Shree Santkrupa College of Pharmacy, Ghogaon

Criterion 2

Teaching- Learning and Evaluation

2.6

Student Performance and Learning Outcomes

2.6.1

Programme Outcomes (POs) and Course Outcomes (COs) for all Programmes offered by the institution are stated and displayed on website

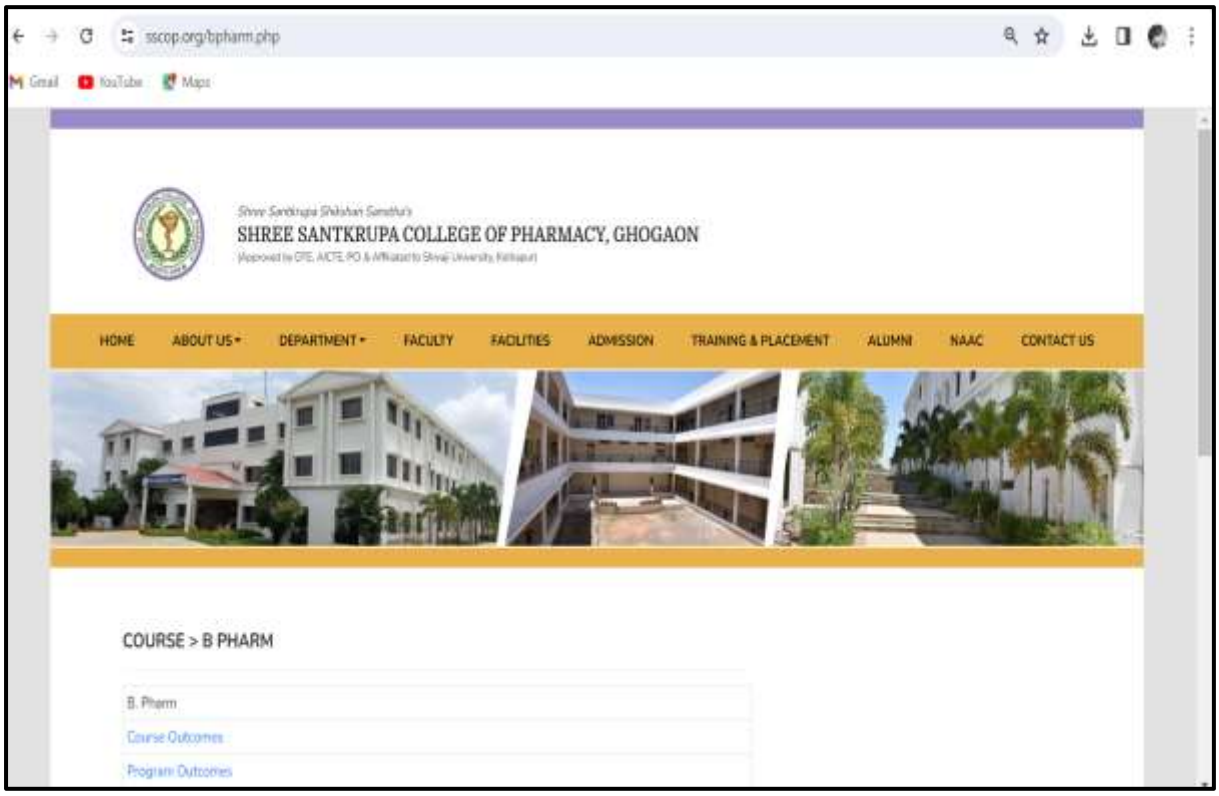
2.6 Student Performance and Learning Outcomes

2.6.1 Programme Outcomes (POs) and Course Outcomes (COs) for all Programmes offered by the institution are stated and displayed on website

INDEX

1. **Programme Outcomes (POs) and Course Outcomes (COs) are stated and displayed on website**

   a. **Screenshot of website indicating PO and CO displayed**



https://www.sscop.org/bpharm.php

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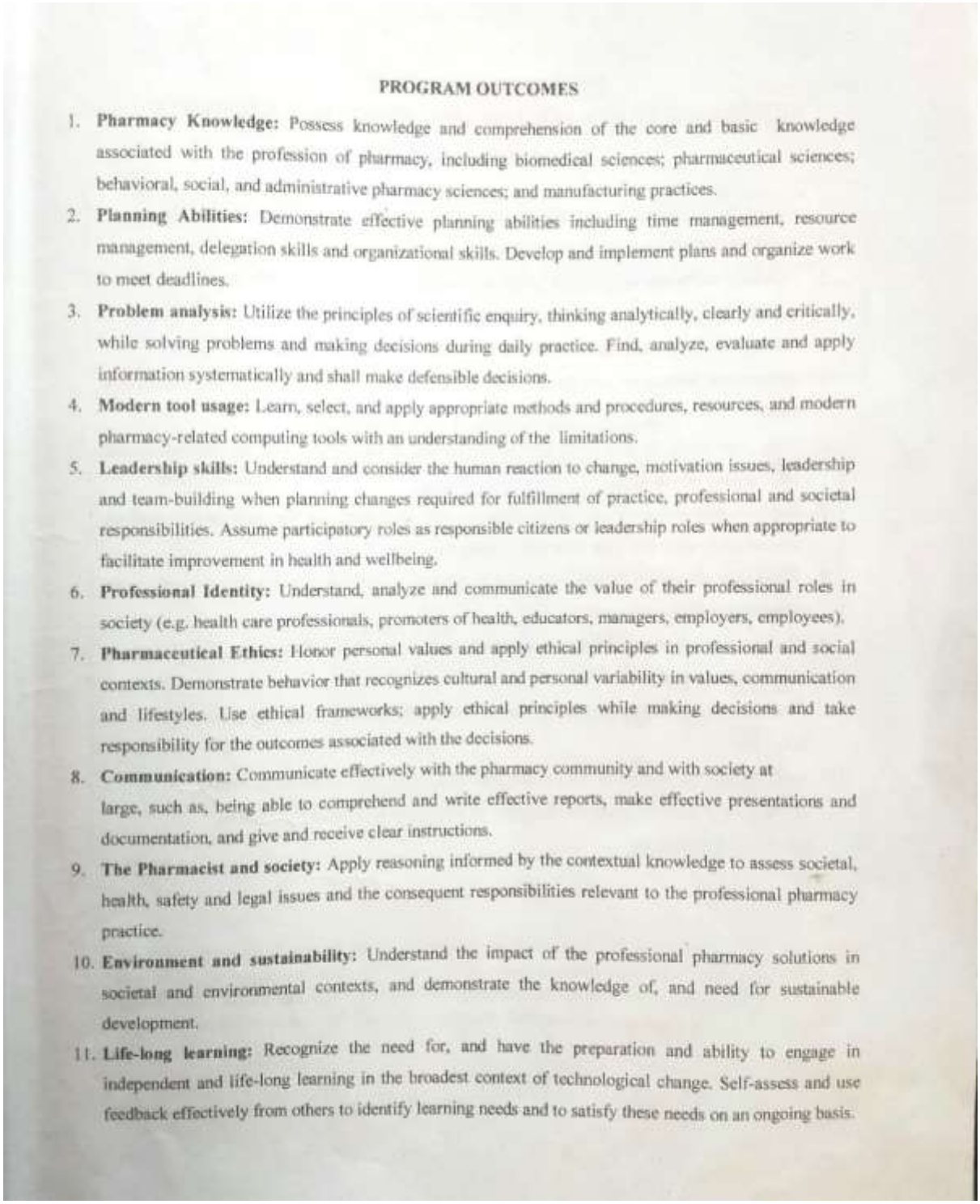
b. Academic documents indicating PO and CO displayed

Laboratory Manual Indicating PO



PROGRAM OUTCOMES

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

Laboratory Manual Indicating CO

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Course objectives:

1. Understand different methods to identify impurities in pharmaceuticals by performing limit tests.
2. Analyze the inorganic compound by performing qualitative analysis.
3. Know the various tests for purity.
4. Know the steps involved in preparation of inorganic compounds.

Course Outcomes:

After completing this course, the students should able to :

1. Identify impurities from pharmaceutical substances by performing limit tests.
2. Perform the identification test for inorganic compounds.
3. Perform the tests for purity.
4. Prepare the inorganic compounds and explain principle behind it.
5. Calculate the theoretical, practical and percentage yield of inorganic pharmaceutical compounds.
6. Recognize important safety precautions before using hazardous chemicals.

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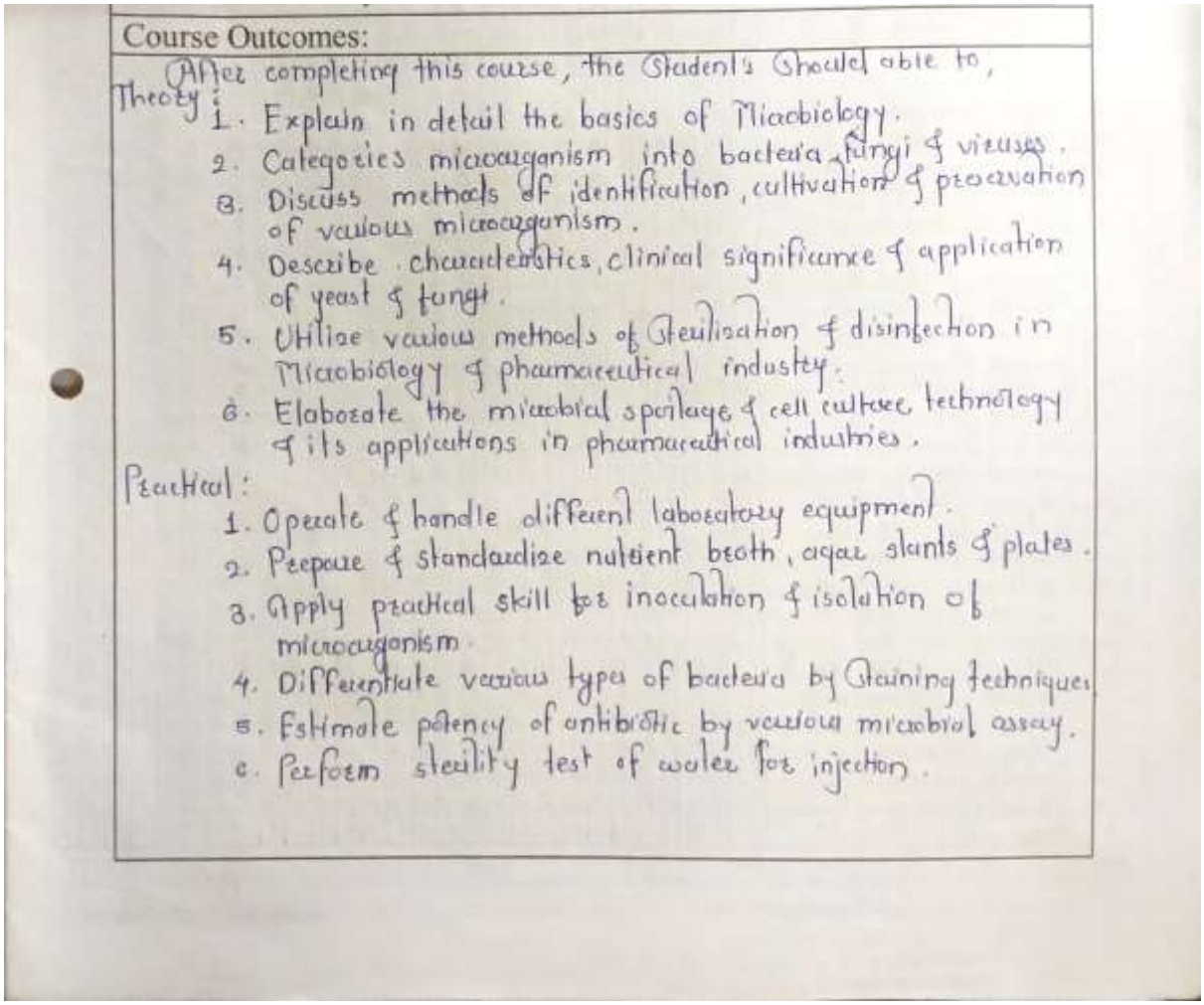
Attendance Record Indicating CO



Course Outcomes:

After completing this course, the Student's Should able to,

Theory:

1. Explain in detail the basics of Microbiology.
2. Categories microorganism into bacteria, fungi & viruses.
3. Discuss methods of identification, cultivation & preservation of various microorganism.
4. Describe characteristics, clinical significance & application of yeast & fungi.
5. Utilize various methods of Sterilisation & disinfection in Microbiology & pharmaceutical industry.
6. Elaborate the microbial spoilage & cell culture technology & its applications in pharmaceutical industries.

Practical:

1. Operate & handle different laboratory equipment.
2. Prepare & standardize nutrient broth, agar slants & plates.
3. Apply practical skill for inoculation & isolation of microorganism.
4. Differentiate various type of bacteria by staining techniques.
5. Estimate potency of antibiotic by various microbial assay.
6. Perform sterility test of water for injection.

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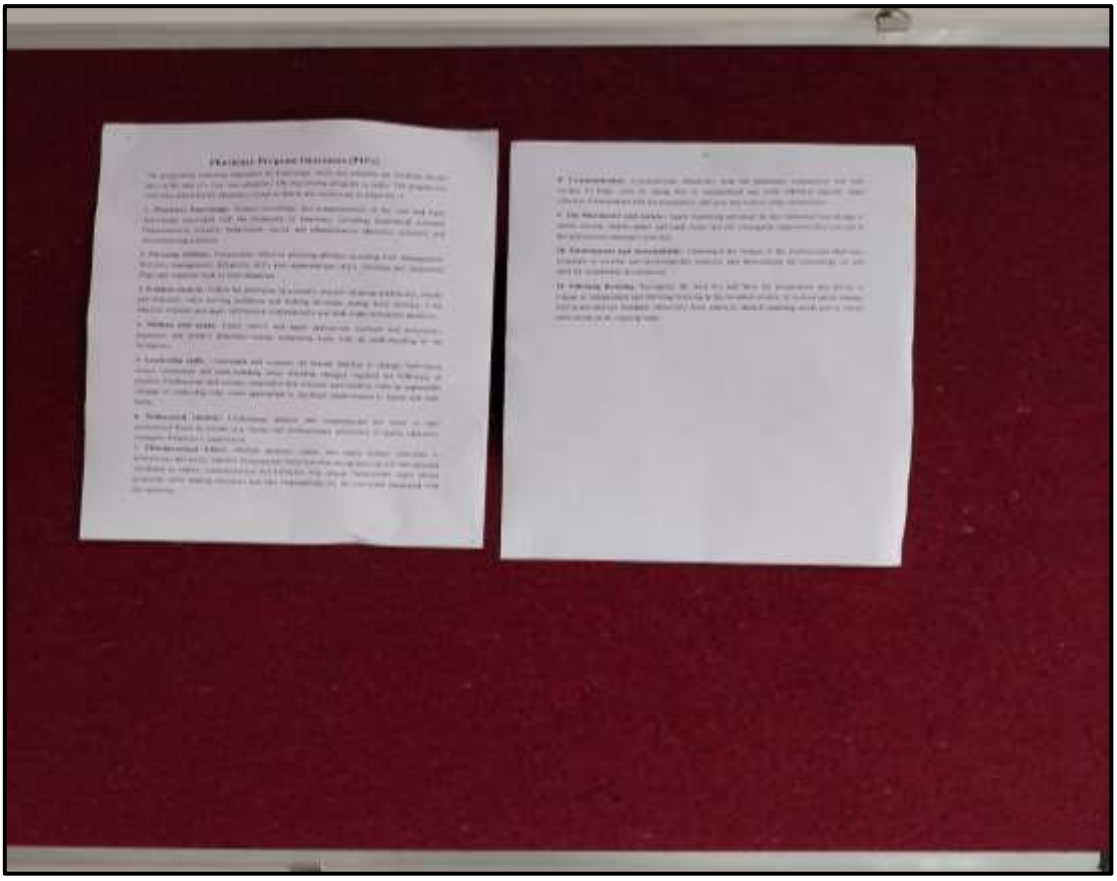
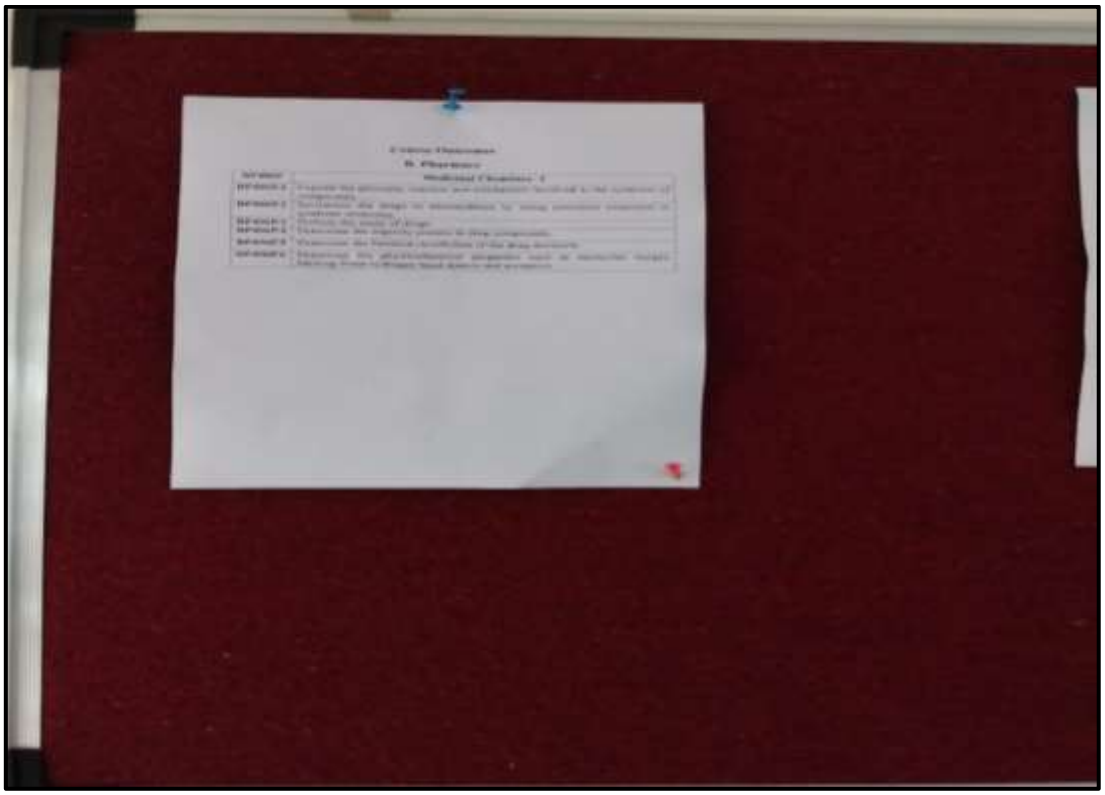
Display of CO on Notice board of Laboratory





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2. Pharmacy Program Outcomes (PO's)

The programme outcomes represent the knowledge, skills and attitudes that the students should have at the end of a four-year pharmacy program in India. The programme outcomes stated for the pharmacy course as below also mentioned in annexure -I

1. **Pharmacy Knowledge:** Possess knowledge and comprehension of the core and basic Knowledge associated with the profession of pharmacy, including biomedical sciences; Pharmaceutical sciences; behavioural, social, and administrative pharmacy sciences; and Manufacturing practices.
2. **Planning Abilities:** Demonstrate effective planning abilities including time management, Resource management, delegation skills and organizational skills. Develop and implement Plans and organize work to meet deadlines.
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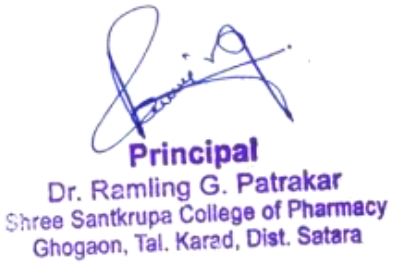

3. Program Specific Outcomes (PSO)

B. Pharmacy

PSO 1: Understand a core and basic knowledge in different subjects of Pharmaceutical Sciences.

PSO2: To strengthen the professional and ethical attitude, effective communication skills, team work skills, multidisciplinary approach, and the ability to relate pharmaceutical sciences issue to broader social context.

PSO3: Understand the applications of Pharmaceutical Sciences in drug and formulation development, drug analysis, drug safety and efficacy in medicine.

PSO4: Perform procedures as per laboratory standards in the areas of Pharmaceutical Sciences.

PSO5: Implementing expertise in medicinal chemistry, preparative pharmacy, analytical skills, and pharmaceutical engineering in coming up with novel dosage forms as well as drug delivery skills to cater the needs of industry

PSO6: To emphasize the significance of quality control and assurance in drug design and formulation development.

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M. Pharmacy (Pharmaceutics)

PSO 1: To acquire knowledge of novel as well as conventional drug delivery systems

PSO2: To identify and resolve the research problems by utilizing the technical skill gained through training and experimentation

PSO3: To utilize the soft skills as a part of team in the professional endeavour

M. Pharmacy (Pharmacology)

PSO 1: Understand the basic concepts of Anatomy, Physiology, Pathophysiology and Clinical Biochemistry and Pharmacology including pharmacokinetics; pharmacodynamics; drug metabolism; and drug drug interactions; and the interrelation of these pharmacological properties and pharmacological profile of a drug

PSO 2: Understand the application of basic knowledge of Anatomy, Physiology and Pathophysiology, Pharmacotherapeutics, Clinical Pharmacology and Toxicology

PSO 3: Understand the approaches for drug discovery and development and the regulatory procedures

PSO 4: Know Current clinical judgement and Pharmacological details of major drugs in clinical practice

PSO 5: Know etiological factors; pathogenesis, pathophysiological changes that occur in the most common disease states, their clinical presentations and strategy of the therapy along with the choice of drug(s) can act to effectively treat, cure, or mitigate the underlying disease causes and/or symptoms along with the non-pharmacological approaches

PSO 6: Understand the physiological, pharmacological, and psychological effects of acute and chronic exposure of individuals to drugs of abuse, and describe the consequences of sudden withdrawal of such a drug from a drug dependent individual

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4. Course Outcomes

Framing of Course Outcomes:

The course outcomes are prepared for each course (each subject) for the syllabus prescribed by Shivaji University, Kolhapur as well as by PCI. The course outcomes are framed by individual subject teacher by using bloom taxonomy. The statements are prepared by action verbs from bloom taxonomy domains like knowledge, Comprehension, Application, Analysis, Synthesis and Evaluation. The course outcomes are evaluated through examinations, assignments, seminars, project and practicals.

1. The Nomenclature for the course

A) For PCI prescribed syllabus incepted from 2017-18 BP101.1

BP - Stands for pharmacy

BPI - Stands for the first semester

BP101 -Stands for first semester and first course for that semester

BP101.1 - Stands for first semester, first course for the semester and first statement of the Course

B) For Syllabus framed by Shivaji University, KolhapurC2.3.2.1

C - Stands for course

C2 - Stands for year of the course

C2.3 - Stands for the year and semester of the course

C2.3.1 - Stands for the year, semester and the course (subject) number of that semester

C2.3.1.1 - Stands for the year, semester, course number and the statement number of the respective course

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Table no. Bloom's Taxonomy

I Remembering	II Understanding	III Applying	IV Analysing	V Evaluating	VI Creating
Exhibit Memory of Previously Learned Material by recalling facts, terms, basic concepts, and answers	Demonstrate understanding of facts and ideas by organizing, comparing, translating, interpreting, giving descriptions, and stating main ideas	Solve Problems to new situations by applying acquired knowledge, facts, techniques and rules in a different way	Examine and break information into parts by identifying Motives or causes. Make inferences and find evidence to support Generalizations.	Present and Defend opinions by making judgments about information, validity of ideas, or quality of work based on a set of Criteria	Compile information together in a different way by combining elements in a new pattern or proposing alternative Solutions
• Choose • Define • Find • How • Label • List • Match • Name • Recall • Relate • Select • Show • What • When • Where • Which • Who • Why	• Classify • Compare •Contrast • Demonstrate • Explain • Extend • Illustrate • Infer • Interpret • Outline • Rephrase • Show • Summarize • Translate	• Apply •Build • Choose • Construct • Develop • Experiment with • Identify • Make use of • Model • Organize • Plan • Select • Solve • Utilize	• Analyse • Assume • Categorize • Classify • Compare • Conclusion • Contrast • Discover • Dissect • Distinguish • Divide • Examine • List • Simplify • Survey • Take part in • Test for • Theme	• Agree • Appraise • Assess • Choose • Compare • Conclude • Determine • Estimate • Evaluate • Explain • Importance • Influence • Interpret • Justify • Mark • Measure • Opinion • Prioritize • recommend	• Adapt • Build • Change • Choose • Combine • Compose • Construct • Create • Design • Develop • Discuss • Elaborate • Formulate • Improve • Invent • Maximize • Minimize • Modify • Originate

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List of Course Outcomes

B. Pharmacy

First year B. Pharmacy:

BP101T	**Human Anatomy and Physiology I– Theory**
BP101T.1	Define the basic anatomical terminologies and discuss the molecule, cell, tissue, organ, their functions and, interrelationships.
BP101T.2	Explain the anatomy and physiology of blood, lymphatic and other body fluids.
BP101T.3	Recognize and differentiate the autonomic nervous system.
BP101T.4	Describe in detail the anatomy and physiology of musculoskeletal system.
BP101T.5	Discuss the gross morphology, and functions of various parts of the cardiovascular system.
BP101T.6	Summarize the anatomy and physiology of sense organs.
BP102T	**Pharmaceutical Analysis I – Theory**
BP102T.1	Recall the fundamental analytical techniques used in quality control.
BP102T.2	Explain the accuracy, precision, significant figure and error concepts.
BP102T.3	Discuss in detail the aqueous, non- aqueous acid-base titration.
BP102T.4	Discuss in detail volumetric and gravimetric analytical techniques.
BP102T.5	Estimate some mentioned pharmaceutical compounds.
BP102T.6	Explain the principle and applications of electrochemical methods of analysis.
BP103T	**Pharmaceutics- I Theory**
BP103T.1	Summarize the historical background and development of profession of pharmacy.
BP103T.2	Describe the basics of different dosage forms, pharmaceutical incompatibilities and pharmaceutical calculations.
BP103T.3	Understand the ethical and professional way of handling the prescriptions with importance effective patient communication.
BP103T.4	Discuss the properties of ingredients used in the formulation of various conventional dosage forms.
BP103T.5	Comprehend formulation of various conventional dosage forms.
BP103T.6	Know the evaluation parameters of the various conventional dosage forms.

BP104T	**Pharmaceutical Inorganic Chemistry – Theory**
BP104T.1	Explain the history of pharmacopoeia and concepts of quality control tests including sources of impurities.
BP104T.2	Describe acids, bases, buffers and different gastrointestinal agents
BP104T.3	Explain in detail the Major extra and intracellular electrolytes: its physiological role with special emphasis to the acid base balance, replacement therapy and oral rehydration salt
BP104T.4	Describe the preparation, properties and medicinal uses of inorganic compounds like Dental products, Antimicrobials, Expectorants, Emetics, Hematinic, Antidotes and Astringents.

BP104T.5	Write the assay method of some selected inorganic compounds.
BP104T.6	Explain the basic concepts, biological effects, diagnostics and therapeutic applications of radiopharmaceuticals.
BP105T	**Communication skills – Theory**
BP105T.1	Explain the types of communication and develop ethical practice for sustaining the reputation of pharmacy profession.
BP105T.2	Develop basic listening skills to be an active listener
BP105T.3	Communicate effectively by verbal and nonverbal techniques.
BP105T.4	Inculcate Interview skills essential for professional development.
BP105T.5	Prepare, deliver and defend presentations competently in front of professionals.
BP105T.6	Utilize soft skills to work cohesively with the team as a member or leader and add value to the pharmaceutical business.

BP106RBT	**Remedial Biology -Theory**
BP106RBT.1	Explain the classification and salient features of five kingdom of life.
BP106RBT.2	Discuss the basic components of anatomy and physiology of plant.
BP106RBT.3	Explain the basic components of anatomy and physiology of animal with special reference to human.
BP106RBT.4	Discuss the various system of human being.
BP106RBT.5	Discuss the plant and mineral nutrition with basic structural and functional activities of plant.
BP106RBT.6	Describe the structure and function of cell and cell organelles.
BP106RMT	**Remedial Mathematics – Theory**
BP106RMT.1	Describe the partial fraction, logarithms, functions, limits and continuity Describe the partial fraction, logarithms, functions, limits and continuity.
BP106RMT.2	Find the matrices and determinants.
BP106RMT.3	Discuss the Analytical Geometry.
BP106RMT.4	Solve the different types of calculations.
BP106RMT.5	Determine the differential equations and Laplace transform.
BP106RMT.6	Explain the important applications of Mathematics in Pharmacy.

BP107P	**Human Anatomy and Physiology- I – Practical**
BP107P.1	Summarize the utilization of the laboratory equipment and other tools.
BP107P.2	Perform and interpret the basic hematological experiments.
BP107P.3	Identify the tissues using specimen and categorize skeletal system.
BP107P.4	Measure and interpret the blood pressure, pulse rate and heart rate.
BP107P.5	Discuss health counseling for community.

BP108P	**Pharmaceutical Analysis I – Practical**
BP108P.1	Prepare primary and secondary standard solutions.
BP108P.2	Perform standardization of secondary standard solutions.
BP108P.3	Determine percentage purity of given pharmaceutical drugs..
BP108P.4	Determine normality of a solution by electro-analytical methods.
BP108P.5	Identify the impurity in Pharmaceuticals by limit test.
BP108P.6	Explain the concept of Normality, Molarity, mEq, Percent Concentration etc.
BP109P	**Pharmaceutics I – Practical**
BP109P.1	Discuss and use instructions and safety measures for working in laboratory.
BP109P.2	Refer and use various Pharmacopoeias for the formulation of various conventional dosage forms.
BP109P.3	Select and describe the properties of ingredients used in the formulation of various conventional dosage forms.
BP109P.4	Formulate some of the conventional dosage forms.
BP109P.5	Evaluate (preliminary) prepared of the conventional dosage forms.
BP109P.6	Elaborate and prepare label for the preparation of the conventional dosage forms.
BP110P	**Pharmaceutical Inorganic Chemistry – Practical**
BP110P.1	Identify the impurities from pharmaceutical substances by performing limit tests.
BP110P.2	Identify the cations and anions present in the inorganic sample through systematic qualitative analysis.
BP110P.3	Perform the tests for purity.
BP110P.4	Prepare the inorganic compounds and understand the chemical reactions.
BP110P.5	Determine the theoretical, practical and percentage yield of inorganic pharmaceutical

	compounds.
BP110P.6	Recognize the important safety precautions before using hazardous chemicals.

BP111P	**Communication skills – Practical**
BP111P.1	Summarize and apply basic communication skills effectively in pharmacy profession.
BP111P.2	Utilize various types of pronunciations in pharmacy practice.
BP111P.3	Compare verbal and nonverbal communications.
BP111P.4	Build effective skills of writing letters, E-mails with etiquettes.
BP111P.5	Adapt sufficient interview skills essential for professional development.
BP111P.6	Show effective presentations in front of professionals.
BP112RBP	**Remedial Biology – Practical**
BP112RBP.1	Discuss the parts of microscope ,section cutting techniques ,mounting and staining ,permanent slide preparation
BP112RBP.2	Describe the cell ,stem , root, leaf ,seed ,fruit, flower and their modifications
BP112RBP.3	Explain the computer models for study of frog
BP112RBP.4	Explain the microscopic evaluation and identification features of tissues of different parts of plant
BP112RBP.5	Determine the blood group, blood pressure ,total volume

BP201T	**Human Anatomy and Physiology II – Theory**
BP201T.1	Discuss the anatomy and physiology of Central Nervous system.
BP201T.2	Discuss the anatomy and physiology of respiratory system and urinary system.
BP201T.3	Describe the anatomy and physiology of endocrine glands and explain the role of each hormone.
BP201T.4	Outline the anatomy and physiology of male and female reproductive system.
BP201T.5	Describe the anatomy and coordination of different organs of digestive system.
BP201T.6	Explain the energetics and genetics.
BP202T	**Pharmaceutical Organic Chemistry I – Theory**
BP202T.1	Differentiate organic compounds based on their functionalities.
BP202T.2	Propose methods for preparing specific compounds using smaller compounds based on their chemical properties.
BP202T.3	Discuss possible applications of physical, chemical properties of organic compounds for

	qualitative and quantitative analysis.
BP202T.4	Describe methodologies and mechanisms for adding small molecules across unsaturated compounds.
BP202T.5	Explain methods for introducing unsaturation in an organic compound.
BP202T.6	Suggest possible applications of physical, chemical properties of organic compounds for commercial and medicinal purposes.
BP203T	**Biochemistry – Theory**
BP203T.1	Define, classify and write the structures of various classes of amino acids, proteins, nucleic acids and their role in biological functions.
BP203T.2	Explain biosynthesis and metabolism of proteins.
BP203T.3	Discuss the role of nucleic acid in biosynthesis of proteins.
BP203T.4	Elaborate enzymes, their role in catalytic reactions including kinetics.
BP203T.5	Explain electron transport chain and oxidative phosphorylation associated with living cells.
BP203T.6	Define, classify and write the structures of various classes of amino acids, proteins, nucleic acids and their role in biological functions.

BP204T	**Pathophysiology – Theory**
BP204T.1	Explain the basics of cell injury, inflammation and tissue repair.
BP204T.2	Discuss the etio-pathogenesis, clinical manifestations and complications of Cardiovascular, respiratory, renal, endocrine, nervous, haematological and gastrointestinal disorders.
BP204T.3	Explain the diseases of musculoskeletal system.
BP204T.4	Describe the etio-pathogenesis of infectious diseases and sexually transmitted diseases.
BP204T.5	Describe the etiopathgenesis of Cancer.
BP204T.6	Discuss the etio-pathogenesis of inflammatory bowel diseases and liver diseases.
BP205T	**Computer Applications in Pharmacy – Theory**
BP205T.1	Discuss various Number systems used in computer and calculate their inter conversion.
BP205T.2	Describe various information systems and outline their flow diagrams.
BP205T.3	Recall the knowledge of web technologies, databases and demonstrate their applications in pharmacy.
BP205T.4	Apply the knowledge to select proper software to carry out various operations in pharmacy.
BP205T.5	Explain the importance of bioinformatics in drug development and vaccine discovery.

BP205T.6	Explain the use of computer for data analysis in preclinical evaluation.
BP206T	**Environmental sciences – Theory ***
BP206T.1	Discuss the mechanism of functioning of the ecosystem.
BP206T.2	Explain how the environment influences us in all dimensions of life.
BP206T.3	Discuss methodologies of conserving natural resources and to find alternative renewable sources.
BP206T.4	Explain the interrelationships of components of the ecosystem.
BP206T.5	Describe sources of ecological system.
BP206T.6	Suggest methods for preventing pollution.

BP207P	**Human Anatomy and Physiology II –Practical**
BP207P.1	Discuss and perform the different general neurological examinations.
BP207P.2	Measure and interpret the body temperature and basal mass index.
BP207P.3	Assess the physiological data of different respiratory volumes.
BP207P.4	Discuss health counseling and family planning for community.
BP207P.5	Describe the integumentary and special senses using specimen, models, etc.
BP207P.6	Explain the nervous system and endocrine system using specimen, models, etc.
BP208P	**Pharmaceutical Organic Chemistry I– Practical**
BP208P.1	Handle, store, and dispose chemicals and glassware as per norms.
BP208P.2	Identify organic compounds through systematic qualitative analysis.
BP208P.3	Prepare complex organic compounds using smaller ones based on known chemical reactions,
BP208P.4	Read observations of experiments properly and record the same in a specified manner.
BP208P.5	Interpret results and make conclusions.
BP208P.6	Prepare models of organic compounds using molecular model kit and recognize the importance of structure and its relation to bond angle, length, shape, molecular volume and thereby its properties.
BP209P	**Biochemistry – Practical**
BP209P.1	Analyze qualitatively the given sample of protein.
BP209P.2	Discuss significance of regents used in protein analysis.
BP209P.3	Propose Isolation of casein and perform the qualitative test.

BP209P.4	Analyze quantitatively the given sample of protein from biological fluid.
BP209P.5	Make use of observations, interpret results and draw conclusion.

BP210P	**Computer Applications in Pharmacy – Practical**
BP210P.1	Explain the various Applications of Computer in Pharmacy
BP210P.2	Create the HTML Web Page mailing labels using label wizards
BP210P.3	Utilize the knowledge of designing the questionaries' and retrieve the information of drug using online tool
BP210P.4	Analyse the data base, Invoice table, queries, design a form and generating labels in MS Access.
BP210P.5	Describe the generating report and printing the report from patient database
BP210P.6	Demonstrate the export tables, quarries, forms report to the web and XML page.

Second Year B. Pharmacy

BP301T	**Pharmaceutical Organic Chemistry II – Theory**
BP301T.1	Outline chemical, physicochemical properties of chemical compounds belonging to: phenols, amines, arenes, PAHs, carboxylic acids and their derivatives.
BP301T.2	Describe the strategies and approaches used to determine the structure, stability of arenes and cycloalkanes.
BP301T.3	Elaborate how chemical properties / physical constants of molecules can be used for evaluating their purity and quality.
BP301T.4	Compare the stability and reactivity of benzene, polynuclear hydrocarbons and their derivatives.
BP301T.5	Discuss mechanism; types; factors influencing and applications of EAS.
BP301T.6	Elaborate on mechanism; uses and application of diazotization reaction.
BP302T	**Physical Pharmaceutics I – Theory**
BP302T.1	Explain the various physicochemical properties of drug molecules in the designing the dosage forms.
BP302T.2	Explain the states of matter, its properties and applications in pharmaceuticals.
BP302T.3	Utilize the concept of surface tension and interfacial tension in the formulation of liquid and semisolid dosage forms.
BP302T.4	Explain the concept and applications of complexation and protein binding.
BP302T.5	Apply the principles of pH, buffers and isotonic buffers.
BP302T.6	Solve the numerical problems related to course content.
BP303T	**Pharmaceutical Microbiology – Theory**
BP303T.1	Explain the basics of Microbiology
BP303T.2	Categorize microorganism into bacteria, actinomycetes, yeast and fungi, rickettsia and viruses.
BP303T.3	Discuss methods of identification, cultivation and preservation of various microorganisms.
BP303T.4	Explain characteristics, clinical significance and applications of Yeast, Fungi and Rickettsia in pharmacy.
BP303T.5	Use various methods of sterilization and disinfection in Microbiology and Pharmaceutical industry.
BP303T.6	Recall the fundamentals of Immunology

BP304T	**Pharmaceutical Engineering – Theory**
BP304T.1	Explain various unit operations used in Pharmaceutical industries.
BP304T.2	Describe the properties of material used in pharmaceutical industry correlate with its handling techniques.
BP304T.3	Illustrate the mechanics of fluid, fluid flow and its measurement in accordance with statics

	& movement of fluids.
BP304T.4	Perform various processes involved in pharmaceutical manufacturing process.
BP304T.5	Appreciate the various preventive methods used for corrosion control in Pharmaceutical industries.
BP304T.6	Apply basic principles including description of equipment and accessories involved in unit operations of crystallization, evaporation, distillation and refrigeration.
BP305P	**Pharmaceutical Organic Chemistry II – Practical**
BP305P.1	Use general equipment's in the organic chemistry laboratory, including the fume-hood to carry out an organic reaction.
BP305P.2	Recognize the importance and the use of personnel and general safety measures to be followed while handling, storing and disposing chemicals and glass ware.
BP305P.3	Plan, extend and execute methods of preparing compounds. Choose a method based on the yield, safety measures needed, ease, economy and possible impurities in the product.
BP305P.4	Plan, extend and execute GREEN methods of preparing compounds. Choose a method based on the yield, safety measures needed, ease, economy and possible impurities in the product.
BP305P.5	Discuss the reactions involved, principle, theory and mechanism involved in the preparation /analysis of a compound.
BP305P.6	Record, interpret the observations and document the same in a suitable format.
BP306P	**Physical Pharmaceutics I – Practical**
BP306P.1	Utilize the skills to operate laboratory instruments used in the determination of various physical properties.
BP306P.2	Determine the physicochemical properties of liquids like, surface tension, PKa, solubility etc.
BP306P.3	Estimate the partition coefficient and discuss its significance.
BP306P.4	Determine Freundlich and Langmuir constants by using activated charcoal.
BP306P5	Estimate the hydrophilic lipophilic balance (HLB) value and critical micelle concentration (CMC) of the surfactants.
BP306P.6	Determine stability constant and donor acceptor ratio of different complexes by solubility and pH titration method.
BP307P	**Pharmaceutical Microbiology – Practical**
BP307P.1	Operate and handle different laboratory equipment.
BP307P.2	Prepare and standardize nutrient broth, agar slants and plates.

BP307P.3	Apply practical skills for inoculation and isolation of microorganisms
BP307P.4	Differentiate various types of Bacteria by staining techniques.
BP307P.5	Estimate potency of antibiotics by various microbial assay.
BP307P.6	Perform stability test of water for injection.
BP 308P	**Pharmaceutical Engineering –Practical**
BP 308P.1	Explain various unit operations used in Pharmaceutical industries.
BP 308P.2	Determine overall heat transfer coefficient.
BP 308P.3	Perform size reduction and size separation using suitable equipment's.
BP 308P.4	Determine various parameters of distillation, humidity and crystallization.
BP 308P.5	Determine rate of drying, filtration and evaporation.
BP 308P.6	Utilize the knowledge of various Pharmaceutical unit operations required in manufacturing industries.

BP401T	**Pharmaceutical Organic Chemistry III– Theory**
BP401T.1	Elaborate on the stereo chemical aspects of organic compounds and stereo chemical reactions.
BP401T.2	Write the nomenclature and classification of heterocyclic compounds.
BP401T.3	Explain the synthesis, reactions of some heterocyclic compounds.
BP401T.4	Discuss the medicinal uses of heterocyclic compounds.
BP401T.5	Describe the relative aromaticity and reactivity of pyrrole, furan and thiophene.
BP401T.6	Discuss the reactions, detailed mechanism and applications for reactions of synthetic importance.
BP402T	**Medicinal Chemistry I – Theory**
BP402T.1	Describe the exhibition of drug action and factors influencing drug action.
BP402T.2	Explain the metabolic pathways of drugs.
BP402T.3	Classify the therapeutic agents and outline the synthetic routes for medicinal agents
BP402T.4	Analyse the correlation of structure and biological activity of medicinal agents.
BP402T.5	Discuss the factors influencing the drug metabolism.
BP402T.6	Elaborate the mechanism of action and efficacy of drug.
BP403T	**Physical Pharmaceutics II – Theory**

BP403T.1	Summarize the colloidal dispersion and its properties with its applications in pharmaceuticals.
BP403T.2	Utilize the deformation of solids in understanding pre-formulation study of tablets.
BP403T.3	Illustrate the pharmaceutical applications of micrometric and derived properties of powders in formulation of the solid dosage forms.
BP403T.4	Discuss the dispersed systems emphasizing on theories, types and properties of suspensions and emulsions.
BP403T.5	Explain the concept and significance of drug stability in half life, shelf life determination and accelerated stability study.
BP403T 06	Utilize the knowledge of Rheology for manufacturing of pharmaceutical dosage forms and differentiate between Newtonian and non-Newtonian fluids.

BP404T	**Pharmacology I – Theory**
BP404T.1	Discuss **t**he basic principles of pharmacokinetics and pharmacodynamics for safe and effective therapeutic management of drug in patients.
BP404T.2	Discuss the adverse drug reactions, pharmacovigilance, drug interactions, drug discovery and clinical trials.
BP404T.3	Discuss the pharmacology of the drugs acting on autonomic nervous system to restore physiological functions.
BP404T.4	Describe the pharmacology of local anesthetics, neuromuscular blocking agents and skeletal muscle relaxants.
BP404T.5	Explain the pharmacology and pharmacotherapeutics of Central Nervous system disorders.
BP404T.6	Discuss the Pathophysiology and pharmacotherapy of neurodegenerative disorders, myasthenia gravis and glaucoma.
BP405T	**Pharmacognosy and Phytochemistry I– Theory**
BP405T.1	Recallthe knowledge of historical development and scope of Pharmacognosy.
BP405T.2	Discuss the sources and classification of crude drugs
BP405T.3	Describe the fundamental principles involved in cultivation, collection and processing of crude drugs along with the effect of environmental factors on quality of crude drugs and agricultural techniques used for crop improvement.
BP405T.4	Apply quality control procedures for qualitative, quantitative evaluation and detection of adulteration in crude drugs.
BP405T.5	Summarize the active chemical constituents generally found in medicinal plants.
BP405T.6	Explain the medicinal, commercial benefits of primary metabolite and different plant products.

BP406P	**Medicinal Chemistry I – Practical**
BP406P.1	Explain the principle, reaction and mechanism involved in the synthesis of compounds.
BP406P.2	Synthesize the drugs or intermediates by using processes employed in synthetic chemistry.
BP406P.3	Perform the assay of drugs.
BP406P.4	Determine the impurity present in drug compounds.
BP406P.5	Determine the Partition co-efficient of the drug molecule.
BP406P.6	Determine the physicochemical properties such as molecular weight, Melting Point hydrogen bond donors and acceptors.
BP407P	**Physical Pharmaceutics II – Practical**
BP407P.1	Utilize skills to operate laboratory instruments used in the determination of various physical properties.
BP407P.2	Determine the density, viscosity of solvents.
BP407P.3	Measure the particle size of powders by various methods.
BP407P.4	Predict its flow ability and compressibility of granules and powders.
BP407P.5	Determination sedimentation volume with effect of different suspending agent.
BP407P.6	Determination of reaction rate constant first and second order reactions.
BP408P	**Pharmacology I – Practical**
BP408P.1	Identify **t**he basics and instruments used in experimental pharmacology.
BP408P.2	Summarize the common laboratory animals and their maintenance as per the Committee for purpose of control and supervision on experimental animals (CPCSEA) guidelines.
BP408P.3	Explain the common laboratory techniques and different routes of drug administration in experimental animals.
BP408P.4	Discuss the effect of hepatic microsomal enzyme inducers and skeletal muscle relaxants by using suitable method.
BP408P.5	Demonstrate the effect of drugs on rabbit eye, ciliary motility of frog's esophagus and locomotor activity by using suitable method.
BP408P.6	Demonstrate the anticonvulsant activity, anxiolytic activity, local anesthetic activity, stereotype and anti-catatonic activity by appropriate methods.

BP409P	**Pharmacognosy and Phytochemistry I – Practical**
BP409P.1	Evaluate the crude drugs by microscopic and chemical examination.
BP409P.2	Identify crude drugs by physical and chemical examination.
BP409P.3	Use the analytical microscopic techniques to determine dimension of starch grains, calcium

	oxalate crystals and phloem fibres.
BP409P.4	Analyse the leaf constants such as stomatal number, stomatal index, and vein-islet and vein-termination number.
BP409P.5	Develop the basic knowledge of qualitative and quantitative microscopy.
BP409P.6	Use the physicochemical methods for evaluation of crude drugs.

Third Year B. Pharmacy

BP501T	**Medicinal Chemistry II – Theory**
BP501T.1	Discuss the development, classification, mechanism of action, uses and adverse effects of antihistaminic, anti-neoplastic, anti-anginal, diuretics, antihypertensive, anti-arrhythmic, anti-hyperlipidaemic, coagulants and anticoagulants, drugs used in congestive heart failure.
BP501T.2	Explain the nomenclature, stereochemistry, metabolism, and classification, mechanism of action, uses and adverse effects of steroids.
BP501T.3	Describe the insulin and its preparations, development, classification, mechanism of action, uses and adverse effects of antidiabetic agents.
BP501T.4	Explain the classification, mechanism of action, uses and adverse effects of thyroid and anti-thyroid, local anesthetic agents.
BP501T.5	Write the SAR of different class of drugs.
BP501T.6	Outline the synthesis of selected drugs.
BP502T	**Industrial Pharmacy -I– Theory**
BP502T.1	Explain the concept, types, pharmacopoeial specifications, manufacturing techniques, equipment and evaluation of non-sterile pharmaceutical formulations
BP502T.2	Outline the sterile techniques used in pharmaceutical industry to develop sterile Dosage forms.
BP502T.3	Apply the basic knowledge of pre-formulation parameters for the development of new formulations.
BP502T.4	Apply the evaluation and packaging skills for different forms of pharmaceutical dosage forms.
BP502T.5	Design the cosmetics for different parts of body.
BP502T.6	Discuss the preparation and evaluation of Aerosol.

BP503T	**Pharmacology II – Theory**
BP503T.1	Discuss the etio-pathogenesis and pharmacology of cardiovascular diseases.
BP503T.2	Discuss the hematinics, coagulants, anticoagulants, fibrinolytics, anti-platelet drugs, plasma volume expanders and drug used in therapy of shock.
BP503T.3	Discuss the pharmacology of Diuretics.
BP503T.4	Describe the physiological, biochemical and pharmacological role of autocoids and related drugs.
BP503T.5	Describe the pharmacological role of drugs used in endocrine disorders like Pituitary, Thyroid, Pancreas and gonads.
BP503T.6	Explain in detail the concept of bioassay with examples like Insulin, Oxytocin, Vasopressin, ACTH, d-tubocurarine, Digitalis, Histamine and 5-HT.

BP504T	**Pharmacognosy and Phytochemistry II– Theory**
BP504T.1	Discuss the biogenesis of different secondary metabolites.
BP504T.2	Discuss the active chemical constituents generally found in medicinal plants.
BP504T.3	Explain the sources, phytochemistry, therapeutic and commercial applications of different secondary metabolites.
BP504T.4	Describ**e** the Isolation and Analysis of Phytoconstituents.
BP504T.5	Explain the Industrial production and utilization of phytoconstituents.
BP504T.6	Describe the modern methods of extraction, isolation and identification of phytoconstituents from crude drugs.

BP505T	**Pharmaceutical Jurisprudence – Theory**
BP505T.1	Describe the various laws, regulations, schedules, regulatory authorities and agencies governing import, manufacture, labeling, packaging, sale or distribution of pharmaceuticals under/in Drug and Cosmetic act 1940 and Rules 1945.
BP505T.2	Explain constitution, functions of pharmacy council of India, educational regulations, state and Joint state pharmacy council, registration of pharmacists, offences and penalties in relation to Pharmacy act 1948.
BP505T.3	Discuss the authorities, power of central and state government, offences and penalties to permit, control and regulate the operations related to Narcotic Drugs and Psychotropic Substances.
BP505T.4	Discuss the Drugs Price Control Order 2013, National List of Essential Medicines and classify advertisements, offences, penalties as per Drugs and Magic Remedies Act 1954.
BP505T.5	Describe the animal welfare board of India, experimentation of animal, offences, penalties under prevention of Cruelty to Animals Act 1960 and pharmacy profession in concern to code of ethics.
BP505T.6	Describe in brief about Pharmaceutical Legislations, Intellectual Property Rights and the laws/regulations in relation to Medicinal and Toilet Preparation Act –1955, Medical Termination of Pregnancy Act, Right to Information Act and
BP506P	**Industrial Pharmacy -I – Practical**
BP506P.1	Revise and apply the basic knowledge of Pre-formulation parameters for the development of new formulations.
BP506P.2	Prepare the manufacturing record sheets
BP506P.3	Summarize the official requirements and components for different types of Parenteral.
BP506P.4	Formulate and evaluate different sterile products
BP506P.5	Design different types of non-sterile dosage forms

BP506P.6	Select the suitable ingredients, equipment, and packaging materials and manufacture cosmetic preparations.

BP507P	**Pharmacology II – Practical**
BP507P.1	Describe the different physiological salt solutions and in-vitro pharmacological experiments.
BP507P.2	Discuss the effect of different drugs and ions on isolated frog heart and on blood pressure and heart rate of dog.
BP507P.3	Demonstrate the bioassay of Acetylcholine, Histamine, Oxytocin and Serotonin using different methods.
BP507P.4	Determine PA2 value and PD2 value by using suitable muscle preparation.
BP507P.5	Demonstrate the analgesic and anti-inflammatory activity by appropriate methods.
BP507P.6	Explain the effect of diuretics, spasmogens and spasmolytics using suitable method.
BP508P	**Pharmacognosy and Phytochemistry II – Practical**
BP508P.1	Evaluate the crude drugs by morphological and microscopic methods.
BP508P.2	Identify the crude drugs by microscopic powder characteristic examination.
BP508P.3	Discussthe isolation and detection of active chemical constituents from crude drugs.
BP508P.4	Apply the basic chromatographic techniques for isolation of phytoconstituents.
BP508P.5	Discussthe extraction of volatile oils and detection of their constituents.
BP508P.6	Identify the crude drugs by physical and chemical examination.
BP601T	**Medicinal Chemistry III – Theory**
BP601T.1	Discuss the history, nomenclature, stereochemistry, and chemical degradation, and classification, mechanism of action, uses and adverse effects of antibiotics.
BP601T.2	Explain the basic concepts and application of prodrug design.
BP601T.3	Describe the classification, mechanism of action, uses and adverse effects of antimalarial, antitubercular, urinary tract anti-infective, antiviral, sulphonamides, antifungal, antiprotozoal, anthelmintics agents.
BP601T.4	Discuss the various approaches in drug design and concepts and applications of combinatorial chemistry.
BP601T.5	Explain the SAR of different class of drugs.
BP601T.6	Outline the synthesis of some drugs.

BP602T	**Pharmacology III – Theory**

BP602T.1	Describe the Pathophysiology and Pharmacology of drugs used in disorders of Respiratory system.
BP602T.2	Describe the Pathophysiology and Pharmacology of drugs used in disorders of Digestive system.
BP602T.3	Discuss the Classification, Mechanism of action, Pharmacokinetics, Adverse effects, contraindications and uses of Antimicrobial agents.
BP602T.4	Discuss the pharmacology of Antineoplastic agents.
BP602T.5	Explain in detail Immuno-pharmacology.
BP602T.6	Discuss the principles of Toxicology and Chrono-pharmacology.
BP603T	**Herbal Drug Technology – Theory**
BP603T.1	Utilize the herbs as source of raw material for herbal medicine.
BP603T.2	Describe the basic principles involved in traditional system of medicine and the methods of preparation and standardization for Ayurveda formulations.
BP603T.3	Discuss the sources and description of raw materials used as herbal excipients in conventional herbal formulation.
BP603T.4	Discuss the benefits of plants based nutraceuticals in prevention of disease.
BP603T.5	Summarize the concept of regulation of herbal medicine in relation to assessment, patenting, and manufacturing.
BP603T.6	Explain the current status and future prospects of herbal industry and GMP in accordance to the herbal drugs.
BP604T	**Biopharmaceutics and Pharmacokinetics – Theory**
BP604T.1	Determine factors affecting drug absorption, bioavailability and bioequivalence
BP604T.2	Describe disposition kinetic models, first order and second order.
BP604T.3	Discuss the importance of bioavailability and bioequivalence
BP604T.4	Interpret plasma drug concentration measurement by the application of compartment model.
BP604T.5	Estimate the Non-linear pharmacokinetics with special reference to its assessment.
BP604T.6	Assess the Biopharmaceutics and Pharmacokinetics and their role in formulation development and clinical setting
BP604T.7	Determine factors affecting drug absorption, bioavailability and bioequivalence

BP605T	**Pharmaceutical Biotechnology – Theory**
BP605T.1	Elaborate on biotechnology, enzyme technology, biosensors, protein engineering and basic principles of genetic engineering
BP605T.2	Explain the rDNA technology, genetic engineering and applications in relation to production of pharmaceuticals.
BP605T.3	Describe the immunology, general method of the preparation of products related to immunity and hybridoma technology.

BP605T.4	Discuss the collection, processing and storage of blood products.
BP605T.5	Explain the immunoblotting techniques, microbial genetics and mutation.
BP605T.6	Utilize the knowledge of fermentation methods and production of various pharmaceutical products.
BP606T	**Quality Assurance –Theory**
BP606T.1	Discuss concept of quality assurance, GMP, TQM, ICH, NABL, QbD and ISO.
BP606T.2	Explain the quality control test for container, rubber, closures packing material.
BP606T.3	Describe the master plan and calibration of PH meter and UV spectrophotometer.
BP606T.4	Describe the various complaints and evaluation of complaints, good return recalling the product.
BP606T.5	Discuss the training program with respects to personal record, sterile and equipment selection
BP606T.6	Explain the principle quality audits, master formula records, SOP, quality documents and quality review.
BP607P	**Medicinal Chemistry- III – Practical**
BP607P.1	Explain the principle, reaction and mechanism involved in the synthesis of compounds.
BP607P.2	Synthesize the drugs or intermediates by using processes employed in synthetic chemistry.
BP607P.3	Perform the assay of drugs.
BP607P.4	Prepare compounds or intermediates by Microwave irradiation technique.
BP607P.5	Draw the structures and reactions using chem draw
BP607P.6	Determine the physicochemical properties such as log P, c log P, MR, molecular weight, hydrogen bond donors and acceptors using drug design software.

BP608P	**Pharmacology -III – Practical**
BP608P.1	Calculate the dose, pharmacokinetics estimates and acute oral toxicity from a given data.
BP608P.2	Demonstrate the Anti-allergic activity, antiulcer activity, hypoglycemic activity and test for pyrogen by appropriate methods.
BP608P.3	Estimate the serum biochemical parameters by using semi-auto-analyzer/colorimeter.
BP608P.4	Explain the effect of drugs on gastrointestinal system by suitable method.
BP608P.5	Evaluate the acute skin irritation and acute eye irritation by suitable method.
BP608P.6	Perform the bio statistical analysis like Student's T test, Anova, Chi-square test and Wilcoxon Signed Rank test.

BP609P	**Herbal Drug Technology – Practical**
BP609P.1	Identify the phytoconstituents of plants by performing phytochemical screening.
BP609P.2	Analyze the herbal formulations as per WHO and ICH guidelines.
BP609P.3	Evaluate the excipients of natural origin
BP609P.4	Prepare and standardized the cosmetics and formulations of herbal origin.
BP609P.5	Use the Pharmacopoeia for analyzing monographs of herbal drug.
BP609P.6	Evaluate the crude drugs by chemical methods

Final Year B. Pharmacy

BP701T	**Instrumental Methods of Analysis – Theory**
BP701T.1	Discuss the role of spectroscopic techniques in qualitative analysis of organic compounds.
BP701T.2	Elaborate where and how spectroscopic techniques could be used for quantitative analysis of materials.
BP701T.3	Illustrate the methodology and the applications of chromatographic, electrophoretic techniques
BP701T.4	Explicate the applications of molecular spectroscopic techniques for quantitative analysis of organic compounds.
BP701T.5	Annotate the role of atomic absorption spectrometry in qualitative and quantitative analysis of organic compounds.
BP701T.6	Describe the application of instrumental chromatographic methods for qualitative and quantitative analysis of pharmaceuticals
BP702T	**Industrial Pharmacy-II – Theory**
BP702T.1	Suggest the sequence and modalities for scale up of a manufacturing process involving on API / Formulation.
BP702T.2	Guide /initiate transfer of technology of a manufacturing process with all its component process.
BP702T.3	Implement national regulation related to drug manufacturing and its evaluation in letter and spirit.
BP702T.4	Implement international regulation related to drug manufacturing and its evaluation in letter and spirit.
BP702T.5	Suggest suitable QMS to a client based on type of his activity production /service
BP702T.6	To use an appropriate application for getting permission to start an industry of manufacture /import /sales of pharmaceutical type.

BP703T	**Pharmacy Practice – Theory**
BP703T.1	Manage the working functioning of hospital, hospital pharmacy and duties responsibilities of hospital pharmacist professional practice management skills in hospital pharmacies.
BP703T.2	Analyze objective, composition ad functions of Pharmacy and Therapeutic committee and concept of hospital formulary
BP703T.3	Correlate the concept channels of distribution, forms of business organization, drug store management, purchasing and inventory control in retail trade
BP703T.4	Summarize the clinical pharmacy services like obtaining medication history and its significance monitoring drug therapy , detecting and assessing adverse drug reactions interpret selected laboratory results and their significance in patient care
BP703T.5	Correlate the business and professional practice management skills in community pharmacies; do patient counseling and proving drug information., Dispensing of OTC products

BP703T.6	Identify the importance of Handling of Prescription and Investigation Drug Product
BP704T	**Novel Drug Delivery System – Theory**
BP704T.1	Demonstrate the Introduction and scope of Novel Drug Delivery System.
BP704T.2	Differentiate controlled and sustained Drug Delivery System.
BP704T.3	Select the appropriate polymers for the development of Novel Drug Delivery System.
BP704T.4	Explain the various approaches for Novel Drug Delivery System
BP704T.5	Discuss the formulation of Novel Drug Delivery System.
BP704T.6	Describe the evaluation of Novel Drug Delivery System.

BP705P	**Instrumental Methods of Analysis – Practical**
BP705P.1	Independently operate various analytical instruments viz: UV-VIS, colorimeter, flame photometer, Flourimetry, nephelo-turbidometer.
BP705P.2	Perform the assay of various APIs and formulations utilizing various analytical instruments:UV-VIS, colorimeter, flame photometer, Flourimetry, nephelo-turbidometer as per Pharmacopoeial standards.
BP705P.3	Perform separation of different components like amino acids, sugars, plant pigments using chromatographic techniques like: Paper, TLC, column chromatography.
BP705P.4	Explain the working, validation by demonstration experiment for HPLC and Gas chromatography.
BP705P.5	Take appropriate safety measures while handling instruments, chemicals and apparatus.
BP706PS	**Practice School***
BP706PS.1	Identify a relevant, manageable scientific problem, for working out. Fix objectives for the research work.
BP706PS.2	Collect information about the problem from primary, secondary and internet sources, process and use it appropriately.
BP706PS.3	Plan, execute experiments and obtain reliable results.
BP706PS.4	Collect process and document data in appropriate formats.
BP706PS.5	Analyse, interpret and present results, if necessary using statistical and graphical tools.
BP706PS.6	Publish present results in an open forum and defend the same.

BP801T	**Biostatistics and Research Methodology- Theory**
BP801T.1	Discuss the techniques in statistics and research methodology, design of experiment
BP801T.2	Illustrate the various ways to interpret and present the collected data.
BP801T.3	Describe the appropriate statistical methods required for particular research design and data.
BP801T.4	Develop the ability to apply methods of statistic and research methodology While working on research project work.
BP801T.5	Demonstrate the operation of M.S Excel, SPSS R and MINITAB
BP801T.6	Elaborate design and analysis of experiments and response surface methodology.
BP802T	**Social and Preventive Pharmacy-Theory**
BP802T.1	Discuss the concept of Health and Disease
BP802T.2	Explain the role of food, sociocultural factors and hygiene on health.
BP802T.3	Describe the general principles of prevention and control of Communicable Diseases.
BP802T.4	Describe the general principles of prevention and control of Non-communicable Diseases
BP802T.5	Discuss the objectives, functioning and outcome of National Health Programmes.
BP802T.6	Explain the role of Community services in rural, urban and school health.
BP805ET	**Pharmacovigilance**
BP805ET.1	Explain importance of drug safety monitoring.
BP805ET.2	Discuss History, development, National and international scenario of pharmacovigilance & comprehend dictionaries, coding and terminologies Used in pharmacovigilance.
BP805ET.3	Summarize detection and assessment of new adverse drug reactions, Adverse drug reaction reporting systems and communication in pharmacovigilance, Pharmacovigilance Program of India IPvPI] requirement for ADR reporting in India, ICH guidelines for ICSR, PSUR, expedited reporting, pharmacovigilance planning, CIOMS requirements for ADR reporting
BP805ET.4	Comprehend methods of safety data during pre-clinical, clinical and post Approval phases of drugs' life cycle.
BP805ET.5	Comprehend methods of safety data during pre-clinical, clinical and post Approval phases of drugs' life cycle.
BP805ET.6	Elaborate case narratives of adverse events and their quality.

BP809ET	**Cosmetic Science- Theory**
BP809ET.1	Explain the physiological consideration of skin, hair and oral cavity with respect to cosmetic appliances.
BP809ET.2	Access the composition of cosmetic product required for appropriate cosmetics treatment.
BP809ET.3	Discuss the basics of sun protection and formulations of sunscreen, antiperspirants and deodorants.
BP809ET.4	Elaborate the role of herbal cosmetics on hair, skin and oral care.
BP809ET.5	Apply the evaluation and analytical skills for different forms of cosmetics.
BP809ET.6	Discuss the cosmetic problems associated with skin and hair.
BP813PW	**Project Work**
BP813PW.1	Identify a relevant, manageable scientific problem, for working out. Fix objectives for the research work.
BP813PW.2	Collect information about the problem from primary, secondary and internet sources, process and use it appropriately.
BP813PW.3	Plan, execute experiments and obtain reliable results.
BP813PW.4	Collect process and document data in appropriate formats.
BP813PW.5	Analyse, interpret and present results, if necessary using statistical and graphical tools.
BP813PW.6	Publish present results in an open forum and defend the same.

Shree Santkrupa College of Pharmacy Ghogaon

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M. Pharmacy (Pharmaceutics)

First Year M. Pharmacy (SEM-I)

MPH101T	**Modern Pharmaceutical Analytical Technique**
MPH 101.1	Demonstrate Assay of single and multiple component pharmaceuticals with the help of different analytical techniques using UV, IR Spectrofluorimetric and Flame Emission Spectroscopy
MPH 101.2	Describe the principles of NMR Spectroscopy and its applications
MPH 101.3	Illustrate the principle, instrumentation and applications of mass spectroscopy and study different types of ionization
MPH 101.4	Explain the various types of chromatographic approaches used in analysis of pharmaceuticals.
MPH 101.5	Explain the principle, instrumentation and applications of electrophoresis and describe fundamentals of X-ray crystallography
MPH 101.6	Illustrate the assay of RIA, ELISA and Bioluminescence
MPH102T	**Drug Delivery System**
MPH 102.1	Describe the principle associated with the development and characterization of sustained release formulations
MPH 102.2	Explain principle and the fundamentals in relation to controlled drug delivery system
MPH 102.3	Explain formulation and evaluation aspects regarding Gastro-retentive Drug Delivery System
MPH 102.4	Describe the barriers for drug permeation and methods to overcome barriers for ocular drug delivery
MPH 102.5	Explain formulation and evaluation aspects regarding Transdermal Drug delivery System
MPH 102.6	Explain fundamentals, formulation and evaluation related to proteins, peptide and vaccines

MPH103T	**Modern Pharmaceutics**
MPH 103.1	Describe the concept of preformulation, stability testing and theories of pharmaceutical dispersion.
MPH 103.2	Explain the different optimization techniques in pharmaceutical formulation with applications.
MPH 103.3	Explain validation, ICH and WHO guidelines for calibration and validation of equipment's.

MPH 103.4	Describe the objectives and policies of cGMP and industrial management.
MPH 103.5	Describe the fundamentals of compression and compaction.
MPH 103.6	Explain the principle involved in consolidation parameters in pharmaceutical formulation.

MPH104T	**Regulatory Affair**
MPH 104.1	Describe the role and importance of documentation in pharmaceutical industry
MPH 104.2	Describe the regulatory requirements for the product approval.
MPH 104.3	Explain CMC, Post-approval regulatory and ICH guidelines.
MPH 104.4	Explain the non-clinical drug development process.
MPH 104.5	Acquire the knowledge on clinical trials data for the conduction and approval.
MPH 104.6	Explain the concept of pharmacovigilance and process of monitoring in clinical trials
MPH105P	**Pharmaceutics Practical -I**
MPH 105.1	Analysis of pharmacopoeial compounds and their formulations using UV, HPLC, and GC.
MPH 105.2	Estimation of various compounds using fluorimetery and flame photometry.
MPH 105.3	Explain formulation and evaluation techniques for sustained release and controlled release formulations.
MPH 105.4	Explain formulation and evaluation of muco-adhesive and transdermal drug delivery systems
MPH 105.5	Study the various pre-formulation concepts in drug development
MPH 105.6	Explain the applications of pharmacokinetic models for different dosage forms,

First Year M. Pharmacy (SEM-II)

MPH201T	**Molecular Pharmaceutics (Nano Tech and Targeted DDS)**
MPH 201.1	Explain the concept and process in relation to targeted drug delivery
MPH 201.2	Explain preparation and evaluation of Nanoparticles and Liposomes
MPH 201.3	Explain preparation and evaluation of microcapsules, microspheres Niosomes, Aquasomes, phytosomes and electrosomes.
MPH 201.4	Explain preparation and evaluation of pulmonary drug delivery system.
MPH 201.5	Describe the gene delivery, gene therapy and various other gene delivery systems.
MPH 201.6	Describe the knowledge related to pharmacokinetics and bio distribution of therapeutics.

MPH202T	Advanced Biopharmaceutics & Pharmacokinetics
MPH 202.1	Explain the concept related to Biopharmaceutics and pharmacokinetics.
MPH 202.2	Describe the various biopharmaceutics consideration in drug product design and in vitro drug product performance.
MPH 202.3	Describe the basic considerations, pharmacokinetic models and application of pharmacokinetic in modified drug delivery systems.
MPH 202.4	Explain the effects of various drug interactions like protein binding, tissue binding, cytochrome p-450 and transporters.
MPH 202.5	Design and Evaluate in vivo performance of a drug substance and bioequivalence studies.
MPH 202.6	Apply the knowledge of pharmacokinetics and pharmacodynamics on targeted drug delivery systems and biotechnological products.

MPH203T	Computer Aided Drug Delivery System
MPH 203.1	Describe the history of computer in pharmaceutical research and development.
MPH 203.2	Explain the Quality-by-Design in pharmaceutical development
MPH 203.3	Describe the use of computers in modelling of drug disposition.
MPH 203.4	Explain the concept of optimization and its parameters in pharmaceutical product development.
MPH 203.5	Explain the computer-aided biopharmaceutical characterization, simulation in pharmacokinetics, pharmacodynamics and clinical development.
MPH 203.6	Describe the artificial intelligence, robotics and computational fluid dynamics in pharmaceuticals.
MPH204T	**Cosmetic and Cosmeceuticals**
MPH 204.1	Describe the concept and regulatory provision for cosmetics and cosmeceuticals.
MPH 204.2	Explain the biological aspects and problems associated with skin, hair and oral cavity.
MPH 204.3	Describe the building blocks for different product formulations of cosmetics and cosmeceuticals.
MPH 204.4	Describe the controversial ingredients like parabens, formaldehyde liberators and dioxone.
MPH 204.5	Explain the formulation development and regulatory aspects of cosmetics and cosmeceuticals.
MPH 204.6	Explain guidelines and challenges for herbal cosmetics related to skin, hair and oral cavity.
MPH205P	**Pharmaceutics Practical - II**
MPH 205.1	Describe the effect of temperature change, non-solvent addition, and incompatible polymer

	addition in microcapsules preparation.
MPH 205.2	Explain preparation and evaluation of different drug deliveries like alginate beads, microspheres, niosomes, liposomes and spherules.
MPH 205.3	Explain solid dispersion study for poorly soluble and protein binding studies.
MPH 205.4	Explain bioavailability studies, pharmacokinetic and IVIVC.
MPH 205.5	Describe Quality-by-Design and Design-of-Experiment in pharmaceutical development.
MPH 205.6	Explain the preparation and evaluation of various cosmetic products like creams, shampoo and tooth paste.

Second Year M. Pharmacy (SEM-III)

MRM301T	**Research Methodology and Biostatistics**
MRM301.1	Describe in general about research methodology.
MRM301.2	Describe about the bio-statistics used in research.
MRM301.3	Apply various bio-statistical methods for expected outcome in research
MRM301.4	Explain the various aspects of medical research.
MRM301.5	Explain the guidelines related to CPCSEA committee.
MRM301.6	Describe about the declaration of Helsinki.

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M. Pharmacy (Pharmacology)

First Year M. Pharmacy (SEM-I)

MPL101T	**Modern Pharmaceutical Analytical Technique**
MPL101.1	Demonstrate Assay of single and multiple component pharmaceuticals with the help of different analytical techniques using UV, IR Spectrofluorimetric and Flame Emission Spectroscopy
MPL101.2	Describe the principles of NMR Spectroscopy and its applications
MPL101.3	Illustrate the principle, instrumentation and applications of mass spectroscopy and study different types of ionization
MPL101.4	Explain the various types of chromatographic approaches used in analysis of pharmaceuticals.
MPL101.5	Explain the principle, instrumentation and applications of electrophoresis and describe fundamentals of X-ray crystallography
MPL101.6	Illustrate the assay of RIA, ELISA and Bioluminescence
MPL102T	**Advanced Pharmacology-I**
MPL102.1	Predict Pharmacokinetic and Pharmacodynamics process of lipophilic and hydrophilic drugs.
MPL102.2	Differentiate pharmacological actions of drug acting on autonomic nervous system
MPL102.3	Relate concept of drug action on central nervous system with its receptors
MPL102.4	Describe mechanism and pharmacology of prototype drugs acting on CVS disorders and explain their clinical use.
MPL102.5	Illustrate feedback mechanism using mechanism and pharmacological action of hormones, autacoids and their antagonists
MPL102.6	Summarize the various animals used in the drug discovery process
MPL103T	**Pharmacological and Toxicological Screening Methods-I**
MPL103.1	Summarize the various animals used in the drug discovery process
MPL103.2	Elaborate good laboratory practices in maintenance and handling of experimental animals
MPL103.3	Appraise the regulations and ethical requirement for the usage of experimental animals
MPL103.4	Describe the various preclinical in-vitro, in-vivo and other possible animal alternative models

	for the screening various pharmacological activities.
MPL103.5	Explain general principles and evaluation of Immunoassay methods
MPL104T	**Cellular and Molecular Pharmacology**
MPL104.1	Analyze the receptor signal transduction processes
MPL104.2	Construct the molecular pathways affected by drugs
MPL104.3	Discuss mechanisms and applicability of molecular pharmacology, genomic and proteomic tools.
MPL104.4	Distinguish the process of Pharmacogenomics
MPL104.5	Summarize the concept of Immunotherapeutic.
MPL104.6	Interpret various Cell culture techniques.
MPL105P	**Pharmacology – I (Practical)**
MPL105.1	Demonstrate route of drug administration, blood withdrawal techniques.
MPL105.2	Evaluate the effect of drug on CNS activity, analgesic activity, Anti-diabetic activity, Anti-inflammatory activity, diuretic activity, antiulcer activity etc.
MPL105.3	Estimate DNA/RNA isolated from biological sample using various techniques
MPL105.4	Demonstrate MTT assay, gel electrophoresis, gene amplification and Protein quantification
MPL105.5	Discuss the principle, procedure and applications of enzyme inhibition activity, pharmacokinetics studies, apoptosis determination etc.
MPL105.6	Exhibit the extraction techniques of drug from biological samples and their estimation using various analytical techniques.
First Year M. Pharmacy (SEM-II)	
MPL201	. **Advanced Pharmacology II**
MPL201.1	Illustrate feedback mechanism using mechanism and pharmacological action of drug acting on endocrine systems.
MPL201.2	Relate concept of mechanism and resistance of drugs acting microbes, fungus, virus and tuberculosis.
MPL201.3	Explain the pharmacotherapy of COPD, Asthma, constipation, diarrhea, Ulcer, inflammation, Rheumatoid Arthritis, immune disorders et
MPL201.4	Relate significance of rhythm, cycles and biological clock for application of chronotherapy in various disease conditions.
MPL201.5	Describe antioxidant scavenging effects on free radicals to cure diabetes, neurodegenerative diseases and cancer etc.
MPL201.6	Conclude the recent advances in the treatment of Alzhemier's disease, Parkinson's disease, cancer and diabetes mellitus

MPL202T	**Pharmacological & Toxicological Screening Methods II - Theory**
MPL202.1	Summarize the various types of toxicity studies.
MPL202.2	Discuss the importance, ethical and regulatory requirements for various types of toxicity studies.
MPL202.3	Outline the significance of reproductive toxicity, teratogenicity, Genotoxicity, carcinogenicity studies
MPL202.4	Describe the significance of IND enabling studies and safety pharmacology studies
MPL202.5	Recognize the importance and applications of toxicokinetics studies and alternative methods to animal toxicity testing
MPL202.6	Demonstrate the practical skills require for conducting the preclinical toxicity studies
MPL203T	**Principles of Drug Discovery-Theory**
MPL203.1	Illustrate various stages in modern drug discovery process
MPL203.2	Appraise role of genomics, proteomics and bioinformatics in drug discovery.
MPL203.3	Discuss the different methods for lead identification
MPL203.4	Summarize different approaches for rational drug design
MPL203.5	Discuss the concept of QSAR and QSAR statistical methods
MPL203.6	Elaborate role of in-vitro screening technique in drug discovery
MPL 204T	**Clinical Research and Pharmacovigilance Theory**
MPL 204.1	Discuss the basic concept of clinical research
MPL 204.2	Explain regulatory requirements and plans for conceptualizing, designing, conducting, managing, and conducting clinical trial.
MPL 204.3	Summarize the types of clinical trial designs
MPL 204.4	Elaborate the responsibilities of key players involved in clinical trials
MPL 204.5	Describe in detail about safety monitoring, reporting and close-out activities
MPL 204.6	Discuss the principles of Pharmacovigilance.
MPL205P	**Pharmacology – II (Practical)**
MPL205.1	Demonstrate the determination of unknown concentration of sample by Bioassay method using chicken ilium preparation
MPL205.2	Elaborate the drug effect on rat BP, heart rate and ECG using computer simulation techniques
MPL205.3	Discuss the acute oral toxicity, dermal toxicity, repeated dose toxicity studies and drug mutagenicity study as per OECD guidelines

MPL205.4	Evaluate the ADR reporting and monitoring protocol.
MPL205.5	Design the protocol for Clinical trial studies
MPL205.6	Explain the efficacy of drugs using In-silico studies like docking studies, Pharmacophore based screening and QSAR studies

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