardization and authentication of crude drug.
	355P Analytical Pharmacognosy	**CO1:** Apply theoretical knowledge of quality control parameters. **CO2:** To apply theoretical knowledge obtained for extraction for phytochemical, set extraction assembly, process material before

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	& Extraction Technology (Practical)	extraction. **CO3:** To understand the concept of quantitative determination of phytoconstituents by different Spectroscopical method. CO4: To demonstrate the various extraction and isolation technique for phytoconstituents evaluation.
	356T Pharmaceutical business management & disaster management	CO1: To understand the pharmaceutical business and management strategies. CO2: To gain knowledge of marketing research & product management. CO3: To understand the concept & current scenario of Indian pharmaceutical industry. CO4: To understand the concept of pharmaceutical market, principle of pharmaceutical marketing & marketing of new products. To understand the process of marketing, planning and concept of modern marketing. CO5: To learn about human resource & development needs. CO6: To learn about the disaster management, preparedness & mitigations. CO7: To understand the concept of leadership , inspiration and motivation,
	357 T Active Pharmaceutical Ingredients Technology (Theory)	CO1: Understand the concepts of bulk and fine chemicals. CO2: Understand the knowledge of material safety data sheet. CO3: Acquire the knowledge of processing of dosage form on large scale production in pharma industry. CO4: Understand the Good Manufacturing Practices.
SEM-VI	**361 T Industrial Pharmacy-II (Theory)**	CO1: To gain the knowledge related to the Disperse system CO2: To Study the various dosage forms like suspension, Emulsion and semisolid dosage form and also to study how to formulate, Evaluate dosage form. CO3: To gain the knowledge of different excipients used in pharmaceutical dosage form and to study all parameter related to excipients. CO4: Designing Manufacturing facility of suspension, emulsion and semisolid dosage as per schedule M.
	361 P	CO1: To Know the how to formulate different dosage form and how to evaluate dosage form. CO2: To prepare different suspension and emulsion dosage form and

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	Industrial Pharmacy-II (Practical)	evaluate them and study how to prepare label for container.and also study different labeling condition CO3: To prepare different semisolid dosage form and evaluate with various testing and prepare and study different labeling condition for label. CO4: To study how to prepare BMR.
	362 T Pharmaceutical Analysis –IV (Theory)	CO1: To understand the various chromatographic techniques and their application. CO2: To study principle of Electrophoresis and Thermal methods CO3: To study and understand X-ray diffraction. CO4: To acquire knowledge of X ray diffraction and radio chemical techniques employed for the analysis of APIs and formulations. CO5: Able to validate various analytical instruments & methods as per ICH/USP guidelines.
	362 P Pharmaceutical Analysis –IV (Practical)	CO1: To study and identified sample by using Chromatographic techniques. CO2: To validate samples as per ICH guidelines CO3: To Interpret XRD spectrum CO4: To study demonstration of Analytical Instrument.
	363T Medicinal chemistry-II (Theory)	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.
	363P Medicinal chemistry-II (Practical)	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.

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	364 T Pharmacology – III (Theory)	CO1: Recall pathophysiological role of central nervous system (CNS) neurotransmitters and neuromodulators. CO2: Compare and contrast pharmacology of general and local CO3: Identify neurochemical basis and plan pharmacotherapy of neurodegenerative diseases CO4: Categorize and justify pharmacotherapy of pain, inflammation, respiratory and gastrointestinal (GI) disorders. CO5: Discuss recent advanced in the field of psychopharmacology.
	364 P Pharmacology – III(Practical)	CO1: understand the pharmacological aspects of drugs falling under the above mentioned chapters CO2: Handle and carry out the animal experiments; CO3:Appreciate the importance of pharmacology subject as a basis of therapeutics; CO4: Correlate and apply the knowledge therapeutically.
	365T Natural Product Chemistry (Theory)	CO1: To understand underlying reasons as why natural products are appropriate material in discovering new drugs & their contribution in modern drug discovery. CO2: To gain knowledge of tools & techniques used in study of biosynthetic pathways in plants. CO3: Able to compare & contrast marine & terrestrial sources of medicinal materials. CO4: To acquire knowledge of source, extraction, processing, chemistry & applications of natural products used in pharmaceutical & allied industry such as coloring, sweetening agents & polymers. CO5: Understand & explain significance of natural pesticides & explain source, chemistry & applications. CO6: To understand the applications of natural products used in pharmaceutical & allied industry such as bioavailability & skin permeation agents; wound healing agents, biofuels
	365P Natural Product Chemistry (Practical)	CO1: To extract & derive various physical constants required in characterization of natural products. CO2: To isolate phytoconstituents (pure material) using column chromatography and evaluation by chemical, chromatographic and spectrum way.

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		CO3: Record and interpret UV/IR/Mass/NMR spectrum of given sample & interpret them. Handle various equipments as per SOPs.
	366T Bio-organic Chemistry and Drug Design	CO1: Understand the significance of Bioorganic Chemistry and establish its relevance in drug design & discovery. CO2: Understand general biochemical features, physiological role, their substrates/antagonists of drug targets, different receptors with reference to their mechanism of action. CO3: Nucleic Acids as drug targets, different approaches. CO4: Understand the different approaches in rational drug design. CO5:Understand various drug targets, their biochemical features, physiological & pathophysiological roles and significance in drug design
	367 T Pharmaceutical biotechnology	CO1:Understanding the importance of Immobilized enzymes in Pharmaceutical Industries CO2:Genetic engineering applications in relation to production of pharmaceuticals CO3:Importance of Monoclonal antibodies in Industries CO4:Appreciate the use of microorganisms in fermentation technology.
FINAL YEAR B.PHARM (2015 PATTERN)		
SEM-VII	**471 T Sterile products (Theory)**	CO1: To acquire basic knowledge of learning pharmacy & pharmaceuticals in sterile products. CO2: To understand & describe various Preformulation concepts of sterile products & its influence on stability. CO3: To describe formulation & processing consideration in development SVP's & LVP's. CO4: To know & understand the concept of pilot plant scale up and able to explain the procedures. CO5: To understand the aspects of validation. To describe GMP's & CGMP's. CO6: To understand the concept of lyophyllization techniques, blood and blood related products, surgical products etc.

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	471 P Sterile products (Practical)	CO1: To understand functions of pharmaceutical packaging and evaluate various parenteral packaging materials as per IP along with their merits and demerits CO2: To Understand the elements of preformulation studies. CO3: To understand the Pharmaceutical Validation and Guidelines of GMPs and current good manufacturing while formulating sterile products. CO4: To Comprehend selecting the type of equipment used in unit operations during pharmaceutical manufacturing and logic behind selection; develop knowledge and skill of designing a proper pharmaceutical process comprising of set of equipment's for various unit operations for quality result. CO5: o Build up skill and ability to Know the formulation and evaluation aspects of sterile dosage forms and ophthalmic preparation with emphasis on compounding, processing, filtration, sealing, sterilization, packaging and labeling
	472 T Pharmaceutical Analysis –V (Theory)	CO1: To acknowledge the different types of instrumental analytical techniques available for quality control of APIs and formulations. CO2: To know the modern chromatographic methods of separation like gas chromatography and HPLC CO3: To understand the near Infrared and Raman spectroscopy CO4:.To understands scanning and transmission electron microscopy.
	472 P Pharmaceutical Analysis –V (Practical)	CO1: To validate UV spectrophotometric method for estimation of various drugs. CO2: To have an idea about Interpretation of 1H NMR spectra of organic compounds. CO3: To have an idea about Interpretation of 13C NMR spectra of organic compounds. CO4: To have an idea about Interpretation of IR spectra of organic compounds. CO5: To have an idea about Interpretation of mass spectra of organic compounds.
	473 T Medicinal Chemistry-III	CO1: Know general aspects of the design & development of drugs including history, classification, nomenclature, structure activity

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	(Theory)	relationship (SAR). CO2:Understand the mechanism of action, adverse effects, therapeutic uses and recent developments in NSAIDs, CO3: Understand the mechanism of action, adverse effects, therapeutic uses and recent developments in steroidal anti-inflammatory drugs, narcotic & non-narcotic analgesics. CO4: Understand the mechanism of action, adverse effects, therapeutic uses and recent developments in antipyretics and autacoids drugs.
	473 P Medicinal Chemistry-III (Practical)	CO1: Make correct use of various equipments & take safety measures while working in medicinal chemistry laboratory. CO2: Develop skills involved in thin layer chromatography techniques and purification of synthesized compounds by column chromatography. CO3: Synthesize, recrystallize and understand reaction mechanisms involved in synthesis of medicinally important organic compounds. CO4: Explain reaction mechanisms involved in synthesis of medicinally important compounds.
	474 T Pharmacology-IV (Theory)	CO1: Classification, mechanism of action, antibacterial spectrum, resistance, therapeutic uses, adverse effects and contraindications of various antibiotics. CO2: Various endocrine hormones, its types, receptors involved and mechanisms involved. CO3: Biosynthesis, Mechanism of action, Pharmacology and regulation of Thyroid, Antithyroid drugs and Parathyroid hormones. CO4: Biosynthesis, Secretion, Mechanism of action, Pharmacology of insulin and glucagon and Pharmacotherapy of Diabetes Mellitus.
	474 P Pharmacology-IV (Practical)	CO1: Use of isolated tissue preparations for bioassay methods. CO2: Basic aspects to carryout Critical appraisal of marketed fixed dose combinations (FDC). CO3: Understanding Prescription auditing and standard treatment protocols.
		CO1: Understand & explain various difficulties in standardization of herbal material, new approaches evolved, and steps in development of

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	475 T Natural drug technology (Theory)	plant monograph. CO2: Understand & explain need & significance of plant material authentication, new approaches used with their merits & demerits. CO3: Comprehend & explain various factors affecting on level of secondary metabolites. CO4: Understand the concept of health & pathogens, philosophical basis, diagnosis & treatment aspects of Ayurveda, Unani, Siddha &Homeopathic system of medicine. CO5: Understand the concept of nutraceutical & functional foods as dietary supplements.
	475 P Natural drug technology (Practical)	CO1: To acquire knowledge of preparation & evaluation of herbal/TSM formulations. CO2: Evaluate marketed cosmetic & nutraceutical formulations CO3: Conduct pre-formulation parameters & understand underlying rationale CO4: Conduct in vitro assays for correlation with biological efficacy.
	476 T Bio-pharmaceutics & pharmacokinetics	CO1: Understand the concept of Biopharmaceutics and its applications in product development. CO2: Study the pharmacokinetic processes and their relevance in efficacy of dosage form. CO3: Learning the concepts of bioavailability and bioequivalence studies. CO4: Learning various compartmental models.
	477 T Pharmaceutical Jurisprudence	CO1: Understand basic principles, purpose, dimensions, significance and relevance of pharmaceutical laws in India. CO2: Discuss the purpose, responsibilities, qualifications for membership and the make-up of the Board.
SEM-VIII	**481 T Advanced drug delivery system (Theory)**	CO1: To understand the drug delivery system of pharmaceutical compound in the body as needed to safely achieve in desired therapeutic effect. CO2: To understand the approaches, formulation technologies and system for transporting a pharmaceutical compound. CO3: To understand the concept of the applications, formulations, evaluation of microencapsulation. CO4: To understand the selection of the polymer in fabrication of drug.

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	CO5: To understand the optimization techniques.
481 P Advanced drug delivery system (Practical)	CO1: Formulation development and evaluation of sustained release, transdermal, gastro retentive formulations. CO2: Formulation development and evaluation of Micro encapsulation. CO3: Evaluation of marketed preparations CO4: Optimization studies using 2 LEVEL factorial design
482 T Cosmetic science (Theory)	CO1: To understand the fundamentals and scope of cosmetic science and also the anatomy & physiology of various body parts for which these cosmetics are used. CO2: To acquire the knowledge of various excipients used in cosmetic industry was including cleanliness, packaging, labeling and quality control of cosmetics manufacturing. CO3: To understand the formulation and evaluation of various cosmetics products. CO4: To gain knowledge of various cosmeceutical agents used in cosmetic industry.
482 P Cosmetic science (Practical)	CO1: : To know the various equipments used for formulation and evaluation of cosmetics products CO2: To perform formulation and evaluation and labelling (as per regulatory requirement) of various cosmetics like skin care products, hair products, eye products, nail products, dental products and bath products. CO3: To perform market survey of different brands of any cosmetic product and carryout comparative study. CO4: To gain the knowledge of use of various ingredients in cosmetic formulations and also the categories of formulation meant for.
483 T Pharmaceutical analysis –VI (Theory)	CO1: To understand the principles, instrumentation of NMR and Mass Spectrometry and their applications in Pharmaceutical research, quality control of APIs & formulations. CO2: To know the principle and instrumentation of ESR. CO3: To understand the basics of ion exchange, flash and supercritical fluid chromatography.

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		CO4: To understand the automated methods of analysis.
	483 P Pharmaceutical analysis –VI (Practical)	CO1: To validate UV spectrophotometric method for estimation of various drugs. CO2: To have an idea about Interpretation of 1H NMR spectra of organic compounds. CO3: To have an idea about Interpretation of 13C NMR spectra of organic compounds. CO4: To have an idea about Interpretation of IR spectra of organic compounds. CO5: To have an idea about Interpretation of mass spectra of organic compounds.
	484 T Medicinal Chemistry-IV (Theory)	CO1: Understanding general aspects of the design & development of drugs including history, classification, nomenclature, structure activity relationship (SAR), mechanism of action, adverse effects, therapeutic uses and recent developments in therapeutic categories such as chemotherapeutic agents, antibiotics, hormones & anti-fertility agents. . CO2: Explain reaction mechanisms involved in synthesis of medicinally important compounds.
	484 P Medicinal Chemistry-IV (Practical)	CO1: Make correct use of various equipments & take safety measures while working in medicinal chemistry laboratory. CO2: Develop skills involved in thin layer chromatography techniques and purification of synthesized compounds by column chromatography. CO3: Synthesize, recrystallize and understand reaction mechanisms involved in synthesis of medicinally important organic compounds. CO4: Make correct use of various equipments and take safety measures while working in Medicinal Chemistry Laboratory
	485 T Pharmacology- V (theory)	CO1: Understanding the importance of isolated preparation, mechanism of action of drugs on isolated tissues, expertise in performing bioassay of drugs. CO2: Analyzing the rational and irrational fixed dose combinations based on various parameters. CO3:Apply basic statistical concepts commonly used in Health and

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		Medical Sciences CO4: Use basic analytical techniques to generate results.
	485 P Pharmacology- V (Practical)	CO1: Understand Use of isolated tissue preparations for antagonistic bioassay methods. CO2: Basic aspects to carryout neurobehavioral characterization. CO3: Understanding various parametric and non-parametric tests used in biostatistics.
	486 T Natural Products: Commerce, Industry & Regulations	CO1: Understand & realize the significance of natural products in daily life. He/she should be able to classify different segments in market, demand & supply position; export & import potential; position of Indian herbal drug industry in global contest; government organizations& policies for promotion; their regulation in India & other countries, various regulatory guidelines, ethical issues etc. CO2: Realize the market potential of natural products & explore entrepreneurship skills to grab these opportunities. CO3: Understand & explain safe use of natural products, possible toxicities &interaction, toxicities in most venerable group (elderly patients), need &significance of Pharmacovigilance systems; WHO guidelines in this regard.
	487 T Quality Assurance Techniques	CO1: Describe the significance of quality in pharmaceutical manufacturing. CO2: Understand the concept of Current Good Manufacturing Practices (cGMP). CO3: Describe various aspects of documentation, SOPs and records. CO4: Elaborate on the role of validation in assurance of quality in pharmaceutical industry.

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