



Pravara Rural Education Society's

COLLEGE OF PHARMACY (FOR WOMEN)



Chincholi, Tal. Sinnar, Dist. Nashik 422103, Maharashtra, India
Ph.No. (02551)271178, Fax No. : (02551)271178

Website: www.pravarapharmacy.in

Email ID: pravaracopc@yahoo.co.in

Approved by A.I.C.T.E., Pharmacy Council of India, New Delhi and recognized by Govt. of Maharashtra
Affiliated to Savitribai Phule Pune University, Pune

Program Outcomes (POs)

The Program Outcomes of Bachelor in Pharmacy course are:

1. **Pharmacy Knowledge:** An ability to acquire , demonstrate, core and basic knowledge of Pharmaceutical and Life Sciences
2. **Planning Abilities:** An ability to develop, implement, effectively plan and organize work using time management, resource management, delegation skills and organizational skills to achieve goals in specified timeline.
3. **Problem Analysis:** An ability to identify, analyze, interpret data and take appropriate decision to solve problems related to routine Pharmacy Practices by applying acquired knowledge.
4. **Modern Tool Usage:** An ability to understand, choose and utilize Modern techniques and computing tools for Pharmacy practices by considering constraints.
5. **Leadership Skills:** An understanding of pharmaceutical management principles and apply these to one's own work, as a member and leader in a team, to manage projects to facilitate improvement in social health and well being.
6. **Professional Identity:** An ability to recognize, analyze and communicate Pharmacy professional values as a healthcare promoter.
7. **Pharmaceutical Ethics:** ability to understand and use professional, ethical, legal, social issues and responsibilities for well being of the society.
8. **Communication:** An ability to comprehend, write reports, present and document to communicate effectively for exchange of professional information to Pharmacy community and society.
9. **The Pharmacist and Society:** An ability to overcome the societal, health and legal problems by providing better pharmaceutical care relevant to the Pharmacy profession.



One Purpose, One Mission, One Dream.



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10. **Environment and Sustainability:** An ability to recognize the impact of the professional Pharmaceutical solutions in social and environmental circumstances for sustainable development.
11. **Life-Long Learning:** An ability to recognize the need to engage in continuous Professional development by taking in consideration timely feedback and technological changes for life long learning process.

Program Specific Outcomes (PSO)

Pharmacy Students are able to:

PSO 1: To build graduate to excel in technical or professional careers in various pharmaceutical industry and/ or institute and /or Health care system through rigorous education. Also analyze and communicate the skills, values of their professional roles in society.

PSO 2: To learn, select, apply appropriate methods, procedures, resources and modern pharmacy-related computing tools with an understanding of the limitations.

PSO 3: To operate, control, analyze and evaluate chemical substances and finished products also processes within permissible limits.

PSO 4: To design a system, component or process to meet desired needs within realistic constraints such as economic, environmental, sustainability social, ethical, health, safety and manufacturability for humans.



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Bhangale
Dr. C. J. Bhangale
Principal

Principal
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FIRST YEAR B. PHARMACY			
Semester I			
Course Code	Course Name	Course Outcomes	After successful completion of course student will able to
BP101T	Human Anatomy and Physiology I	1	Recall [L1:Remembering] about the gross morphology, structure and functions of cell, skeletal, muscular, cardiovascular system of the human body.
		2	Classify[L2:Understanding] the various homeostatic mechanisms and their imbalances.
		3	Identify[L1:Understanding] the different types of bones in human body & various tissues of different systems of human body.
		4	Apply about the various experimental techniques [L3:Applying] related to physiology learnt various techniques like blood group determination, blood pressure measurement, blood cells counting.
BP102T	Pharmaceutical Analysis I	1	Learn [L1:Remembering] definition and scope of different techniques of analysis.
		2	[L2:Understanding] Understand the principles of volumetric and electro chemical analysis.
		3	[L2:Understanding] methods of expressing concentration, Primary and secondary standards, preparation and standardization of various molar and normal solutions and errors.
BP103T	Pharmaceutics I	1	[L1:Remembering] Know the history of profession of pharmacy.
		2	[L2:Understanding] Understand the basics of different dosage forms, pharmaceutical incompatibilities and pharmaceutical calculations.
		3	[L2:Understanding] Understand the professional way of handling the prescription.



		4	[L3:Applying] Preparation of various conventional dosage forms.
BP104T	Pharmaceutical Inorganic Chemistry	1	Understand[L1:Remembering] principle, and to know the sources of impurities and methods to determine the impurities in inorganic drugs and pharmaceuticals inorganic chemistry.
		2	Understand the medicinal and pharmaceutical importance of inorganic compounds[L1: Remembering] and practical skills of inorganic compounds [L3:Applying].
		3	Discuss and Know pharmaceuticals inorganic compound [L2:Understanding] and to understands its chemical and physical properties[L3: Applying]
BP105T	Communication Skills	1	Understand [L2:Understanding]behavioral needs for a Pharmacist to communicate effectively in areas of pharmaceutical operations.
		2	Lead the team effectively and will manage it efficiently [L3:Applying]
		3	Learn effective presentation and interview skills [L3:Applying]
BP106 RBT	Remedial Biology	1	[L2:Understanding] know the classification and salient features of five kingdoms of life.
		2	Understand [L2:Understanding] the basic components of anatomy & physiology of plant.
		3	Know understand [L2:Understanding] the basic components of anatomy & physiology animal with special reference to human.
BP106 RMT	Remedial Mathematics	1	[L1:Remembering] Know the theory and their application in Pharmacy.
		2	Solve the different types of problems by applying theory [L3:Applying]
		3	[L2:Understanding] Appreciate the important application of mathematics in Pharmacy.
BP107P	Human Anatomy and Physiology I	1	Recall [L1:Remembering] the construction, working, care and handling of instruments, glassware's and equipment's required for practical.
		2	Explain [L2:Understanding]the significance of Bleeding time, Clotting time, Blood group detection, Haemoglobin detection and measurement of blood pressure.
		3	Knowledge of mechanism of White Blood Cell Count and Red Blood Cell Count of blood sample[L3:Applying]
		4	Students would learn about the various experimental techniques [L3:Applying] related to physiology learnt various techniques like blood group determination, blood pressure measurement, blood cells counting.
		1	Perform [L4:Analyzing] limit test of different compounds.



BP108P	Pharmaceutical Analysis I	2	Carry out various volumetric and electrochemical titrations [L4:Analyzing]
		3	Determination [L4:Analyzing] of Normality by electro-analytical methods.
BP109P	Pharmaceutics I	1	Fundamental knowledge [L3:Applying] in preparing conventional dosage forms like Syrups, Elixirs, Linctus, Solutions, Suspensions, Emulsions.
		2	[L3:Applying] Preparations of Powders and Granules.
		3	[L3:Applying] Preparations of Suppositories, Semisolids and Gargles and Mouthwashes.
BP110P	Pharmaceutical Inorganic Chemistry	1	Understand[L1:Remembering] principle, and to know the sources of impurities and methods to determine the impurities in inorganic sample.
		2	Understand the medicinal and pharmaceutical importance of synthesis of inorganic compounds[L1:Remembering] and practical skills of inorganic compounds [L3:Application].
		3	Discuss and Know pharmaceuticals inorganic compound [L2:Understanding] and to understands its chemical and physical properties[L3:Applying].
BP111P	Communication Skills	1	[L2:Understanding] Understand and evaluate key theoretical approaches used in the interdisciplinary field of communication.
		2	[L3:Applying] Develop knowledge, skills, and judgment around human communication that facilitate their ability to work collaboratively with others.
		3	[L4:Analyzing] Communicate effectively orally and in writing.
		4	Find, use, and [L5:Evaluating] evaluate primary academic writing associated with the communication discipline.
BP112RBP	Remedial Biology	1	[L3:Applying] Study of Microscope, Section cutting techniques, Mounting and staining, Permanent slide preparation, Stem, Root, Leaf, seed, fruit, flower and their modifications.
		2	[L2:Understanding] Study of cell and its inclusions.
			[L2:Understanding] Detailed study of frog by using computer models.
		3	Microscopic study and [L4:Analyzing] identification of tissues pertinent to Stem, Root Leaf, seed, fruit and flower.
Semester II			
Course Code	Course Name	Course Outcomes	After successful completion of course student will able to
			



BP201T	Human Anatomy and Physiology II	1	Study [L1:Remembering] of Nervous , Endocrine ,digestive, respiratory, cardiovascular ,urinary ,reproductive, integumentary system and special senses with the help of models, charts and specimens.
		2	Demonstrate [L2:Understanding] general neurological examination, the function of olfactory nerve , visual acuity, reflex activity , positive and negative feedback mechanism and total blood count by cell analyser.
		3	Record [L1:Remembering] body temperature, basal mass index.
		4	Examine [L4:Analyzing] the different types of taste and determine tidal volume and vital capacity.
		5	Identify [L3:Applying] the Permanent slides of vital organs and gonads and study [L1:Remembering] family planning devices and pregnancy diagnosis test.
BP202T	Pharmaceutical Organic Chemistry	1	[L3:Applying] Write the structure, name and the type of isomerism of the organic compound.
		2	[L3:Applying] Write the reaction, name the reaction and orientation of reactions.
		3	[L2:Understanding] Account for reactivity/stability of compounds.
BP203T	Biochemistry	1	[L2:Understanding] Understand the significance, concepts of Cell and applications of biochemistry.
		2	Describe [L1:Remembering] the chemistry, biological functions of Carbohydrates, Lipids, Proteins, Vitamins and Amino acids.
		3	[L3:Applying] Apply the mechanism of enzyme action and identify the classes of enzymes and factors affecting action, mechanism of electron transport chain.
		4	Explain [L4:Analyzing] the synthesis of nucleic acids, their role in metabolic pathways transcriptional, translational, and post-translational levels, Hereditary Diseases.
		5	Discuss [L2:Understanding] the metabolic pathways of Carbohydrates, Lipids, Proteins and Amino Acids.
		1	Understand [L1:Remembering] basic principles of cell injury its adaptations [L2:Understanding] and process of inflammation.
		2	Get in-depth knowledge [L1&L2:Remembering & Understanding] of pathogenesis of cardiovascular, respiratory and renal disorders.




BP204T	Pathophysiology	3	Study pathophysiology [L1:Remembering] and complications [L2:Understanding] of hematological, endocrine, nervous and gastrointestinal system.
		4	Summarize [L2:Understanding] signs and symptoms of different inflammatory diseases, diseases of bones, joints and cancer.
		5	Explain [L2:Understanding] etiology and pathogenesis of infectious diseases.
BP205T	Computer Applications in Pharmacy	1	Apply [L3:Applying] the knowledge of mathematics and computing fundamentals to pharmaceutical applications for any given requirement.
		2	Design and develop [L6:Creating] solutions to analyze pharmaceutical problems using computers.
		3	Integrate and [L3:Applying] apply efficiently the contemporary IT tools to all Pharmaceutical related activities.
		4	Solve [L5:Evaluating] and work with a professional context pertaining to ethics, social, cultural and regulations with regard to Pharmacy.
BP206T	Environmental Sciences	1	Create [L6:Creating] the awareness about environmental problems among learners.
		2	Impart basic knowledge [L2:Understanding] about the environment and its allied problems and 3. Develop an attitude of concern for the environment.
		3	Acquire skills to help the concerned individuals in identifying [L4:Analyzing] and solving environmental problems.
BP207P	Human Anatomy and Physiology II	1	Study [L1:Remembering] of Nervous , Endocrine ,digestive, respiratory, cardiovascular ,urinary ,reproductive, integumentary system and special senses with the help of models, charts and specimens.
		2	Demonstrate [L2:Understanding] general neurological examination, the function of olfactory nerve , visual acuity, reflex activity , positive and negative feedback mechanism and total blood count by cell analyser.
		3	Record [L1:Remembering] body temperature, basal mass index.
		4	Examine [L4:Analyzing] the different types of taste and determine tidal volume and vital capacity.
		5	Identify [L3:Applying] the Permanent slides of vital organs and gonads and study [L1:Remembering] family planning devices and pregnancy diagnosis test
		1	[L2:Understanding] Safety measures in an organic laboratory.
		2	[L2:Understanding] Introduction to laboratory techniques.



BP208P	Pharmaceutical Organic Chemistry	3	Systematic qualitative [L4:Analyzing] analysis of unknown organic compounds.
		4	Preparation [L3:Applying] of suitable solid derivatives from organic compounds.
		5	Building [L6:Creating] of molecular models of structures containing various functional groups.
BP209P	Biochemistry	1	[L1:Remembering] Study the concept of enzyme hydrolysis and examine the role of enzyme in day to day life.
		2	[L2:Understanding] Understand the various qualitative tests for identification of biomolecules.
		3	[L3:Applying] Determine the pH and blood constitute like blood sugar, blood creatinine and total serum cholesterol.
		4	[L4:Analyzing] Estimation of reducing sugar by DNS method, proteins by Biuret method and urine abnormalities.
BP210P	Computer Applications in Pharmacy	1	Design [L6:Creating] a questionnaire using a word processing package or Design a form in MS Access to view, add, delete and modify the patient record in the database.
		2	Create [L6:Creating] a HTML web page or mailing labels Using Label Wizard or database in MS Access or invoice table using – MS Access and Creating and working with queries in MS Access.
		3	Retrieve the information of a drug and its adverse effects using online tools [L3:Applying].
		4	Generating report and printing the report from patient database [L3:Applying].




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SECOND YEAR B. PHARMACY Semester III			
Course Code	Course Name	Course Outcomes	After successful completion of course student will able to
2.3.1 T	Physical Pharmaceutics I	1	Describe [L1:Remembering] the phase rule and its components along with pharmaceutical application.
		2	Understand [L2:Understanding] various properties of gaseous state of matter and principle and concept of aerosol.
		3	Describe [L1:Remembering] various properties of solution of non electrolyte and electrolyte.
		4	Understand [L2:Understanding] crystallization and crystal parameter of solid state, its properties, method of detection and pharmaceutical application.
		5	Understand [L2:Understanding] solubility of phases and their properties and law of distribution and its application in pharmacy.
		6	Understand [L2:Understanding] concept of thermodynamics.
2.3.1 P	Physical Pharmaceutics I	1	[L2:Understanding] Operate different pharmaceutical laboratory instruments used in determining various physical properties such as surface tension, viscosity, adsorption and solubility.
		2	Calculate [L4:Analyzing] critical solution temperature & effect of addition of electrolyte on CST of phenolwater system.
		3	Construct [L3:Applying] of ternary phase diagram for three-component system.



		4	Predict [L4:Analyzing] solubility, molecular weight, cell constant, pKa of given compound.
		5	[L5:Evaluating] Evaluate unknown concentration by conductometric titration.
2.3.2 T	Pharmaceutical Microbiology	1	[L1:Remembering] Aware about historical developments and contributions of scientists in the field of microbiology.
		2	[L2:Understanding] Know the recent advances in microbiology.
		3	Compare [L3:Applying] and contrast the various structural features, biology & characteristics of microbes.
2.3.2 P	Pharmaceutical Microbiology	1	[L1:Remembering] Explain the principle, construction and working of various instruments and perform their operations.
		2	[L3:Analyzing] Handle microscope for observation of microbes.
		3	Learn how to prepare and sterilize nutrient broth, nutrient agar, slants, stabs and plates [L3: Analyzing] .
		4	[L2: Understanding] Adopt the skills required for maintaining strictly aseptic condition & handling inoculating loop, its sterilization and inoculation procedure.
		5	Isolate microorganism by streak plate technique & count them by pour plate technique [L5: Evaluating]
		6	[L5: Evaluating] Observe motility of bacteria by hanging drop technique.
2.3.3 T	Pharmaceutical Biochemistry	1	[L2:Understanding] Understand the significance, concepts of Cell and applications of biochemistry.
		2	Describe [L1: Remembering] the chemistry, biological functions of Carbohydrates, Lipids, Proteins, Vitamins and Amino acids.
		3	[L3:Applying] Apply the mechanism of enzyme action and identify the classes of enzymes and factors affecting action, mechanism of electron transport chain.
		4	Explain [L4: Analyzing] the synthesis of nucleic acids, their role in metabolic pathways transcriptional, translational, and post-translational levels, Hereditary Diseases.
		5	Discuss [L2:Understanding] the metabolic pathways of Carbohydrates, Lipids, Proteins and Amino Acids.



2.3.3 P	Pharmaceutical Biochemistry	1	[L1: Remembering] Study the concept of enzyme hydrolysis and examine the role of enzyme in day to day life.
		2	[L2:Understand] Understand the various qualitative tests for identification of biomolecules.
		3	[L3: Applying] Determine the pH and blood constitute like blood sugar, blood creatinine and total serum cholesterol.
		4	[L4: Analyzing] Estimation of reducing sugar by DNS method, proteins by Biuret method and urine abnormalities.
2.3.4 T	Pharmaceutical Organic Chemistry III	1	Understand [L2:Understanding] molecular representation, interconversion,significance and basic concepts of stereochemistry conformational analysis of molecules.
		2	Understand [L2:Understanding] various rearrangement reactions, pericyclic reactions and its mechanism with application.
		3	Understand [L2:Understanding] chemistry of amino acids and carbohydrates and its underlying concepts with synthesis and reaction methods.
2.3.4 P	Pharmaceutical Organic Chemistry III	1	Synthesize & [L4:Analyzing] recrystallize the organic compounds based on rearrangement reactions.
		2	Understand [L2:Understanding] the chromatographic techniques in organic chemistry
		3	Explain [L1:Remembering] the principle and procedure involved in column chromatographic separation techniques and TLC.
		4	Understand [L2:Understanding] the principle behind various qualitative tests and analyze [L4:Analyzing] the given unknown binary organic compounds having different functional
2.3.5 T	Pharmacology	1	[L1Remembering] in detailed about mechanism of drug action at organ system/sub cellular/ macromolecular levels.
		2	[L2:Understanding] the pharmacological actions of different categories of drugs.
		3	[L2:Understanding] the application of basic pharmacological knowledge in the prevention and treatment of various diseases.
		4	[L2:Understanding]the signal transduction mechanism of various receptors.
		1	Explain [L2:Understanding] meaning & significance of Pharmacognostic parameters & Pharmacognostic study of crude drugs.



2.3.6 T	Pharmacognosy & Phytochemistry I	2	Comprehend & explain [L3:Applying] underlying reason of evolutionary significance of secondary metabolites production in plants & other organisms & deduce their significance as medicinal molecules.
		3	Comprehend & explain [L3:Applying] primary metabolites comprehensively from source to their Pharmaceutical & industrial applications.
		4	Define, classify, explain [L3:Applying] source, name & draw chemical structures, identify [L4:Analyzing] from the structure, organize the biosynthetic sequence, and describe methods of extraction & underlying rationale of qualitative & quantitative analysis of glycosides & tannin compounds of plant origin.
2.3.6 P	Pharmacognosy & Phytochemistry I	1	Demonstrate [L3:Applying]skill of plant material sectioning, staining, mounting & focusing.
		2	Identify [L4:Analyzing] the parts of plants from its morphological & microscopical features by applying [L3:Applying] experimental & theoretical knowledge of morphology & anatomy obtained in theory classes.
		3	Conduct extractions/isolations [L3:Applying] & explain significance of use of various chemicals & physical conditions.
		4	Identify [L4:Analyzing] unorganized crude drugs & samples of powders of organized & unorganized crude drugs using morphological, chemical, physical & microscopical
Semester IV			
Course Code	Course Name	Course Outcomes	After successful completion of course student will able to
2.4.1 T	Physical Pharmaceutics II	1	Knowledge [L1: Remembering]: Relate the scientific concepts of surface tension, viscosity, micromeritics, kinetics and colloids in connection with preparation, characterization and evaluation of dosage forms.
		2	Breadth [L2: Understanding]: Explain the various methods for the determination of surface &interfacial tension of liquids, the properties of colloids, properties of powder, order of reactions and flow of fluids.
		3	Comprehension [L2: Understanding]: Describe the rate of reactions, degradation and stability methods of drugs as well as principle and significance of accelerated stabilitytesting.
		4	Application [L3: Applying]: Illustrate fundamentals and pharmaceutical applications of surface & interfacial tension, kinetics, rheology, micromeritics and colloids.



2.4.1 P	Physical Pharmaceutics II	1	Discuss [L1: Understand] basic concept of physical pharmaceutics and Evaluate [L5: Evaluate] surface tension, viscosity, specific surface area, particle size distribution of given material and estimate composition of binary mixture by viscosity method.
		2	Calculate [L4: Analyze] Cloud point, critical micelle concentration and HLB value of given surfactant.
		3	Calculate [L4: Analyze] energy of activation of acid hydrolysis, order of given reaction, relative strength of two acids.
2.4.2 T	Pathophysiology & Clinical Biochemistry	1	Recall [L1: Remembering] the etiology and pathogenesis of the selected disease states
		2	[L2: Understanding] signs and symptoms of the diseases.
		3	Identify [L2: Understanding] complications of the diseases.
		4	Explain [L2: Understanding] the pathophysiological state(s) and/or disease mechanism(s), as well as any clinical testing requirements.
2.4.2 P	Pathophysiology & Clinical Biochemistry	1	The how biochemical analysis can be employed to differentiate [L2: Understanding] between normal and diseased conditions.
		2	Apply [L3: Applying] knowledge & perform qualitative tests for determination of abnormal constituents, liver function test, cardiac Profile Tests as well as kidney function test for given samples.
		3	Understand [L2: Understanding] & perform the clinical biochemical analyze [L4: Analyzing] of biological fluid samples.
2.4.3 T	Pharmaceutical Organic Chemistry IV	1	Understand [L1: Remembering] principle, synthesis, manufacturing process, of some important heterocyclic and polycyclic compounds [L4: Analyzing] Understand basics of chemical process for new compounds and formulations.
		2	To understand Theoretical chemical process, reaction system, chemical equipments used in manufacturing [L1: Remembering] and practical skills of the instruments [L3: Applying]
		3	Various techniques of combinatorial chemistry and understand [L2: Understanding] applications of combinatorial chemistry in the speedy synthesis of organic compounds and peptides [L1: Remembering] and guidelines involved in retro-synthesis and construct retrosynthesis of pharmaceutically important compound [L3: Applying]



2.4.3 P	Pharmaceutical Organic Chemistry IV	1	Perform qualitative [L4:Analyzing] analysis of solid-liquid and liquid-liquid organic binary mixtures, separate and purify of binary mixtures of organic compounds.
		2	Synthesize [L3:Applying] heterocyclic compounds and know reaction mechanisms.
		3	Demonstrate [L3:Applying] techniques such as Recrystallisation, filtration and precipitation.
		4	Perform quantitative [L4:Analyzing] determination of different reactive groups.
2.4.4 T	Pharmaceutical Analysis II	1	Understand [L2:Understanding] the basic principles, instrumentation and applications of various analytical techniques.
		2	Understand [L2:Understanding] the importance of analysis in pharmaceutical industry.
		3	Inculcate [L1:Remembering] theoretical knowledge on various instrumental techniques adopted for analysis of pharmaceuticals.
2.4.4 P	Pharmaceutical Analysis II	1	[L1:Remembering] Take appropriate safety measures while handling instruments, chemicals and apparatus.
		2	Assay [L4:Analyzing] of various chemicals, drug intermediates, APIs and formulations as per Pharmacopoeial standards.
		3	[L4:Analyzing] Interpret the data obtained through experimentation and report the results as per regulatory requirements.
		4	Independently operate [L3:Applying] and calibrate various analytical instruments for the [L4:Analyzing] separation/isolation.
2.4.5 T	Pharmacognosy & Phytochemistry II	1	Definition and objectives [L2:Understanding] of Pharmacognosy, Information about the use of Medicinal plants, Plant as a source of drugs of pharmaceutical interest.
		2	Define & classify [L2:Understanding] alkaloids, explain source, name & chemical structures, organize the biosynthetic sequence in formation of major group of alkaloids and terpenoids / resins.
		3	[L1:Remembering] Explain historical significance & contribution of alkaloids and terpenoids / resins in modern drug discovery, & their currently marketed semisynthetic derivatives/analogues.



		4	Comprehend & explain [L3:Applying] underlying reason of evolutionary significance of alkaloids formation in plants & other organisms & deduce their significance as medicinal molecules.
2.4.5 P	Pharmacognosy & Phytochemistry II	1	Demonstrate [L3:Applying] skill of plant material sectioning, staining, mounting & focusing.
		2	Identify [L4:Analyzing] the parts of plants from its morphological & microscopical features by applying [L3:Applying] experimental & theoretical knowledge of morphology & anatomy obtained in theory classes.
		3	Conduct extractions/isolations [L3:Applying] & explain significance of use of various chemicals & physical conditions.
		4	Identify [L4:Analyzing] unorganized crude drugs & samples of powders of organized & unorganized crude drugs using morphological, chemical, physical & microscopical characteristics.
2.4.6 T	Pharmaceutical Engineering	1	Knowledge [L1: Remembering] of various unit operations used in pharmaceutical industries and Emphasize [L2: Understanding] the principles, mechanisms and theories of different unit operations.
		2	Breadth [L2: Understanding]: To understand the working principles and constructions of equipments used for handling unit processes in pharmaceutical industries.
		3	Application [L3: Applying] of various concepts of unit operations and compare the several operations [L4: Analyze] .
		4	Understand [L2: Understanding] the various preventive methods used for corrosion control in Pharmaceutical industries and the concept of material handling and know [L1: Remembering] the different materials used in the pharmaceutical plant constructions.
		5	Inculcate [L2: Understanding] the importance of safety, hazards and their management and indicate the integrated automated production lines and robotics.





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THIRD YEAR B. PHARMACY			
Semester V			
Course Code	Course Name	Course Outcomes	After successful completion of course student will able to
3.5.1 T	Industrial Pharmacy I	1	Summarize [L2:Understanding] the concepts of solid dosage form design & formulation strategies.
		2	Explain [L2:Understanding] tablets as a dosage form, physico-chemical principles guiding tablet formulation, various tablet additives, manufacture & evaluation [L4: Analyzing], equipments, defects in tableting & remedies.
		3	Tell [L1:Remembering] the concept, types, pharmacopoeial specifications, techniques & equipments used [L2:Understanding] in tablet coating.
		4	Describe [L1:Remembering] capsules, types, additives, size selection, manufacturing & evaluation [L4:Analyzing], equipments, & defects.
		5	Explain [L2:Understanding] the concept of technology transfer.
3.5.1 P	Industrial Pharmacy I	1	Formulate [L6:Creating], evaluate [L5:Evaluating] and label the prepared tablets.
		2	Formulate evaluate [L5:Evaluating] and label the prepared capsules.
		3	Associate [L2:Understanding] rational behind use of formulation ingredients.
		4	Solve [L3:Applying] pharmaceutical calculations to determine evaluation parameters like Hausner ratio, etc Study different packaging material.
		5	Conduct [L2:Understanding] survey /Industrial visit and report its finding [L1:Remembering].



3.5.2 T	Pharmaceutical Analysis III	1	Understand the principle [L1:Remembering] and application[L3:Application] of different analytical instruments used in pharmaceutical industries.
		2	Know various sampling techniques employed in analysis of solid, semisolid and liquids dosage forms[L3:Application]
		3	Ability to interpret the analytical data[L4:Analysis] and identify the structure of the compound[L2:Understanding]
		4	Perform quantitative analysis of drugs form different dosage forms using various analytical tools . [L4:Analysis]
3.5.2 P	Pharmaceutical Analysis III	1	Understand [L1:Remembering] principles, instrumentation, working and applications of UV-VIS, Flourimetry, Atomic absorption, Atomic Emission Spectroscopy, Flame Photometry, Phosphorimetry and Nepheloturbidimetry.
		2	To Understand operation[L2:Understanding]and calibration of various analytical instruments for the assay of various APIs and formulations as per Pharmacopoeial standards [L3:Application]
		3	To Acquire knowledge [L1:Remembering] for processing and interpretation of data obtained through experimentation and report the results as per regulatory requirements[L4:Analysis]
		4	To Take appropriate safety measures while handling instruments, chemicals and apparatus.[L3:Applying]
3.5.3 T	Medicinal Chemistry I	1	[L1:Remembering]History and general aspects of the design & development of drugs.
		2	[L2:Understanding] Explain drug metabolism & its significance in drug discovery.
		3	[L3:Applying] Classification, nomenclature, structure activity relationship (SAR), mechanism of action, adverse effects and therapeutic uses of Local anesthetics, Oral Anti- hyperglycemic, Diagnostics and drugs acting on Central nervous system.
		4	[L3: Applying] Study the scheme of synthesis of drugs.
		5	[L4: Analyzing] Recent developments of Drugs in Local anesthetics, Oral Anti- hyperglycemic, Diagnostics and drugs acting on Central nervous system.
		1	[L1:Remembering]History and general aspects of the design & development of drugs.



3.5.3 P	Medicinal Chemistry I	2	[L2:Understanding] Explain drug metabolism & its significance in drug discovery.
		3	[L3:Applying] Classification, nomenclature, structure activity relationship (SAR), mechanism of action, adverse effects and therapeutic uses of Local anesthetics, Oral Anti- hyperglycemic, Diagnostics and drugs acting on Central nervous system.
		4	[L3:Applying] Study the scheme of synthesis of drugs.
		5	[L4:Analyzing] Recent developments of Drugs in Local anesthetics, Oral Anti-hyperglycemic, Diagnostics and drugs acting on Central nervous system.
3.5.4 T	Pharmacology II	1	Understand [L2:Understanding] the signal transduction mechanism involved between the neurotransmitter and its receptors in the autonomic nervous system.
		2	Classify [L2:Understanding] the cholinergic receptors and Adrenergic receptors, and understand [L2:Understanding] the cholinergic drugs and adrenergic drugs and their selective agonist and antagonist.
		3	Get in-depth knowledge [L2:Understanding] of Ganglion Stimulating and Blocking agents and centrally and Peripherally acting skeletal muscle relaxants.
		4	Get in-depth knowledge [L2:Understanding] about pharmacology and pharmacotherapy [L3:Applying] of drugs used in infectious diseases in cardiovascular diseases, urinary system and respiratory disorders.
3.5.4 P	Pharmacology II	1	Understand [L2:Understanding] the CPCSEA guidelines given for animal experimentation.
		2	Explain [L2:Understanding] the composition of physiological salt solution, various routes of drug administration, methods for blood collection from experimental animals.
		3	Demonstrate [L2:Understanding] the basic instruments used in experimental pharmacology.
		4	Experiment with [L3:Applying] isolated tissue and the effect of different drugs on the concentration response curves of acetylcholine.
		5	Make use of [L3:Applying] computer simulations methods and illustrate [L2:Understanding] the action of various drugs.



3.5.5 T	Analytical Pharmacognosy & Extraction Technology	1	Explain [L2:Understanding] underlying principle of mass transfer process in extraction, effect of various factors, specific care in herbal material, & various approaches in extraction processes with their theoretical consideration, methodological steps, & applications.
		2	Understand [L2:Understanding] & explain principle & applications of chromatographic & non-chromatographic separation methods.
		3	Explain [L2:Understanding] source material & extraction methods of phytochemicals specified; [L3:Applying] draw schematic representation of such processes.
		4	Explain need of analysis of natural products & explain their significance; [L2: Understanding] Understand & explain various parameters with their principles, significance& applications.
3.5.5 P	Analytical Pharmacognosy & Extraction Technology	1	Explain [L2:Understanding] various factors affecting on level of secondary metabolites, how these can be minimized to ensure quality in raw material, effect of post harvesting manipulations, and changes during storage etc. & methods to control these modification.
		2	Explain [L1:Remembering] various guidelines issued by WHO in relation with cultivation, collection, storage etc.
		3	Understand [L2:Understanding] & explain concept of health & pathogenesis, philosophical basis, diagnosis & treatment aspects of Ayurveda, Unani, Siddha & Homoeopathic system of medicine.
		4	Understand [L2:Understanding] and explain the applications of plant tissue culture for Secondary metabolite production.
		5	Explain [L5:Evaluating] in vitro screening methods and its applications for biological evaluation of natural products. Explain the approaches and potentials of herbal new drug delivery systems like liposomes, phytosomes, nanoparticles and vesicles.
		6	Understand & [L5:Evaluating] explain various physical, chemical, spectroscopic means & methods used in structural elucidation of natural products.
		1	Define [L1:Remembering] management, need for management, Management thoughts, and associate [L2:Understanding] function of management.



3.5.6 T	Pharmaceutical Business Management & Disaster Management	2	Describe [L2:Understanding] classification of materials, objectives and principals of purchasing, inventory control.
		3	Understand [L2:Understanding] the knowledge of Pharmaceutical Marketing, Sales promotions marketing research, product management.
		4	Express [L2:Understanding] Motivation, Leadership , Communication, Interview techniques and Performance appraisal qualities and skills of Human Resource andDevelopment .
		5	Explain [L2:Understanding] Disaster Management, its types ,causes and effects, Disaster Management cycle and preparedness and mitigation of Disasters.
3.5.7 T	Active Pharmaceutical Ingradient Technology	1	Understand [L2:Understanding] basics of chemical process kinetics, some classes of reactions with examples of API for each unit process and reaction system, equipments used in API manufacturing and layout design for API manufacturing. Polymorphism in APIs.
		2	Explain [L2:Understanding] principle, industrial process, scale up techniques, Industrial manufacturing process, flow charts of some important APIs.
		3	[L1:Remebering] Know Quality assurance (QA) and quality control (QC) of APIs and GMP Guidelines in API manufacturing like ICH Q7, Q7A and Q11 [L2:Understanding].
		4	[L2:Understanding] Explain techniques and process of synthetic routes and optimization of reactions, raw material & reagent selection, scale up techniques for APIs, Quality control aspects, material safety data sheet (MSDS), Scale up techniques in API manufacturing, environmental aspects in manufacturing of APIs, green chemistry approaches, [L1:Remebering] health hazards with chemical handling.
Semester VI			
Course Code	Course Name	Course Outcomes	After successful completion of course student will able to
		1	Name [L1:Remembering] disperse systems, its classification [L2:Understanding] , theories of disperse systems, thermodynamic v/s kinetic stability considerations.



3.6.1 T	Industrial Pharmacy II	2	Explain [L2:Understanding] suspensions, types, formulation [L6:Creating], development, manufacturing, excipients used, evaluation [L5:Evaluating] , of suspensions.
		3	Define [L1:Remembering] emulsions, their physicochemical properties, theory of emulsification, HLB value & phase inversion temperature, Kraft point, cloud point, excipients, formulation [L6:Creating] & evaluation [L5:Evaluating] of emulsions; cracking, coalescence, stability & stress testing.
		4	Explain [L2:Understanding] semi-solids, anatomy & physiology of skin, selection of bases; penetration enhancers, formulation [L6:Creating] development, Percutaneous absorption, flux measurement & evaluation [L5:Evaluating] .
		5	Describe [L2:Understanding] layout for manufacturing of suspensions, emulsions & semi-solids as per schedule M. Concept [L1:Remembering] of Scale up & technology transfer for dispersed system.
3.6.1 P	Industrial Pharmacy II	1	Develop [L3:Applying] Formulate [L6:Creating] , Prepare, Evaluate [L5:Evaluating] & label of Suspensions dosage forms.
		2	Develop [L3:Applying] Formulate [L6:Creating], Prepare, Evaluate [L5:Evaluating] & label of Emulsions dosage forms.
		3	Develop [L3:Applying] Formulate [L6:Creating], Prepare, Evaluate [L5:Evaluating] & label of Semisolids dosage forms.
		4	Conduct [L2:Understanding] a survey of any one drug, its different dispersed/semisolid dosage forms available in market and submit its report [L2: Understanding] highlighting the rational /logic [L1:Remembering] behind designing of different dosage forms of same drug.
		5	Compare [L2:Understanding] different packaging and its labeling materials of semisolid dosage forms.
3.6.2 T	Pharmaceutical Analysis	1	Understand principles, instrumentation and applications[L1:Remembering] of, electrophoresis, thermal, X ray, Diffraction and radio chemical techniques employed for the analysis of APIs and formulations [L2:Understanding]
		2	Understand [L2:Understanding] the basic principle, instrumentation of chromatography and Planar chromatographic techniques.



	IV	3	Process[L3:Applying], interpret the data obtained through experimentation and report the results as per regulatory requirements.
		4	Discuss the analytical method validation [L2:Understanding] and Validate various analytical [L4:Analyzing] methods as per ICH/USP guidelines.
3.6.2 P	Pharmaceutical Analysis IV	1	Understand[L2:Understanding] the different separation techniques and their applications in analysis of drugs[L3:Applying]
		2	Calibrate [L3:Applying]and validate various analytical instruments & methods as per ICH/USP guidelines[L4:Analyzing]
		3	Acquire knowledge [L1:Remembering] for processing and interpretation of data obtainedthrough experimentation and report the results as per regulatory requirements[L4:Analyzing]
		4	Take appropriate safety measures while handling instruments, chemicals and apparatus.[L2:Understanding]
3.6.3 T	Medicinal Chemistry II	1	[L1:Remembering]History and general aspects of the design & development of drugs.
		2	[L2:Understanding] Explain drug metabolism & its significance in drug discovery.
		3	[L3:Applying] Classification, nomenclature, structure activity relationship (SAR), mechanism of action, adverse effects and therapeutic uses of Local anesthetics, Oral Anti- hyperglycemic, Diagnostics and drugs acting on Central nervous system.
		4	[L3:Applying] Study the scheme of synthesis of drugs.
		5	[L4:Analyzing] Recent developments of Drugs in Local anesthetics, Oral Anti-hyperglycemic, Diagnostics and drugs acting on Central nervous system.
3.6.3 P	Medicinal Chemistry II	1	[L4:Analyzing] Determine molar refractivity of compounds.
		2	Separate solvents by Steam distillation technique [L3:Applying].
		3	Understand [L2:Understanding] the mechanism and carry out Dean stark azeotropic water separation.
		4	Synthesize, recrystallize [L4:Analyzing] and [L2:Understanding] understand reaction mechanisms involved in synthesis of medicinally important organic compounds
		5	Synthesize [L3:Applying] medicinally important organic compounds using microwave assisted organic synthesis.



3.6.4 T	Pharmacology III	1	Learn [L1:Remembering] pharmacological actions of drugs and skills used for anaesthetizing a part or whole body to perform surgical procedures [L2:Understanding].
		2	Get in-depth knowledge of [L2: Understanding] pharmacology of Alcohol, its management and treatment [L3: Applying] in conditions associated with chronic alcoholism.
		3	Understand [L2:Understanding] and study [L1:Remembering] pharmacological actions of drugs acting on central nervous system.
		4	Study [L1:Knowledge] pharmacology of drugs used for the treatment of pain, pyrexia and inflammatory conditions.
		5	Learn [L1:Knowledge] Pharmacology of drugs used [L3:Applying] for clinical management of diseases/ disorders related to bones and joints.
		6	Comprehend and study [L2:Understanding] Pharmacotherapy of [L3:Applying] respiratory and Gastrointestinal tract disorders.
3.6.4 P	Pharmacology III	1	Record [L4:Analyzing] matching bioassay, bracketing bioassay, Interpolation bioassay method of acetylcholine using suitable isolated tissue preparation.
		2	Estimate [L4:Analyzing] unknown concentration of histamine using suitable isolated tissue preparation by matching, bracketing and interpolation method.
		3	Study [L2:Understanding] analgesic activity by Eddy's hot plate analgesiometer, locomotor activity of drug by actophotometer and muscle relaxant property by rotarod using suitable computerized simulated software programme [L3:Applying].
		1	Understand [L1:Understanding] & explain tools & techniques used in study of biosynthetic pathways in plants. Explain source, chemistry & applications of drugs from marine origin.
		2	Explain difficulties in elucidation [L5:Evaluating] of biosynthetic pathways in plant & explain approaches used with their merits & demerits. Understand [L2:Understanding] & explain underlying reasons as why natural products are appropriate material in discovering new drugs & also explain their contribution in modern drug discovery.



3.6.5 T	Natural Product Chemistry	3	Explain [L2:Understanding] source, extraction, processing, chemistry & applications of natural products used in pharmaceutical & allied industry such as coloring, sweetening agents & polymers. Compare & contrast nutraceuticals & functional foods & understand & explain their significance. Explain & classify natural products used as dietary supplements.
		4	Understand [L2:Understanding] & explain significance of natural pesticides & explain source, chemistry & applications. Explain source, extraction, processing, chemistry & applications of natural products used in pharmaceutical & allied industry such as bioavailability & skin permeation agents; wound healing agents, biofuels.
3.6.5 P	Natural Product Chemistry	1	Extract [L3:Applying] & subsequently conduct experiments to derive various physical constants required in characterization [L5:Evaluating] of natural products.
		2	Charge, elute [L5:Evaluating] & gather pure material using column chromatography.
		3	Record UV/IR spectrum of given sample & [L4: Analyzing] interpret them.
		4	Able to perform the evaluation [L5: Evaluating] of isolated phytoconstituents by chemical, chromatographic and spectral means.
		5	[L1:Remembering] Listen carefully, raise logical query, draw information, understand [L2:Understanding] rationale during field visits & prepare brief report for evaluation.
3.6.6 T	Bioorganic Chemistry & Drug Design	1	Understand [L2:Understanding] the significance of Bioorganic Chemistry and establish its relevance in drug design & discovery.
		2	Explain [L1:Remembering] approaches in rational drug design.
		3	Understand [L2:Understanding] various drug targets, their biochemical features, physiological & pathophysiological roles and significance in drug design.
		4	Explain [L1:Remembering] biotransformation of pro-drug design aspect in drug design.
3.6.7 T	Pharmaceutical Biotechnology	1	[L2:Understanding] Understanding the importance of Immobilized enzymes in Pharmaceutical Industries.
		2	[L2:Understanding] Genetic engineering applications in relation to production of pharmaceuticals.
		3	[L2:Understanding] Importance of Monoclonal antibodies in Industries [L3:Applying]

		4	[L2:Understanding] Understanding the importance of genetic engineering.
		5	[L2:Understanding] Recombinant DNA technology applications in relation to production of pharmaceuticals.
		6	[L2:Understanding]Importance of Monoclonal antibodies in Industries.



Bhangale
Dr. C. J. Bhangale
Principal
Principal
College of Pharmacy, Chincholi
Tal. Sinnar, Dist. Nashik 422102



Pravara Rural Education Society's

COLLEGE OF PHARMACY (FOR WOMEN)

Chincholi, Tal. Sinnar, Dist. Nashik 422103, Maharashtra, India

Ph.No. (02551)271178, Fax No. : (02551)271178

Website: www.pravarapharmacy.in

Email ID: pravaracopc@yahoo.co.in



Approved by A.I.C.T.E., Pharmacy Council of India, New Delhi and recognized by Govt. of Maharashtra
Affiliated to Savitribai Phule Pune University, Pune

FINAL YEAR B. PHARMACY			
Semester VII			
Course Code	Course Name	Course Outcomes	After successful completion of course student will able to
471T	Sterile Products	1	Understand [L2: Understanding] and describe [L1: Knowledge] the development [L3: Applying] of sterile pharmaceutical dosage forms including preformulation studies, packaging and GMP design of parenteral production facility
		2	Study [L1: Knowledge] and understand [L2: Understanding] the Classification, concept of formulation, selection of vehicles and added substance, processing and manufacturing of SVPs, LVPs, Parenteral Nutrition, intravenous admixture, ophthalmic products and various injectable / parenteral devices
		3	Understand [L2: Understanding] the principle, steps involved, Application of Lyophilizer/ Freeze dryer
		4	Learn [L1: Remembering] and understand [L2: Understanding] the fundamental concepts of blood and blood products and surgical dressings
471P	Sterile Products	1	Know [L2: Understanding] formulation, development and pharmacopoeial evaluation [L5: Evaluating] and labelling of SVPs, LVPs, and ophthalmic preparations
		2	Understand [L2: Understanding] importance and validation of aseptic area and expertise in sealing of ampoules.



		3	Know [L2: Understanding] how to do evaluation of packaging materials as per Pharmacopoeia [L5: Evaluating]
		4	Understand [L2: Understanding] how to do evaluation marketed preparations and know significance [L4: Analyzing] and accelerated stability testing of marketed samples.
472T	Pharmaceutical Analysis V	1	Learner will be able to understand [L1: Knowledge] principles, instrumentation and applications of various chromatographic, spectroscopic and microscopic techniques employed [L4: Analysis] for the analysis of APIs and formulations
		2	Learner will be able to understand Theoretical [L1: Knowledge] and practical [L3: Application] skills of instruments
		3	Learner will be able to understand various methods of analysis, parameters for analytical methods and interpretation of data [L2: comprehension] for the analysis of APIs and formulations .
472P	Pharmaceutical Analysis V	1	Learner will be able to Understand [L1: Knowledge] principles, instrumentation, working and applications of UV-VIS, IR, GC, SEM, AAS etc.
		2	Learner will be able to Understand [L1: Knowledge] operation and calibration of various analytical instruments for the assay of various APIs and formulations as per Pharmacopoeial standards
		3	Learner will be able to Acquire knowledge [L3: Apply] for processing and interpretation of data obtained through experimentation and report the results as per regulatory requirements.
473T	Medicinal Chemistry III	1	To demonstrate [L2: Understanding] the general aspects of the design and development of drugs including history, classification, nomenclature, structure activity relationship (SAR).
		2	To relate [L1: Remembering] the mechanism of action, adverse effects, therapeutic uses and recent developments in antibiotics.
		3	To relate [L1: Remembering] the mechanism of action, adverse effects, therapeutic uses and recent developments in antineoplastic agents.
		4	To understand [L2: Understanding] the mechanism of action, adverse effects, therapeutic uses and recent developments in anti-infective agents.



473P	Medicinal Chemistry III	1	To Create [L6:Creating] the medicinally important compounds by appropriate method and monitoring reaction with TLC.
		2	To Analyze [L4:Analyzing] synthesized compound by column chromatograph
		3	To develop and apply [L3:Applying] standard spectra of organic compound by ¹ H-NMR
		4	To explain and demonstrate [L2:Understanding] principle and working of Gas Chromatography, Atomic Absorption Spectrophotometry & SEM
474T	Pharmacology IV	1	Get in-depth knowledge [L2: Understanding] about pharmacology and pharmacotherapy [L3: Applying] of drugs used in infectious diseases
		2	Understand [L2: Understanding] endocrine pharmacology and actions of hormones along with mechanisms involved.
		3	Know [L2: Understanding] pharmacological actions [L3: Applying] of Thyroid, antithyroid drugs and Parathyroid hormones.
		4	Study [L1: Knowledge] Pharmacology of insulin and glucagon and Pharmacotherapy [L3: Applying] of Diabetes Mellitus.
		5	Get in-depth knowledge [L2: Understanding] about sex hormones and Pharmacology of drugs acting [L3: Applying] on it.
474P	Pharmacology IV	1	Record [L4: Analyzing] three point and four point bioassay of drugs using suitable isolated tissue preparation.
		2	Analyze [L4: Analyzing] the rational and irrational fixed dose combinations based on various parameters.
		3	Study [L2: Understanding] the prescription pattern and rational use of drugs by performing case studies or hospital visits.
475T	Natural Technology Drug	1	Explain [L2: Understanding] various factors affecting on level of secondary metabolites, how these can be minimized to ensure quality in raw material, effect of post harvesting manipulations, and changes during storage etc. & methods to control these modifications.
		2	Explain [L2: Understanding] various guidelines issued by WHO in relation with cultivation, collection, storage etc.
		3	Understand [L1: Remembering] & explain [L2: Understanding] concept of health & pathogenesis, philosophical basis, diagnosis & treatment aspects of Ayurveda, Unani, Siddha & Homeopathic system of medicine
		4	Understand [L1: Remembering] and explain [L2: Understanding] the applications [L3: Applying] of plant tissue culture for Secondary metabolite production.
		5	Understand the in vitro screening methods [L2: Understanding] and its applications for biological evaluation [L3: Applying] of natural products. Explain [L2: Understanding] the approaches and potentials of herbal new drug delivery systems like liposomes, phytosomes, nanoparticles and vesicles
		6	Understand [L1: Remembering] & explain various physical, chemical, spectroscopic means & methods [L4: Analyzing] used in structural elucidation of natural products

475P	Natural Technology	Drug	1	To evaluate [L5:Evaluating] herbal / TSM formulations.
			2	Evaluate [L5:Evaluating] marketed cosmetic & nutraceutical formulations.
			3	Analyze [L4: Analyzing] pre-formulation parameters & understand underlying rationale.
			4	Estimate [L6:Creating] in vitro assays for correlation with biological efficacy.
476T	Bio-Pharmaceutics & Pharmacokinetics		1	To Explain [L2: Understanding] the basic concept in biopharmaceutics and its importance [L5: Evaluating] in dosage form design
			2	To Compare [L2: Understanding] the processes and terms related to the fate of drug in human body also explain [L2: Understanding] and list [L4: Analyzing] the physicochemical, dosage form and patient related factors affecting absorption, distribution, metabolism and excretion of drugs
			3	To study [L1: Knowledge] the concept of compartment modelling and evaluate [L5: Evaluating] the quantity/concentration of drug in body at any point of time
			4	To identify [L3: Applying] pharmacokinetic parameters in non-linear pharmacokinetics also classify [L2: Understanding] of BCS (Biopharmaceutical classification system) theories of dissolution, dissolution test apparatus and IVIVC
			5	To explain [L2: Understanding] and evaluate [L5: Evaluating] bioavailability , bioequivalence and its regulatory requirements for conducting bioequivalence study, bio-waivers, bio- similar
477T	Pharmaceutical Jurisprudence		1	To know [L1: Knowledge] and understand [L2: Understanding] the history of pharmacy profession ,scope, objective, new drug policy of pharmaceutical legislation along with principles and significance of code of pharmaceutical ethics
			2	To understand [L2: Understanding] the Basic principles, parameters purpose and dimensions of the different pharmaceutical laws, act and rules
			3	To know [L1: Knowledge] and understand [L2: Understanding] the Drugs Price Control Order
			4	To study [L1: Knowledge] and understand [L2: Understanding] IPR, patents and process of related to patents
			5	To know [L1: Knowledge] and understand [L2: Understanding] the information of Standard Institutions and Regulatory Authorities
Semester VIII				
Course Code	Course Name	Course Outcomes	After successful completion of course student will able to	

481T	Advanced Drug Delivery System	1	Understand [L2: Understanding] and describe the basic concept, design [L6: Creating] and types of modified release drug delivery system.
		2	Understand [L2: Understanding] and describe the selection, types and application of polymers.
		3	Understand [L2: Understanding] and study the concept behind, formulation and evaluation [L5: Evaluating] of novel drug delivery system like particulate drug carrier, pulmonary drug delivery system, aerosols, TDDS, mucoadhesive DDS and microencapsulation etc
		4	Understand [L2: Understanding] the basic concept of optimization
481P	Advanced Drug Delivery System	1	To compare[L2: Understanding] and contrast and design [L6: Creating] various tablets.
		2	To compare and contrast [L2: Understanding] various polymers.
		3	To compare and contrast [L2: Understanding] and design [L6: Creating] various NDDS.
		4	To compare and contrast [L2: Understanding] and design[L6: Creating] various microcapsules.
482T	Cosmetic Science	1	State [L1: Remembering] the cosmetics and generalize [L2: Understanding] the concepts of cosmetics and cosmeceuticals; anatomy of skin v/s hair, general excipients used in cosmetics and their classification and preservation.
		2	Apply [L3: Apply] the basic characteristics and scientific knowledge of cosmetic preparations to develop [L6: Creating] the various cosmetic preparations by using various equipments
		3	Discuss [L2: Understanding] the classification and mechanism of different cosmetic agents used and their preparations and cosmeceuticals agents
		4	Evaluate [L5: Evaluating] the different cosmetics preparation
482P	Cosmetic Science	1	State [L1: Remembering] the correct use of various equipments in Pharmaceutics Laboratory relevant to cosmetics
		2	Perform [L3:Applying] the formulation, evaluation, [L5: evaluating] and labeling of cosmetics preparation
		3	Describe [L2: Understand] the use of various ing.s. in formulation and category of formulation
483T	Pharmaceutical Analysis VI	1	Understand[L1: Knowledge] principles, instrumentation and applications of various spectroscopic technique [L4: Analysis] for the analysis of APIs and formulations
		2	Learner will be able to understand Theoretical[L1: Knowledge] and practical [L3: Application] skills of instruments
		3	Learner will be able to understand various methods of analysis, parameters for analytical methods and interpretation of data [L2:comprehension] for the analysis of APIs and formulations .
483P	Pharmaceutical Analysis VI	1	Learner will be able to understand[L1: Knowledge] principles, instrumentation and applications of various spectroscopic technique [L4: Analysis] for the analysis of APIs and formulations

		2	Learner will be able to understand Theoretical [L1: Knowledge] and practical [L3: Application] skill in instrumentation
		3	Learner will be able to understand various methods of analysis, parameters for analytical methods and interpretation of data [L2:comprehension] for the analysis of APIs and formulations .
484T	Medicinal Chemistry IV	1	Examine [L1: Remembering] the general aspects of the design and development of drugs including history, classification, nomenclature of antihistaminic, autacoids, NSAID's, narcotic, steroidal, hormones, insulin, oral antihypoglycemic, diagnostic and serotonergic agents.
		2	Describe and discuss [L2: Understanding] the drug design including SAR and mechanism of action of antihistaminic, autacoids, NSAID's, narcotic, steroidal, hormones, insulin, oral antihypoglycemic, diagnostic and serotonergic agents.
		3	Explain and illustrate [L3: Applying] adverse effects, therapeutic uses and recent developments of antihistaminic, autacoids, NSAID's, narcotic, steroidal, hormones, insulin, oral antihypoglycemic, diagnostic and serotonergic agents
		4	Design [L4: Creating] scheme of synthesis of drugs of antihistaminic, NSAID's, narcotic, steroidal insulin and oral antihypoglycemic
484P	Medicinal Chemistry IV	1	Originate, [L6: Creating] synthesize, recrystallization and monitoring of TLC
		2	Evaluate [L5: Evaluating] and purification of synthesized compounds by Column chromatography
		3	Interpretation [L3: Applying] , [L2: Understanding] of IR spectra of synthesized compounds, Demonstration of High Vacuum Distillation and Demonstration on CADD
485T	Pharmacology V	1	Get in-depth knowledge [L2: Understanding] about various drug-drug interactions, mechanism [Applying] involved and its predisposing factors.
		2	Understand [L2: Understanding] the mechanism of adverse drug reactions, risk factors and pharmacovigilance.
		3	Know [L2: Understanding] functioning [Applying] and role of hospital pharmacy and practice of rational drug therapy and methods of assessment of patient compliance and non-compliance.
		4	Study [L1: Knowledge] the details of clinical trials, ethics and practice of Good Clinical Practice involved in clinical trials.
485P	Pharmacology V	1	Record [L4: Analyzing] three point and four point bioassay of drugs using suitable isolated tissue preparation.
		2	Analyze [L4: Analyzing] the rational and irrational fixed dose combinations based on various parameters.
		3	Study [L2: Understanding] the prescription pattern and rational use of drugs by performing case studies or hospital visits.

486T	Natural Products: Commerce, Industry & Regulations	1	To classify [L4: Analyzing] 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.
		2	Evaluate [L5: Evaluating] the market potential of natural products & explore entrepreneurship skills to grab these opportunities.
		3	Understand [L1: Remembering] & explain [L2: Understanding] safe use of natural products, possible toxicities & interaction, toxicities in most vulnerable group (elderly patients), need & significance of Pharmacovigilance systems; WHO guidelines in this regard.
487T	Quality Assurance Techniques	1	Describe [L2: Understanding] the basic concept in Quality, QA, QC and IPQC and its importance in pharmaceutical industry, also objectives, components and responsibilities of QA Dept.
		2	Know [L3: Application] and understand [L2: Understanding] the Calibration & Qualifications and describe [L1: Remembering] the Calibration Master Plan, Responsibility and Frequency of Calibration, Calibration of instruments and Equipment qualification, URS, DQ, IQ, OQ and PQ.
		3	Apply [L3: Application] the Concept of Good Manufacturing Practices (GMP), Good Laboratory Practices (GLP), Good Documentation Practices (GDP) and estimate [L2: Understanding] Pharmaceutical quality management system and quality risk management.
		4	Identify [L2: Understanding] need, benefits, types of validation and documents involved in validation and apply [L3: Application] this in validation
		5	Describe [L1: Remembering] Regulatory Agencies imparting quality standards such as WHO, ICH, USFDA, TGA, MHRA and apply [L3: Application] this in regulatory framework.



Bhangale
Dr. C. J. Bhangale
Principal

Principal
 College of Pharmacy, Chincholi
 Tal. Sinnar, Dist. Nashik 422102



Pravara Rural Education Society's

COLLEGE OF PHARMACY (FOR WOMEN)

Chincholi, Tal. Sinnar, Dist. Nashik 422103, Maharashtra, India

Ph.No. (02551)271178, Fax No. : (02551)271178

Website: www.pravarapharmacy.in

Email ID: pravaracopc@yahoo.co.in



Approved by A.I.C.T.E., Pharmacy Council of India, New Delhi and recognized by Govt. of Maharashtra
Affiliated to Savitribai Phule Pune University, Pune

FIRST YEAR M. PHARMACY			
Semester I			
Course Code	Course Name	Course Outcomes	After successful completion of course student will able to
MQA 101T	Modern Pharmaceutical Analytical Techniques	1	Understand [L1:Remembering] principles, instrumentation, working and applications of UV-VIS, HPLC and Potentiometry.
		2	Understand operation[L2:Understanding]and calibration of various analytical instruments for the assay of various APIs and formulations as per Pharmacopoeial standards [L3:Applying]
		3	Acquire knowledge [L1:Remembering] for processing and interpretation of data obtainedthrough experimentation and report the results as per regulatory requirements[L4:Analyzing]
		4	Discuss the analytical method validation [L2:Understanding] and Validate various analytical [L4:Analyzing] methods as per ICH/USP guidelines.
MQA 102T	Quality Management System	1	Understand [L1:Remembering] the importance of quality Quality objectives, strategic planning and its implementation. [L2:Understanding]
		2	Study [L2:Understanding] and implement [L3:Applying] the ISO management systems.
		3	Know different tools for quality improvement. [L1:Remembering]
		4	Study the analysis [L5:Evaluating] of issues in quality.
		5	Get in depth knowledge [L1:Remembering] of Quality evaluation [L5:Evaluating] of pharmaceuticals.

		6	Study [L1:Remembering] Stability testing of drug and drug substances and Statistical approaches [L3: Applying] for quality.[L2:Understanding]
MQA 103T	Quality Control and Quality Assurance	1	Understand [L2:Understanding] the various aspects of quality control and quality assurance aspects of pharmaceutical industries.
		2	Understand [L2:Understanding] the cGMP aspects in a pharmaceutical industry, documentation, quality certifications.
		3	Justify [L5:Evaluating] the scope of quality certifications applicable to Pharmaceutical industries such as Three tier documentation, eCTD.
		4	Explain [L3:Applying] the responsibilities of QA & QC departments. , scope and importance of intellectual property rights. trade mark, copyright and patents.
MQA 104T	Product Development and Technology Transfer	1	Apply [L3:Applying] the knowledge to develop new procedures of their own design of Pilot layouts.
		2	Understand [L2:Understanding] the Quality by design practices of sterile and non sterile dosage forms.
		3	Understand [L2:Understanding] the practices of packaging technology.
		4	The Regulatory requirements in drug development stages [L2:Understanding]
		5	Understand [L2:Understanding] the phase of technology transfer.
MQA 105P	Pharmaceutical Quality Assurance Practical I	1	[L4:Analyzing] Use of Spectrophotometer for analysis for Pharmacopoeial compounds and their formulations.
		2	Simultaneous [L5:Evaluating] estimation of combination formulations.
		3	[L3:Applying] Effect of pH and solvent on UV spectrum of certain drugs.
		4	Use of fluorimeter for analysis of Pharmacopoeial compounds [L4:Analyzing]
		5	[L5:Evaluating] IR, NMR and Mass spectroscopy - Interpretation of spectra & structural elucidation.
		6	Use of [L4:Analyzing] colorimeter for analysis of Pharmacopoeial compounds and their formulations.
Semester II			
Course Code	Course Name	Course Outcomes	After successful completion of course student will able to

MQA 201T	Hazards and Safety Management	1	Understand about environmental problems among learners.[L2:Understanding]
		2	Ensure safety standards in pharmaceutical industry [L1:Remembering]
		3	Empower an ideas to clear mechanism and management in different kinds of hazard management system [L3: Application]
		4	Provide comprehensive knowledge on the safety management [L1:Remembering]
MQA 202T	Pharmaceutical Validation	1	[L1:Remembering] The importance of patent and intellectual property rights.
		2	The students are trained on the qualification aspects of instruments [L3:Applying]
		3	[L3:Applying] The importance of calibration to be performed for the instruments.
		4	[L2:Understanding]The students gain knowledge on how validation are carried for various components in industry Such as instrument validation, cleaning validation and process validation.
MQA 203T	Audits and Regulatory Compliance	1	[L2:Understanding] understand concept and principles of Auditing, Audit process, Assurance Standards, and Audit of computerized Systems.
		2	[L1:Remembering] Role of quality systems and audits in pharmaceutical manufacturing environment.
		3	[L2:Understanding]Familiarize the students with the principles and procedure of auditing.
		4	[L3:Applying] Auditing of Quality Assurance and engineering department.
MQA 204T	Pharmaceutical Manufacturing Technology	1	Understand [L2:Understanding] the common practice in the pharmaceutical industry developments.
		2	Understand [L2:Understanding] the practices of aseptic process technology, non sterile and packaging technology.
		3	Understand [L2:Understanding] of principles and implementation of Quality by design (QbD).
		4	Understand [L2:Understanding] of principles and implementation of process analytical technology (PAT) in pharmaceutical manufacturing.
MQA 205P	Pharmaceutical Quality	1	[L4:Analyzing] Use of Spectrophotometer for analysis for Pharmacopoeial compounds and their formulations.
		2	Simultaneous [L5:Evaluating] estimation of combination formulations.
		3	[L3:Applying] Effect of pH and solvent on UV spectrum of certain drugs.
		4	Use of fluorimeter for analysis of Pharmacopoeial compounds [L4:Analyzing]



	Assurance Practical II	5	[L5:Evaluating] IR, NMR and Mass spectroscopy - Interpretation of spectra & structural elucidation.
		6	Use of [L4:Analyzing] colorimeter for analysis of Pharmacopoeial compounds and their formulations.
Semester III			
Course Code	Course Name	Course Outcomes	After successful completion of course student will able to
MRM 301T	Research Methodology	1	Develop [L2: Understand] understanding on various kinds of research, objectives of doing research, research process, research designs and sampling.
		2	Have basic knowledge on qualitative research techniques [L1:Remembering]
		3	Have adequate knowledge on measurement & scaling techniques as well as the quantitative data analysis [L4: Analyzing]
		4	Have basic awareness of data analysis-and hypothesis testing procedures [L1:Remembering]
MQA/MPH 395	Introduction to Constitution	1	Understand [L2: Understanding] the knowledge of philosophy of the Indian constitution.
		2	Apply [L3: Applying] and discuss the fundamental rights of Indian constitution.
		3	Evaluate [L5: Evaluating] the Directive Principles of State Policy.
		4	Understand the Fundamental Duties[L2:Understanding]





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FIRST YEAR M. PHARMACY (Pharmaceutics)			
Semester I			
Course Code	Course Name	Course Outcomes	After successful completion of course student will able to
MPH101T	Modern Pharmaceutical Analytical Techniques	1	Understand [L1:Remembering] principles, instrumentation, working and applications of UV-VIS, HPLC and Potentiometry.
		2	Understand operation[L2:Understanding]and calibration of various analytical instruments for the assay of various APIs and formulations as per Pharmacopoeial standards [L3:Applying]
		3	Acquire knowledge [L1:Remembering] for processing and interpretation of data obtained through experimentation and report the results as per regulatory requirements[L4:Analyzing]
		4	Discuss the analytical method validation [L2:Understanding] and Validate various analytical [L4:Analyzing] methods as per ICH/USP guidelines.
MPH102T	Drug Delivery System	1	Explain [L5:Evaluating] the various approaches for development of novel drug delivery Systems.
		2	Enumerate [L1:Remembering] the application of Dosage Forms for Personalized Medicine, Pharmacogenetics, Customized drug delivery systems, Bioelectronic Medicines, 3D printing of pharmaceuticals, andTelepharmacy.
		3	Identify [L4:Analyzing] the criteria for selection of drugs and polymers for the development of delivering system.
		4	Discuss [L2:Understanding] the formulation and evaluation of Novel drug delivery systems
MPH103T	Modern Pharmaceutics	1	Explain [L5:Evaluating] the elements of Preformulation studies of different dosageform

		2	Discuss [L2:Understanding]physics of tablets and its effect on pharmacokinetic parameters.
		3	Explain [L5:Evaluating] the Industrial Management and GMP Considerationsconcepts in pharmaceutical industries
		4	Outline [L2:Understanding] the Optimizatio Techniques & Pilot Plant Scale Up Techniques in pharmaceutical industries.
		5	Apply [L3:Applying] the knowledge of Stability Testing, sterilization process & packaging of dosage forms in pharmaceutical industries.
MPH104T	Regulatory Affairs	1	Discuss [L2:Understanding] the Concepts of innovator and generic drugs, drug development Process.
		2	Explain [L5:Evaluating] the Regulatory guidance and guidelines for filing and approval Process including Post approval regulatory requirements for actives anddrug products.
		3	Explain[L5:Evaluating] preparation of Dossiers and their submission e-formats to regulatory agencies across the globe.
		4	Outline [L2:Understanding] Clinical trials requirements for approvals for conducting clinical trials.
		5	Relate[L1:Remembering] Pharmacovigilance and process of monitoring in clinical trials.
MPH105P	Pharmaceutics Practical I	1	Evaluate [L5: Evaluating] therapeutic agents by various instrumental analytical techniques
		2	Perform [L3: Applying] preformulation studies for development of various dosage forms
		3	Design [L6: Creating] and optimize various types of controlled oral, transdermal and mucosal drug delivery systems
		4	Evaluate [L5: Evaluating] various developed drug delivery systems using suitable methods
		5	Predict [L6: Creating] pharmaceutical factors affecting drug release kinetics
Semester II			
Course Code	Course Name	Course Outcomes	After successful completion of course student will able to

MPH201T	Molecular Pharmaceutics (Nano Tech and Targeted DDS)	1	Explain [L2: Understanding] the various approaches for development of novel drug delivery Systems.
		2	Identify [L3: Applying] the criteria for selection of drugs for the development of delivering system.
		3	Identify [L3: Applying] the criteria for selection of Polymer for the development of delivering system.
		4	Discuss [L6: Creating] the formulation and evaluation of Novel drug delivery systems
MPH202T	Advanced Biopharmaceutics & Pharmacokinetics	1	Know [L3: Application] and understand the processes and terms related to the fate of drug in human body also explain and describe [L2: Understanding] factors affecting absorption of drug from Non per oral extra-vascular routes, and [L2: Understanding] distribution of drugs, Tissue permeability, binding of drugs, apparent volume of drug distribution, plasma and tissue protein binding, factors affecting protein-drug binding. Kinetics of protein binding, Clinical significance of protein binding of drugs
		2	Know [L3: Application] and understand Drug metabolism, metabolic pathways, factors affecting drug metabolism, [L2: Understanding] renal excretion of drugs, factors affecting renal excretion of drugs, renal clearance, Non renal routes of drug excretion of drugs. Identify [L2: Understanding] pharmacokinetic parameters in non-linear pharmacokinetics also understanding of BCS (Biopharmaceutical classification system) theories of dissolution, dissolution test apparatus and IVIVC.
		3	Describe [L1: Remembering] and evaluate [L5: Evaluating] bioavailability, bioequivalence and its regulatory requirements for conducting bioequivalence study, bio-waivers, bio- similar and methods to enhance the dissolution rates and bioavailability of poorly soluble drugs..
		4	Apply [L3: Application] the concept of compartment modelling and estimate [L5: Evaluating] the quantity/concentration of drug in body at any point of time also Pharmacokinetics parameters - KE, $t_{1/2}$, Vd, AUC, Ka, CL _T and CL _R .
		5	Know [L3: Application] and understand [L2: Understanding] Nonlinear Pharmacokinetics, Factors causing Non-linearity, Michaelis-menten equation, Determination of V _{max} and K _m . Significance of nonlinear pharmacokinetics, Explanation with example of drugs. Pharmacokinetics in Clinical Situations.
MPH203T	Computer Aided Drug Delivery System	1	Describe [L1: Remembering] history and role of computers in Pharmaceutical research and preclinical development
		2	Explain [L2: Understanding] drug disposition modeling techniques
		3	Express [L2: Understanding] the importance of computer in market analysis, biopharmaceutical characterization, Pharmacokinetic and dynamics and clinical

			development
		4	Describe [L1: Remembering] pharmaceutical application, advantages, disadvantages, currentchallenges and future scope of artificial intelligence and robotics
		5	Describe [L1: Remembering] pharmaceutical application, advantages, disadvantages, currentchallenges and future scope of computational fluid dynamics.
MPH204T	Cosmetic Cosmeceuticals and	1	State [L1: Remembering] the cosmetics and generalize [L2: Understanding] the concepts of cosmetics and cosmeceuticals; key excipients used in cosmetics and cosmeceuticals.
		2	Discuss [L2: Understanding] the building blocks for different product formulations of cosmetics and cosmeceuticals
		3	Apply [L3: Apply] the basic and scientific knowledge to develop [L6: Creating] various cosmetics and cosmeceuticals cosmetic preparations with desired Safety, stability, and efficacy by using current technologies in the market
		4	Discuss [L2: Understanding] the classification and mechanism of different key ingredients to develop cosmetics and cosmeceuticals and evaluate [L5: Evaluating] the different cosmetics preparation
MPH205P	Pharmaceutics Practical II	1	Compare [L4: Analyzing] the dissolution efficiency of various marketed pharmaceutical products
		2	Formulate [L6: Creating] and evaluate [L5: Evaluating] various cosmetic products
		3	Design [L6: Creating] experiments based on QbD for optimization of drug delivery
		4	Analyze [L4: Analyzing] and predict [L6: Creating] pharmacokinetic parameters using softwares
		5	Evaluate [L5: Evaluating] computational modeling of drug disposition
Semester III			
Course Code	Course Name	Course Outcomes	After successful completion of course student will able to
MRM 301T	Research Methodology	1	Develop [L2: Understand] understanding on various kinds of research, objectives of doingresearch, research process, research designs and sampling.
		2	Have basic knowledge on qualitative research techniques [L1:Remembering]
		3	Have adequate knowledge on measurement & scaling techniques as well as the quantitative data analysis [L4: Analyzing]
		4	Have basic awareness of data analysis-and hypothesis testing procedures [L1:Remembering]



Bhangale
Dr. C. J. Bhangale
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