Dr. D. Y. Patil Pratishthan's
Dr. D. Y. PATIL COLLEGE OF PHARMACY
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Approved by : All India Council for Techinical Education, New Delhi
Pharmacy Council of India, New Delhi. Recognized by : Government of Maharashtra
Affiliated to Savitribai Phule Pune University, Pune

Dr. Sanjay D. Patil
President

Padmashree Dr. D. Y. Patil
Founder

Shri. Satej D. Patil
Vce-President & Chairman

Dr. N. S. Vyawahare
Principal

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

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The course objectives of all courses are mentioned in the curriculum prescribed by the University. Each subject teacher has designed course outcomes (Cos) for theory and practical based on the number of units/ practical's in curriculum ranging between 4-8 and Teaching Learning outcomes (TLOs) are framed as per lectures/ practical's conducted. All Course outcomes and Programme outcomes are of all programmes are appropriately disseminated on website and conveyed to the students during lectures.

Summary

Sr. No.	Content	Documents
1.	Programme Outcomes	View Documents
2.	Course Outcomes of all courses of all programmes	View Documents
3.	Sample copy of Course outcomes prepared by Subject teacher	View Documents
4.	Dissemination of Course Outcomes	View Documents
5.	Dissemination of Programme Outcomes	View Documents
6.	Sample copy of Question paper Designed and mapped with Course outcomes and Programme outcomes	View Documents

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Dr. D. Y. Patil Pratishthan's
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Akurdi, Pune-411044

PROGRAMME 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 well- being.
6. **Professional Identity:** Understand, analyze and communicate the value of their professional roles in society (e.g. health care professionals, promoters of health, educators, managers, employers, employees).
7. **Pharmaceutical Ethics:** Honour personal values and apply ethical principles in professional and social contexts. Demonstrate 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.

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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.

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Back to Summary

Course Outcomes

(2015 Pattern)

Subject: Pharmaceutics I	**Class: First Year B. Pharm**
Subject Code: 1.1.1	
Course outcomes:	
1.1.1.1 Explain the history of Pharmacy, Pharmacy Profession, Pharmaceutical Industry and alternative system of medicine.	
1.1.1.2 Appraise role of ethics, Pharmacopeia, compendia, code of conduct of Pharmacy and applications.	
1.1.1.3 Formulate and evaluate various Pharmaceutical dosage forms and find the need for accuracy, thoroughness in manufacture of Pharmaceutical products and routes of drug administration.	
1.1.1.4 Summarise and evaluate various preformulation parameters.	
1.1.1.5 Predict the special requirements of preparations regarding the use, handling, storage conditions.	
1.1.1.6 Differentiate between quality assurance and quality control.	

Subject: Modern Dispensing Pharmacy	**Class: First Year B. Pharm**
Subject Code: 1.1.2	
Course outcomes:	
1.1.2.1Interpret and assess prescriptions and other requests for medicines, including legal and clinical validation, dispensing, labelling and supply.	
1.1.2.2 Explain drug interactions, adverse drug reactions, pharmacovigilance and idiosyncrasy.	
1.1.2.3 Formulate and dispense various dosage forms with their label including storage instructions.	
1.1.2.4 Calculate the dose of drug and Perform pharmaceutical calculations accurately.	
1.1.2.5 Interpret the types of incompatibility and their remedies.	
1.1.2.6Summarise the Role of pharmacists in community healthcare and patient counselling.	

Subject: Pharmaceutics-II	**Class: First Year B. Pharm**
Subject Code: 1.2.1	
Course outcomes:	
1.2.1.1 Design and develop new technologies (equipment based) in Pharmaceutical industry.	
1.2.1.2 Analyze the use of correct material for construction of Pharmaceutical plant.	
1.2.1.3 Practice the hazards and safety measures taken in industry.	
1.2.1.4 Predict the clinical significance of bioavailability and bioequivalence.	
1.2.1.5 Develop the practical knowledge while working in industry to apply theoretical principle of Manufacturing.	
1.2.1.6 Apply Pharmacopoeial standards for the preparation of various dosage forms.	

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Subject: Dosage Form Design **Subject Code: 1.2.2**	**Class: First Year B. Pharm**
Course objectives:	
1.2.2.1 Compare conventional and novel dosage forms.	
1.2.2.2 Describe fundamentals of manufacturing, evaluation stages and stability aspects for various dosage form.	
1.2.2.3 Summarise the details of radiopharmaceuticals.	
1.2.2.4 Discuss the methods to improve solubility and their role in dissolution study.	
1.2.2.5 Appraise the various aspect regarding dosage form design and explain the mechanism of granulation.	
1.2.2.6 Explain the structure of skin, mechanism of drug penetration and penetration enhancers in semisolid dosage form.	

Subject: Physical Pharmaceutics-I **Subject Code: 2.3.1**	**Class: Second Year B. Pharm**
Course outcomes:	
2.3.1.1 Explain various states of matter and their applications in pharmacy.	
2.3.1.2 Summarise concepts of phase rule and construct phase diagrams.	
2.3.1.3 Discuss and apply knowledge of colligative properties.	
2.3.1.4 Describe and apply knowledge of solubility of solids, distribution phenomena and thermodynamics in the design of dosage form.	
2.3.1.5 Justify role of BCS in dosage form Design.	
2.3.1.6 Investigate various theories, laws and equation related to states of matter.	

Subject: Pharmaceutical Microbiology and Immunology **Subject Code: 2.3.2**	**Class: Second Year B. Pharm**
Course outcomes:	
2.3.2.1 Explain in detail role of microbiology in pharmaceutical sector.	
2.3.2.2Compare and execute various structural features, biological characteristics and application of microbes like bacteria, yeast, moulds, viruses etc.	
2.3.2.3Summarise and measure various Microbial Limit tests, Sterility test, MIC, Antibiotic assay, and various staining techniques.	
2.3.2.4Discuss and apply principles of sterilization, preservation, disinfection and its application	
2.3.2.5 Summarize the concept, applications of immunology and Antigen-antibody reaction.	
2.3.2.6 Perform different Inoculation techniques, motility testing.	

Subject: Physical Pharmaceutics-II **Subject Code: 2.4.1**	**Class: Second Year B. Pharm**
Course outcomes:	
2.4.1.1 Appraise and apply knowledge of physical properties of matter.	
2.4.1.2 Illustrate the concept surface and interfacial phenomenon	
2.4.1.3 apply knowledge of chemical kinetics including stability testing protocols and regulatory requirements in dosage form design	
2.4.1.4 Explain and demonstrate knowledge of different properties, methods and stability of colloids	
2.4.1.5 Appraise various instruments used to determine physicochemical properties of matter	
2.4.1.6 Assess role various physicochemical properties in formulation of biphasic liquid dosage form	

Subject: Pharmaceutical Engineering **Subject Code: 2.4.6**	**Class: Second Year B. Pharm**
Course objective:	
2.4.6.1 Illustrate principle, construction and working of equipment's for different unit operations.	
2.4.6.2 Differentiate between traditional & advanced operating instruments.	
2.4.6.3 Explain the fundamentals involved in mass transfer, fluid flow, and heat transfer.	
2.4.6.4 Summarise the various mechanisms, factors influencing corrosion process and methods used for corrosion control in Pharmaceutical industries.	
2.4.6.5 Compare various unit operations with respect to their applications in Pharmacy.	
2.4.6.6 Relate the role of unit operations like Drying, Evaporation, Distillation, Crystallization etc. in dosage form design.	

Subject Industrial Pharmacy-I **Subject Code: 3.5.1**	**Class : Third Year B. Pharm**
Course outcomes:	
3.5.1.1 Discuss various concepts of preformulation and perform experiments showing influence of various additives on dosage form design & stability.	
3.5.1.2 Explain different physicochemical principles, guiding solid oral dosage forms like tablet, capsules, various additives used therein, manufacture & evaluation, equipment's, defects and corrective approaches.	
3.5.1.3 Explain the concept, types, Pharmacopoeial specifications, techniques &equipment's used in tablet coating.	
3.5.1.4 Construct the Plant layout for tablet and capsule manufacturing.	
3.5.1.5 Review different techniques used to formulate modified release dosage forms.	
3.5.1.6 Review & compare different advances in manufacturing of Capsules.	

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Subject: Pharmaceutical Business Management & Disaster Management **Class: Third Year B. Pharm** **Subject Code: 3.5.6**
Course outcomes:
3.5.6.1 Summarise knowledge of Pharmaceutical business management strategy.
3.5.6.2 Discuss Pharmaceutical Marketing strategies and management.
3.5.6.3 Discuss human resource and development needs.
3.5.6.4 Describe disaster management and disaster preparedness plan.
3.5.6.5 Demonstrate the perspectives & Barriers in communication.
3.5.6.6 Explain the effects of disasters on the environment.

Subject Industrial Pharmacy-II **Class : Third Year B. Pharm** **Subject Code: 3.6.1**
Course outcomes:
3.6.1.1 Describe various concept of dispersed system along with formulation strategies and thermodynamics.
3.6.1.2 Describe mechanisms of formation of dispersed systems and make use of different concepts like structured vehicles, HLB, PIT tec. of dispersed systems inversion temperature.
3.6.1.3 Illustrate the concept of topical drug delivery with emphasis on anatomy & functions of Skin as a barrier and develop formulations followed by evaluation of semisolids.
3.6.1.4 Classify & compare various equipment's used in manufacturing of dispersed systems and semisolids. Sketch & discuss the Plant layout for dispersed systems and semisolids.
3.6.1.5 Review various natural excipients used in topical formulations.
3.6.1.6 Prepare report on advances in formulation of dispersed systems.

Subject: Pharmaceutical Biotechnology **Class: Final Year B. Pharm** **Subject Code:3.6.7**
Course outcomes:
3.6.7.1 Summarise scope and applications in Pharmacy.
3.6.7.2 Compile the role of gene transfer and genetic engineering techniques in field of molecular biotechnology and application
3.6.7.3 Summarized rDNA technology and applications for biotechnological derived products, human gene therapy and monoclonal antibody.
3.6.7.4 Appraise application of genetic engineering in animals.
3.6.7.5 Categories enzymes immobilization methods and organise its applications.
3.6.7.6 Appraise fermentation, downstream process, effluent treatment and its application.

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Subject: Sterile Products **Subject Code:4.7.1**	**Class: Final Year B. Pharm**
Course outcomes:	
4.7.1.1 Summarise the requirements for Pre-formulation and formulation of sterile products, packaging material.	
4.7.1.2 Demonstrate GMP guidelines for Parenteral Production and discuss layout of Parentral facility along with its requirements.	
4.7.1.3 Classify ,formulate and evaluate parentrals on large and Pilot plant scale.	
4.7.1.4 Illustrate pre formulation, formulation, and evaluation of ophthalmic products, Blood Products and Surgical Dressings.	
4.7.1.5 differentiate various advances in parenteral formulations.	
4.7.1.6 report various advancements in excipients used in parenterals.	

Subject: Biopharmaceutics& Pharmacokinetics **Subject Code: 4.7.6**	**Class: Final Year B. Pharm**
Course outcomes:	
4.7.6.1 Illustrate the concept of ADME of drug in human body.	
4.7.6.2 Describe mechanism of dissolution and concept of IVIVC. 4.7.6.3 Analyze the different pharmacokinetic parameters on the basis of Nonlinear and compartment model analysis.	
4.7.6.4 Describe measures of bioavailability bioequivalence and review the various regulations required to develop BA -BE study protocol for the new drug molecule.	
4.7.6.5 Review of software's and statistical models used in determination pharmacokinetic and Pharmacodynamic factors.	
4.7.6.6 Discuss the case studies of drugs-drug and drug-food interactions and enlist irrational combinations banned by FDA in India.	

Subject: Pharmaceutical Jurisprudence **Subject Code: 4.7.7**	**Class: Final Year B. Pharm.**
Course outcomes	
4.7.7.1. Recall the definitions, schedules in the various pharmaceutical laws and obey Pharmaceutical Code of Ethics. 4.7.7.2. Summarise in detail various Pharmaceutical Acts in India and their executions.	
4.7.7.3. Explain Patents, procedure for patent application and IPR.	
4.7.7.4. Illustrate role of the regulatory systems for safety and effectiveness of medicine and their quality.	
4.7.7.5. Explain advance resources for intellectual property rights.	
4.7.7.6 Report revisions and amendments in various Pharmaceutical Acts.	

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Subject: Advanced Drug Delivery System **Subject Code: 4.8.1**	**Class: Final Year B. Pharm**
Course outcomes:	
4.8.1.1 Elaborate various Novel Drug Delivery Systems with their formulation and evaluation.	
4.8.1.2 Explain the role of polymers in formulation of modified dosage forms.	
4.8.1.3 Describe the importance of optimization studies in formulation development.	
4.8.1.4 Explain the role of aerosols for delivery of drug, with its formulation and safety considerations.	
4.8.1.5 Compare full and fractional factorial design.	
4.8.1.6 Appraise the recent advances in aerosol technology.	

Subject: Cosmetic Science **Subject Code: 4.8.2**	**Class: Final Year B. Pharm**
Course outcomes:	
4.8.2.1. Describe the concepts of cosmetics, cosmeceuticals and its history.	
4.8.2. 2 Demonstrate the selection of excipients.	
4.8.2. 3 Formulate cosmetics for skin, hair, nail and dental care.	
4.8.2. 4 Evaluate cosmetics for skin, hair, nail and dental care.	
4.8.2.5 Select proper Packaging receptacle for cosmetics.	
4.8.2. 6 Appraise the selection of equipment and label information as per regulatory guidelines.	

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(2015 Pattern)

Pharmaceutical Chemistry Department

Subject Name: Pharmaceutical Inorganic chemistry **Class: First Year B. Pharm** **Subject Code: 1.1.3**
Course outcomes:
1.1.3.1 Elaborate the concept of Inorganic chemistry along with various pharmacopoeias.
1.1.3.2 Describe monographs of marketed formulations of Gastrointestinal agents, Topical agents, Inorganic gases and various other miscellaneous agents in I.P.
1.1.3.3 Summarise and apply concept of determination of impurities, different pharmaceutical waters, essential and trace elements, electrolytes in body along with various therapies associated with it.
1.1.3.4 Estimate quantities of various categories of inorganic pharmaceutical compounds and perform quality control tests.
1.1.3.5 Predict various acidic and basic radicals from given unknown inorganic binary mixture.
1.1.3.6 Investigate the given inorganic compounds by various quality control tests like limit tests, swelling power, acid neutralizing capacity and adsorption property.

Subject Name: Pharmaceutical Organic Chemistry-I **Class: First Year B. Pharm** **Subject Code: 1.1.4**
Course outcomes:
1.1.4.1. Elaborate the basic concepts of organic compounds and its significance.
1.1.4.2. Identify the IUPAC nomenclature of organic compounds.
1.1.4.3. State the concept of isomerism and apply the knowledge in understanding the structure property relationship.
1.1.4.4. Discuss different reagents in organic reactions and explain how addition and elimination reactions are performed with respect to alkenes and alkynes.
1.1.4.5. Explain factors affecting strength of acids and bases.
1.1.4.6. Analyse the synthesized organic compounds and explain their application.

Subject: Pharmaceutical Organic Chemistry-II **Class: First Year B. Pharm** **Subject Code: 1.2.3 T**
Course outcomes:
1.2.3.1. Explain the reactions of organic compound containing different function groups and their identification by qualitative analysis.
1.2.3.2. Illustrate in detail substitution nucleophilic reactions.
1.2.3.3. Analyse the synthesized organic compounds and explain their application.
1.2.3.4. Determine physicochemical properties of synthesized compounds.
1.2.3.5 Describe the various active pharmaceutical ingredients synthesized from various functional groups.
1.2.3.6 Construct the organic compounds with help of functional groups.

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Subject Name: Pharmaceutical Analysis-I **Subject Code: 1.2.6**	**Class: First Year B. Pharm**
Course outcomes	
1.2.6.1 Summarise the concept of Pharmaceutical analysis.	
1.2.6.2. Generalize basic principles of data treatment and data handling.	
1.2.6.3. Elaborate the principle and basic concepts of various types of titration methods like acid-base, non-aqueous, precipitation, Complexometric, redox and Gravimetric analysis.	
1.2.6.4. Determine the calibration factor for weighing balance and volumetric apparatus.	
1.2.6.5. Estimate the strength of given solutions using various types of titration techniques.	
1.2.6.6. Investigate the percentage purity of the given compounds using various types of titration techniques.	

Subject: Pharmaceutical Biochemistry **Subject code: 2.3.3**	**Class: Second Year B. Pharm**
Course outcomes	
2.3.3.1Explain the scope of biochemistry in pharmacy and role of biochemical processes and cell metabolism.	
2.3.3.2Discuss chemistry, structure, function, factors affecting the activities and biological importance of biomolecules.	
2.3.3.3Estimate and characterise biomolecules by qualitative and quantitative tests.	
2.3.3.4Elaborate the fundamentals of metabolism, processes, steps involved in metabolism of biomolecules, various metabolic pathways involved in metabolism of biomolecules.	
2.3.3.5Explain the various organ function tests and advance diagnostic techniques.	
2.3.3.6Demonstrate the isolation and estimation of DNA and analyse the contents of gastric juice.	

Subject: Pharmaceutical Organic Chemistry-III **Subject Code: 2.3.4**	**Class: Second Year B. Pharm**
Course outcomes:	
2.3.4.1 Discuss the stereochemical aspects of the organic compounds.	
2.3.4.2 Explain mechanism and applications of rearrangement of electron deficient & electron rich systems.	
2.3.4.3 Discuss the chemistry of amino acids and Carbohydrates.	
2.3.4.4 Analyze the unknown binary compounds having different functional groups by qualitative analysis.	
2.3.4.5 Identify various drugs synthesized with the help of Molecular rearrangements.	
2.3.4.6 Compare the activity of marketed drugs available in enantiomeric form.	

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Subject: Pharmaceutical Organic Chemistry-IV **Subject Code: 2.4.3**	**Class: Second Year B. Pharm**
Course outcomes:	
2.4.3.1.1. Illustrate chemistry, methods of preparation & chemical reactions of heterocyclic, Polycyclic compounds and various Reagents used in organic synthesis.	
2.4.3.2. Design the retro-synthetic route of medicinal compounds.	
2.4.3.3. Explain in details nanochemistry, combinatorial chemistry and microwave assisted synthesis of compounds and their applications.	
2.4.3.4. Analyze the unknown binary compounds having different functional groups by qualitative and quantitative analysis.	
2.4.3.5 Summarise the heterocyclic compounds obtained from natural resources.	
2.4.3.6 Illustrate the properties of organic compounds from MSDS document.	

Subject: Pharmaceutical Analysis –II **Subject Code: 2.4.4**	**Class: Second Year B. Pharm**
Course outcomes:	
2.4.4.1. Explain the concept of electroanalytical techniques	
2.4.4.2.Explain principle, instrumentation & application of various electroanalytical methods	
2.4.4.3. Illustrate skill of operation, calibration and inference of results of electroanalytical instruments together with safety measures to be followed.	
2.4.4.4. Develop practical hand in analytical methods by estimation of analyte concentration in pure form and in formulation with thorough understanding of principle and procedures used in different analytical techniques.	
2.4.4.5. Demonstrate the required level of professional competence in the planning, conducting, evaluation and reporting of the results of investigations	
2.4.4.6. Independently process, interpret the data obtained through experimentation and report the results as per regulatory requirements.	

Subject Name: Pharmaceutical Analysis III **Subject Code: 3.5.2**	**Class: Third Year. B. Pharm**
Course outcomes:	
3.5.2.1 Elaborate concept of Instrumental methods of analysis and electromagnetic spectrum.	
3.5.2.2 Explain types of sampling techniques and separation techniques used for analysis of pharmaceutical formulations.	
3.5.2.3 Elaborate principle, instrumentation and applications of different analytical Instrumental techniques.	
3.5.2.4 Analyze Active pharmaceutical Ingredients (API) and pharmaceutical formulations using different analytical instruments.	
3.5.2.5 Elaborate concept of recent advances in analytical Instrumental techniques.	
3.5.2.6 Explain analytical method validation parameters as per ICH guidelines used for analysis of Pharmaceutical formulations.	

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Subject: Medicinal Chemistry-I **Subject code: 3.5.3**	**Class: Third Year B. Pharm**
Course outcomes:	
3.5.3.1 Discuss general aspects of the design and development of drugs including classification, nomenclature and Structure activity relationship (SAR) of agonists and antagonists.	
3.5.3.2 Examine the Drug receptor interaction including synthetic scheme of agonists and antagonists.	
3.5.3.3 Investigate the reported drugs as per pharmacopeia and MSDS Sheets.	
3.5.3.4 Explain recent developments of agonists and antagonists.	
3.5.3.5 Synthesize, recrystallize and understand reaction mechanism involved in synthesis of medicinally important organic compounds and evaluate their physicochemical properties.	
3.5.3.6 Develop the skills involved in thin layer chromatography techniques and purification of synthesized compounds by various techniques.	

Subject: Active Pharmaceutical Ingredients Technology **Subject Code: 3.5.7**	**Class: Third Year B. Pharm**
Course outcomes:	
3.5.7.1. Elaborate basics of chemical process kinetics with respect to various classes of chemical reactions with examples of API for each unit process.	
3.5.7.2. Explain equipment's used in API manufacturing, layout design for API manufacturing, various regulatory guidelines for manufacturing of APIs .	
3.5.7.3. Elaborate various approaches for optimization of organic reactions and processes.	
3.5.7.4. Elucidate principle, industrial process, scale up techniques, Industrial manufacturing Process, flow charts of some important APIs, Polymorphism in APIs and Chirality in API industry with some examples.	
3.5.7.5. Discuss regulatory guidelines for testing of pharmaceuticals.	
3.5.7.6. Explain different types of instrumental techniques available for quality control of API & formulations.	

Subject Name: Pharmaceutical Analysis-IV **Subject Code: 3.6.2**	**Class: Third Year B. Pharm**
Course outcomes:	
3.6.2.1 Elaborate concept of chromatographic techniques and its applications.	
3.6.2.2 Summarize principle, instrumentation and applications of various analytical instrumental techniques.	
3.6.2.3 Analyze Pharmaceuticals by various analytical method validation parameters.	
3.6.2.4 Demonstrate working of different analytical instruments.	
3.6.2.5 Explain validation of different instruments.	
3.6.2.6 Elaborate recent advances in Chromatographic techniques.	

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Subject: Medicinal Chemistry-II **Subject code: 3.6.3**	**Class: Third Year B. Pharm**
Course outcomes:	
3.6.3.1 Discuss general aspects of the design & development of drugs including classification, nomenclature, and MOA of agonists and antagonists.	
3.6.3.2 Examine the effect of functional group modification on Pharmacophore.	
3.6.3.3 Investigate the reported drugs as per pharmacopeia and MSDS Sheets.	
3.6.3.4 Explain recent developments including synthetic scheme of agonists and antagonists	
3.6.3.5 Develop the skill of separation of solvent by various techniques.	
3.6.3.6 Synthesize recrystallize and understand reaction mechanisms involved in synthesis of medicinally important organic compounds also evaluate their physicochemical properties.	

Subject: Bioorganic Chemistry and Drug Design **Subject Code: 3.6.6**	**Class: Third Year B. Pharm**
Course outcomes:	
3.6.6.1. Explain the concept of bioorganic chemistry & drug design and molecular adaptation and recognition.	
3.6.6.2. Describe general biochemical features, physiological role, substrates/ antagonist of enzymes, nucleic acid & receptors as drug targets with reference to mechanism of action.	
3.6.6.3. Describe the phases involved in drug design & discovery, methods of lead discovery & optimization.	
3.6.6.4. Explain the various approaches in ligand based & structure based drug design with suitable examples.	
3.6.6.5 Describe the various phases involved in clinical trial along with regulatory guidelines.	
3.6.6.6 Explain the concept of prodrug, different strategies for design of prodrug with suitable example based on biotransformation.	

Subject: Pharmaceutical Analysis-V **Subject code: 4.7.2**	**Class: Final Year B. Pharm**
Course outcomes:	
4.7.2.1. Explain & apply different types of analytical instrumental technique available for quality control of pharmaceuticals. (API's & Formulations).	
4.7.2.2. Explain and apply various sampling techniques and data acquisition from analytical methods.	
4.7.2.3. Justify and apply the analytical and validation data for sample analysis.	
4.7.2.4. Analyze and Interpretation of analytical data procedures used in different analytical techniques.	
4.7.2.5. Investigate the recent advances in pharmaceutical analytical instrument & techniques.	
4.7.2.6. Remember and understand the electromagnetic spectrum and its interaction with matter.	

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Subject: Medicinal Chemistry- III **Subject code: 4.7.3**	**Class: Final Year B. Pharm**
Course outcomes:	
4.7.3.1 Discuss general aspects of the design & development of drugs including classification, nomenclature and MOA of agonists and antagonists.	
4.7.3.2 Examine the effect of functional group modification on Pharmacophore.	
4.7.3.3 Investigate the reported drugs as per pharmacopeia and MSDS Sheets.	
4.7.3.4 Explain recent developments including synthetic scheme of agonists and antagonists.	
4.7.3.5 Synthesize, recrystallize and understand reaction mechanisms involved in synthesis of medicinally important organic compounds and evaluate their physicochemical properties.	
4.7.3.6Interpret the spectral data obtained from IR and 1H-NMRs of separated compound.	

Subject: Pharmaceutical Analysis-VI **Subject code: 4.8.3**	**Class: Final Year B. Pharm**
Course outcomes:	
4.8.3.1. Explain & apply different types of analytical instrumental technique available for quality control of pharmaceuticals. (API's & Formulations).	
4.8.3.2. Explain and apply various sampling techniques and data acquisition from analytical methods.	
4.8.3.3. Justify and apply the analytical and validation data for sample analysis.	
4.8.3.4. Analyze and Interpretation of analytical data procedures used in different analytical techniques.	
4.8.3.5. Investigate the recent advances in pharmaceutical analytical instrument & techniques.	
4.8.3.6. Remember and understand the electromagnetic spectrum and its interaction with matter.	

Subject: Medicinal Chemistry- IV **Subject code: 4.8.4**	**Class: Final Year B. Pharm**
Course outcomes:	
4.8.4.1 Discuss general aspects of the design & development of drugs including classification, nomenclature and MOA of agonists and antagonists.	
4.8.4.2 Examine the effect of functional group modification on Pharmacophore.	
4.8.4.3 Investigate the reported drugs as per pharmacopeia and MSDS Sheets.	
4.8.4.4Explain recent developments including synthetic scheme of agonists and antagonists.	
4.8.4.5 Synthesize, recrystallize and understand reaction mechanisms involved in synthesis of medicinally important organic compounds and evaluate their physicochemical properties.	
4.8.4.6 Interpret the spectral data obtained from IR of separated compound by chromatographic Techniques.	

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(2015 Pattern)

Subject: Quality Assurance Techniques **Subject code: 4.8.7**	**Class: Final year B. Pharm**
Course outcomes:	
4.8.7.1 Describe the significance of quality in pharmaceutical manufacturing.	
4.8.7.2 Practice Current Good Manufacturing Practices along with various aspects of documentation, SOPs and records.	
4.8.7.3 Elaborate on the role of quality by design and validation in assurance of quality in pharmaceutical industry.	
4.8.7.4 Explain about ICH guidelines and QMS.	
4.8.7.5 Summarize various regulatory agencies involved in assurance of Quality in dosage form design.	
4.8.7.6 Differentiate between calibration and Qualifications of various equipment's.	

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Pharmacology Department

Subject: Human Anatomy & Physiology-I **Subject Code: 1.1.5**	**Class: First Year B. Pharm**
Course outcomes:	
1.1.5.1 Recognise anatomical terminologies specific to the human body and human health.	
1.1.5.2 Explain the progression of structural levels (cells, tissues, organs and system) contributes to the body's anatomy with their functions.	
1.1.5.3 Describe the anatomy and physiology of different organs of lymphatic system, cardiovascular system and Digestive system.	
1.1.5.4 Determine the haematological parameters and interpret its clinical significance.	
1.1.5.5 Promote health education in society.	
1.1.5.6 Summarise associated disorders of various organ in human body.	

Subject:-Human Anatomy and physiology-II **Subject code:1.2.4**	**Class: First Year B. Pharm**
Course outcomes	
1.2.4.1 Explain basic structure, function and mechanism of various organs involved in CNS and ANS alongwith its associated disorders.	
1.2.4.2 Describe structure, physiology and basic mechanism of various organ systems like endocrine system, urinary system, respiratory, reproductive system, sense organs etcalong with its disorders.	
1.2.4.3 Determine and interpret the haematological parameters with its clinical significance.	
1.2.4.4 Apply the knowledge of HAP to understand the pathophysiology of diseases.	
1.2.4.5 Promote health education in society.	
1.2.4.6 Analyze associated disorders of various organ in human body.	

Subject:- Pharmacology - I **Subject code: 2.3.5**	**Class: Second Year B. Pharm**
Course outcomes:	
2.3.5.1 Demonstrate the knowledge of Sources of drug, routes of administration, drug discovery and development process etc.	
2.3.5.2 Recognize the clinical significance of various pharmacokinetic parameters and factors affecting it to rationalize the drug treatment.	
2.3.5.3 Elaborate Pharmacodynamic aspects like different targets for drug action, receptors, its types, SAR, combined effect of drugs, factors modifying drug action etc. to understand the mechanism of drug actions.	
2.3.5.4 Discuss pharmacotheapeutics aspect related to adverse drug reactions, drug interactions, drug toxicity and its role to determine pharmacotherapy.	
2.3.5.5 Explain pharmacology of Autacoids and their antagonist.	
2.3.5.6 Justify rational drug treatment in pediatric, geriatric patients and in pregnancy.	

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Subject:- Pathophysiology & Clinical Biochemistry **Subject code: 2.4.2 T**	**Class: Second Year B. Pharm**
Course outcomes:	
2.4.2.1 Apply principles of normal anatomy and physiology of human body systems to the pathophysiologic processes of common health problems.	
2.4.2.2 Elaborate different etiological factors, types, clinical manifestations, of common pathophysiological conditions of various organ systems.	
2.4.2.3 Recognise the clinical importance and principle of diagnostic tests used in diagnosis of various pathophysiological conditions.	
2.4.2.4 Practice critical thinking when analyzing pathophysiological report and understanding of treatment strategies for various pathophysiological conditions.	
2.4.2.5 Explain the principle and application of various instruments used in clinical biochemistry and techniques of biological fluid collection and separation.	
2.4.2.6 Demonstrate an ability to follow experimental procedures to carry out estimation of various markers present in biological samples and its interpretation for investigation of kidney, liver, G.I.T. and heart diseases by using clinical lab instruments.	

Subject: Pharmacology–II **Subject Code: 3.5.4**	**Class: Third Year B.Pharm**
Course outcomes:	
3.5.4.1 Explain mechanism of action, pharmacological actions, adverse effect, drug interaction, contradiction and therapeutic uses of prototype drug acting on autonomic nervous system.	
3.5.4.2 Describe mechanism and pharmacology of prototype drugs acting on cardiovascular, respiratory tract disorders and explain their clinical use.	
3.5.4.3 Illustrate bioassay methods using suitable isolated tissue preparations.	
3.5.4.4 Demonstrate various techniques of routes of drug administration and experimental animal handling.	
3.5.4.5 Relate the social, cultural and environmental factors for neurological disorders.	
3.5.4.6 Evaluate the various drug effects using suitable computerized simulated software programme.	

Subject: Pharmacology–III **Subject Code: 3.6.4**	**Class: Third Year B.Pharm**
Course outcomes:	
3.6.4.1 Describe pharmacology of prototype drug of General anesthetic, Local anesthetics, Anti-epileptic, Anti-depression, Anti-Psychosis, Anti-parkinsonism etc.	
3.6.4.2 Discuss the pharmacotherapy of COPD, Cough, constipation, diarrhea, Ulcer, Rheumatoid Arthritis, Osteoarthritis, Gout etc.	
3.6.4.3 Explain preclinical screening of drugs using computer simulation and its interpretation.	
3.6.4.4 Demonstrate bioassay methods using suitable isolated tissue preparations.	
3.6.4.5 Analyse GABA-benzodiazpines receptor-chloride channel complex as neurological disorder target.	
3.6.4.6 Relate concept of central nervous system with its receptors. i.e dopaminergic andopioid receptor etc.	

Subject: Pharmacology - IV **Subject Code.: 4.7.4**	**Class: Final Year B. Pharm**
Course outcomes:	
4.7.4.1 Describe classification, Mechanism of action, indications, antibacterial spectrum mechanism of resistance, pharmacokinetics, contraindications, most common adverse reactions, and important drug-drug interactions of various antibiotics and chemotherapeutic agents.	
4.7.4.2 Illustrate the biosynthesis, receptors involved, mechanism of action, regulation of secretion and physiological role of various endocrine gland hormones disorders.	
4.7.4.3 Discuss recent pharmacotherapy including pharmacology and clinical management of various endocrine gland hormones disorders.	
4.7.4.4 Use suitable isolated tissue preparation for bioassay methods.	
4.7.4.5 Justify rationality of prescription and standard treatment protocol.	
4.7.4.6 Appraise the marketed fixed dose drug combinations (FDC).	

Subject: Pharmacology –V (Including Biostatistics) **Subject Code.: 4.8.5 T**	**Class: Final Year B. Pharm**
Course outcomes:	
4.8.5.1 Illustrate different types of drug-drug interactions, Adverse drug reactions with their mechanism, risk factors, epidemiology etc.	
4.8.5.2 Outline the basic concept of drug safety and pharmacovigilance in relation to monitoring and reporting of ADR	
4.8.5.3 Summarize functioning of hospital pharmacy, methods of assessment of patient compliance and non-compliance	
4.8.5.4 Discuss Clinical trial, its role in drug development, regulatory requirements, ethical issues and responsibilities of various stake holders involved in clinical trial	
4.8.5.5 Use suitable isolated tissue preparations for bioassay methods and carry out neurobehavioral characterization.	
4.8.5.6 Solve the statistical problem using different methods and computer software	

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Pharmacognosy Department

Subject: Pharmacognosy **Subject code:1.2.5**	**Class: First Year B. Pharm**
Course outcomes:	
1.2.5.1Explain the significance of plant classification and its relevance to Pharmacy.	
1.2.5.2Explain principles of genetics & their application on crop improvement process.	
1.2.5.3Elaborate Pharmacognostic study of plant tissues and their identification.	
1.2.5.4Summarize the ecosystem and its effect on environment.	
1.2.5.5Explain remedies to get rid from ecosystem and environment degradation.	
1.2.5.6Explain Pharmacognosy development and linkage to other branches of science.	

Subject: Communication & Soft Skill Development **Subject Code:1.1.6**	**Class: First Year B. Pharm**
Course outcomes:	
1.1.6.1 Elaborate the elements, styles and barriers of communication and methods to overcome them.	
1.1.6.2 Reflect communication etiquettes and excellent presentation skills.	
1.1.6.3demonstrate the behavioral needs for a Pharmacist to function effectively in the areas of pharmaceutical operation through effective communication.	
1.1.6.4Develop interview skills , Leadership qualities and essentials of group discussions	
1.1.6.5 practice good writing skills	
1.1.6.6Identify, classify and apply relevant soft skills.	

Subject: Pharmacognosy & Phytochemistry–I **Subject code: 2.3.6 T**	**Class: Second Year B. Pharm**
Course outcomes:	
2.3.6.1 Elaborate the concept of metabolites.	
2.3.6.2 Elaborate the metabolites by studying its Pharmacognostic parameters.	
2.3.6.3 Determine extracted metabolites by quantitative method.	
2.3.6.4 Analyse the qualitative aspects of crude drugs.	
2.3.6.5 Deduce the significance of metabolites and its role in Phytochemistry.	
2.3.6.6 Explain the Pharmaceutical utility of primary metabolites.	

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Subject: Pharmacognosy & Phytochemistry –II Class: Second Year B.Pharm **Subject code:2.4.5**
Course outcomes:
2.4.5.1 Elaborate the concept of metabolites.
2.4.5.2 Summarise the pharmacognostic study of various categories of metabolites.
2.4.5.3 Determine extracted metabolites by quantitative method.
2.4.5.4 Analyse the qualitative aspects of crude drugs.
2.4.5.5 Deduce the use of marketed derivatives of alkaloids.
2.4.5.6 Explain the industrial applications of secondary metabolites

Subject: Analytical Pharmacognosy& Extraction Technology Class: Third Year B. Pharm **Subject code:3.5.5**
Course outcomes:
3.5.5.1 Explain various types of extraction methods with applications for Phytopharmaceuticals.
3.5.5.2 Discuss principle and applications of chromatographic and non-chromatographic separation for various phytoconstituents.
3.5.5.3 Explain micrometric analysis for crude drugs.
3.5.5.4 Evaluate quality control parameters for various phytoconstituents.
3.5.5.5 Discuss various guidelines for separation of phytoconstituents by chromatographic and non-chromatographic methods.
3.5.5.6 Explain efficacy and safety parameters for herbal drug analysis.

Subject: Natural Product Chemistry Class: Third Year B. Pharm **Subject Code:3.6.5**
Course outcomes:
3.6.5.1Explain structural elucidation of phytoconstituents with its contribution in drug discovery.
3.6.5.2 Elaborate on marine drugs and its significance.
3.6.5.3Discuss various natural products used as pharmaceutical excipients as allied industrial utility.
3.6.5.4 Describe various techniques used in biosynthetic study for natural products with its applications.
3.6.5.5 Explain Industrial utility of drugs used as binders, adhesives, mucilage, dyes etc.
3.6.5.6 Elaborate on marine drugs and its market status.

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Subject: Natural Drug Technology Class: Final Year B. Pharm Subject Code:4.7.5
Course outcomes:
4.7.5.1 Discuss various Traditional Systems of Medicines along with crude drugs in detail
4.7.5.2 Elaborate various Ayurvedic dosage forms and nutraceuticals
4.7.5.3 Discuss development of NDDS in herbals
4.7.5.4 Develop and evaluate cosmetic &nutraceutical formulations
4.7.5.5 Explain current scenario of nutraceuticals in India
4.7.5.6 Eloborate on manufacturing of novel drugs delivery systems in herbals

Subject: Natural Products: Commerce, Industry & Regulations Class: Final Year B. Pharm Subject Code:4.8.6
Course outcomes:
4.8.6.1. Explain importance of herbal drug industry in global contest.
4.8.6.2. Explore entrepreneurship skills in of herbal drug industry.
4.8.6.3. Explain Pharmacovigilance of herbal medicines.
4.8.6.4. Elaborate the concept of plant allergens.
4.8.6.5 Explain various regulatory guidelines and ethical issues for herbal drug regulation in India.
4.8.6.6. Explain current status of Clinical trials in India.

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Course Outcomes

(2018 & 2019 Pattern)

Dr. D. Y. Patil Pratishthan's
Dr. D. Y. Patil College of Pharmacy,
Akurdi, Pune-411044

B. PHARM COURSE OUTCOMES

Course	Outcomes
Semester-I	
BP101T Human Anatomy and Physiology –I	**BP101T(1):** Memorize the concepts about cell, tissues and human body.
	BP101T(2): Interpret the skeletal system of human body.
	BP101T(3): Appraise the concepts of sense organs.
	BP101T(4): Differentiate the concepts of blood and lymph.
	BP101T(5): Demonstrate the anatomy and physiology of blood and lymph.
	BP101T(6): Investigate the mechanisms of cardiovascular system.
BP107P Human Anatomy and Physiology –I	**BP107P(1):** Explain the gross morphology, structure and functions of various organs of the human body.
	BP107P(2): Investigate the parameters of human blood.
	BP107P(3): Differentiate and identify various tissues and organs of different systems of human body.
	BP107P(4): Examine blood pressure and heart rate.
	BP107P(5): Appreciate coordinated working pattern of different organs of each system.
	BP107P(6): Operate instruments for analyzing human physiology
BP102T Pharmaceutical Analysis-I	**BP102T (1)** Elaborate scope, different techniques of Pharmaceutical analysis.
	BP102T (2) Illustrate different types of errors and methods of minimizing errors.
	BP102T (3) Explain concept of different types of volumetric titrations.
	BP102T (4) Summarize concept of gravimetric analysis.
	BP102T (5) Explain principle, construction and applications of different types of electrochemical methods of analysis.
	BP102T (6) Discuss principle, construction and applications of refractometry.
BP108P Pharmaceutical Analysis-I	**BP108P (1)** Demonstrate preparation and standardization of primary standards
	BP108P (2) Analyze inorganic compounds by volumetric titration methods.
	BP108P (3) Predict normality of different solutions by electro-analytical methods.

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	BP108P (4) Interpret refractive index of different samples by refractometry.
	BP108P (5) Develop analytical skills.
BP103T Pharmaceutics-I	**BP103T (1)** Discuss history of profession of Pharmacy in India & Pharmacopeia and its development.
	BP103T (2) Explain parts and handling of prescription, posology & dose calculation of drug in children. Different types of dosage form.
	BP103T (3) Elaborate different pharmaceutical calculation involved in formulation.
	BP103T (4) Illustrate basic requirement and formulation of powder and liquid (monophasic& biphasic) dosages form.
	BP103T (5) Summarise type of Pharmaceutical incompatibility.
	BP103T (6) Explain formulation and evaluation of semisolid preparations.
BP109P Pharmaceutics-I	**BP109 (1)** Formulate and evaluate Pharmaceutical solutions.
	BP109(2) Evaluate formulated pharmaceutical dispersed system.
	BP109 (3) Formulate and evaluate semi-solid dosage form.
	BP109(4) Evaluate formulated pharmaceutical Powders.
BP104T Pharmaceutical Inorganic Chemistry	**BP104T (1)** Define and differentiate between pharmacopeias based on tests mention in it for all compounds.
	BP104T (2) Summarise buffers with respect to tonicity adjustment and based on different acid base theories.
	BP104T (3) Signify the role of electrolytes in maintaining physiological balance and dental hygiene.
	BP104T (4) Discuss classification function mechanism of action of various inorganic compounds based on their pharmacological action.
	BP104T (5) Argue on applications of inorganic agents in pharmaceuticals.
BP110P Pharmaceutical Inorganic Chemistry	**BP110P (1)** Apprise basic of apparatus, instruments and their calibration.
	BP110P (2) Investigate the given inorganic compounds by various quality control tests like limit tests, swelling power and neutralizing capacity.
	BP110P (3) Predict various acidic and basic radicals from given unknown inorganic binary mixture.
	BP110P (4) Prepare inorganic Pharmaceuticals.
	BP110P (5) Develop analytical skills in data interpretation and calculations
BP105T Communication	**BP105T (1)** Elaborate the elements, styles and barriers of communication and methods to overcome them.

skills	**BP105T (2)** Reflect communication etiquettes and excellent presentation skills.
	BP105T (3) Demonstrate the behavioral needs for a Pharmacist to function effectively in the areas of pharmaceutical operation through effective communication
	BP105T (4) Develop interview skills, Leadership qualities and essentials of group discussions.
	BP105T (5) Practice good writing skills.
	BP105T (6) Identify, classify and apply relevant soft skills
BP111P Communication skills	**BP111P(1)** Develop Basic communication skills
	BP111P(2) Practice various types of Pronunciations
	BP111P(3) Demonstrate the behavioral needs for a Pharmacist to function in pharmaceutical operation through effective communication
	BP111P(4) Develop interview skills, Leadership qualities and essentials of group discussions.
	BP111P(5) Practice good writing skills.
	BP111P(6) Apply relevant soft skills.
Semester-II	
BP201T Human Anatomy and Physiology-II	**BP201T (1)** Critique the concepts and mechanism related to nervous system.
	BP201T (2) Investigate the anatomy and physiology of digestive system.
	BP201T (3) Appraise the concepts of respiratory system.
	BP201T (4) Construct the anatomy and physiology of urinary system.
	BP201T (5) Demonstrate the anatomy and physiology of Endocrine system.
	BP201T (6) Differentiate the concepts related to reproductive system and investigate the mechanisms involved in genetics.
BP207P Human Anatomy and Physiology-II	**BP207P (1)** Explain the gross morphology, structure and functions of various organs of the human body.
	BP207P (2) Investigate the parameters of human blood.
	BP207P (3) Differentiate and identify various tissues and organs of different systems of human body.
	BP207P (4) Examine neurological reflexes & visual activity.
	BP207P (5) Appreciate coordinated working pattern of different organs of each system.
	BP207P (6) Operate instruments for analyzing human physiology
BP202T Pharmaceutical Organic Chemistry-I	**BP202T (1)** Elaborate basic concept of organic compounds and its significance.
	BP202T (2) Identify the IUPAC nomenclature of organic chemistry.

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	BP202T (3) Describe significance of reagent used in reactions for inorganic compounds.
	BP202T (4) Argue between SN1 and SN2 reaction with respect to factors affecting and alkyl halide role.
	BP202T (5) Predict the reactions of organic compounds based on different functional groups and their identification by qualitative analysis.
	BP202T (6) Elaborate properties and application of various active pharmaceutical ingredients synthesized from various functional groups.
BP208P Pharmaceutical Organic Chemistry-I	**BP208P (1)**Identify unknown organic sample.
	BP208P (2) Illustrate the Synthesize organic compounds.
	BP208P (3) Determine melting point of organic compounds.
	BP208P (4) Demonstrate molecular models.
	BP208P (5) Develop analytical skills.
BP203T Biochemistry	**BP203T (1)** Elaborate classification, chemical nature and biological role of carbohydrate, lipids, nucleic acids, amino acids and proteins.
	BP203T (2) Summarize the metabolism of nutrient molecules in physiological and pathological conditions.
	BP203T (3) Explain concepts in biological oxidation and bioenergetics.
	BP203T (4) Explain the genetic organization of mammalian genome and functions of DNA in the synthesis of RNAs and proteins.
	BP203T (5) Elaborate catalytic role of enzymes, importance of enzyme inhibitors in design of new drugs, therapeutic and diagnostic applications of enzymes.
BP209P Biochemistry	**BP209P (1)**Identify carbohydrates, amino acids and Proteins.
	BP209P (2) Analyze urine for abnormal constituents.
	BP209P (3) Analyze blood for different constituents.
	BP209P (4) Analyze proteins and reducing sugars.
	BP209P (5) Evaluate effects of different factors on enzyme activity.
	BP209P (6) Formulate buffer solution and measure pH.
BP204T Pathophysiology	**BP204T (1)** Describe the etiology and pathogenesis of the selected disease states.
	BP204T (2) Illustrate Basic principles of Cell injury Adaptation and explain the concept of inflammation and repair.
	BP204T (3) Classify autoimmune diseases in man and discuss mechanism of autoimmunity, allograft, and graft rejection, mechanism AIDS, amyloidosis.
	BP204T (4) Explain the etiology and pathogenesis of Infectious diseases Sexually transmitted diseases.

	BP204T (5) Classify and explain the etiology and pathogenesis of cancer.
	BP204T (6) Discuss signs and symptoms of the various diseases.
BP205T Computer applications in Pharmacy	**BP205T (1)** Apply the knowledge of mathematics and computing fundamentals to pharmaceutical applications for any given requirement.
	BP205T (2) Design and develop solutions to analyses pharmaceutical problems using computers.
	BP205T (3) Integrate and apply efficiently the contemporary IT tools to all Pharmaceutical related activities.
	BP205T (4) Solve and work with a professional context pertaining to ethics, social, cultural and regulations with regard to Pharmacy.
BP210P Computer applications in Pharmacy	**BP210P (1)**Demonstrate the use of MS Word to create questionnaires and other documentation related to pharmacy.
	BP210P (2) Discuss use of MS Access to modify the data bases created.
	BP210P (3) Operate web and XML pages to export table, forms and queries.
	BP210P (4) Explain generation of report, work with queries on MS Access.
	BP210P (5) Prepare database, HTML web page.
BP206T Environmental Sciences	**BP206T (1)** Create the awareness about the environmental studies.
	BP206T (2) Discuss basic knowledge about the environment and its allied problems.
	BP206T (3) Develop an attitude of concern for the environment.
	BP206T (4) Motivate learner to participate in environment protection and environment improvement.
	BP206T (5) Acquire skills to help the concerned individuals in identifying and solving environmental problems.
	BP206T (6) Strive to attain harmony with nature.
Semester-III	
BP301T Pharmaceutical Organic Chemistry-II	**BP301T (1)** Explain the basic concept along with structure and uses of the organic compounds.
	BP301T (2) Summarise the chemical reaction, reaction orientation, principle, mechanism of organic compounds.
	BP301T (3) Elaborate the reactivity and stability of organic compounds includes cycloalkanes.
	BP301T (4) Discuss the preparation of organic compounds.
	BP301T (5) Revise the chemistry, chemical reactions and analytical constant of fats and oils.
BP305P Pharmaceutical Organic Chemistry-II	**BP305P (1)** Experiment involving laboratory techniques such as crystallization, Distillation.
	BP305P (2) Separate Binary mixtures and perform their analysis.

	BP305P (3) Determine saponification value of given oil samples.
	BP305P (4) Synthesize medicinally important compounds and their intermediates and perform their characterization.
	BP305P (5) Prepare chemical compounds based on some typical type of reactions.
BP302T Physical Pharmaceutics-I	**BP302T (1)** Investigate and apply various theories, laws & equation related to different states of matter.
	BP302T (2) Distinguish the principles of complexation /Protein binding and to use them for calculation of drug release and stability constant.
	BP302T (3) Demonstrate use of physicochemical properties of drug in formulation development and evaluation of dosage from.
	BP302T (4) Signify the importance of buffer, pH & isotonic solutions in pharmaceutical & biological system.
	BP302T (5) Evaluate different physicochemical properties of drug molecule.
	BP302T (6) Differentiate between ideal and real solutions with respect to their colligative properties.
BP306P Physical Pharmaceutics-I	**BP306P (1)** Apply the knowledge of various theories, laws & equation in evaluation of physicochemical properties.
	BP306P (2) Operate different pharmaceutical laboratory instruments used in evaluation of various physicochemical properties.
	BP306P (3) Calculate critical solution temperature & effect of addition of electrolyte on CST of phenol-water system.
	BP306P (4) Determine stability constant of chemical complexes by various methods.
	BP306P (5) Predict solubility, partition coefficient, pKa of given compound.
	BP306P (6) Evaluate thermodynamic parameters using solubility studies and Interpret scientific data, represent in a tabular and/or graphical form.
BP303T Pharmaceutical Microbiology	**BP303T (1)** Explain in detail role of microbiology in pharmaceutical sector.
	BP303T (2) Compare the various structural features, biology and characteristics of microbes.
	BP303T (3) Discuss and apply principles, application of sterilization, disinfection and demonstrate the various techniques used for microbial estimation.
	BP303T (4) Summarize the concept of Animal cell culture.
BP307P	**BP307P (1)** Explain the principle, construction and working of various instruments and perform their operations.

Pharmaceutical Microbiology	**BP307P (2)** Illustration of sterilization, preparation of various media and isolation techniques of microorganism.
	BP307P (3) Examine motility of bacteria by hanging drop technique.
	BP307P (4) Discuss morphology of bacteria by staining techniques and sterility test.
BP304T Pharmaceutical Engineering	**BP304T (1)** Apply basic concepts of physics and chemistry in various mass and heat transfer processes.
	BP304T (2) Identify the various unit operations used in Pharmaceutical industries.
	BP304T (3) Outline the working principles of various machines used in pharmaceutical manufacturing process.
	BP304T (4) Discuss the laws and develop different equations that govern the various mass and heat transfer processes.
	BP304T (5) Apply knowledge to the solution of a real-life research, plant operational problem.
	BP304T (6) Summarize about hazards and safety aspects in industrial environment.
BP308P Pharmaceutical Engineering	**BP308P (1)** Explain the construction and operation of various equipments used in pharmaceutical processes
	BP308P (2) Operate equipments used in the manufacturing of pharmaceutical products
	BP308P (3) Experiment with engineering principles to address issues in various pharmaceutical processes
	BP308P (4) Construct graphical representations for various unit operations
	BP308P (5) Illustrate the material and energy requirements for optimizing the pharmaceutical unit processes.
	BP308P (6) Discover technological advancements in the pharmaceutical industries.
Semester-IV	
BP401T Pharmaceutical Organic Chemistry-III	**BP401T (1)** Explain nomenclature, properties and methods of preparation of heterocyclic compounds.
	BP401T (2) Elaborate the fundamentals of stereo chemical aspects.
	BP401T (3) Discuss medicinal uses and other applications of organic compounds.
	BP401T (4) Appraise role of stereo isomerism in biphenyl compounds (atropisomerism) and conditions for optical activity.
	BP401T (5) Explain reactions and synthetic importance of metal hydride reduction, Clemmensen reduction, Oppenauer oxidation and Beckmann rearrangement.
	BP401T (6) Discuss optical isomerism, optical activity, enantiomerism, diastereoisomerism and meso compounds.

BP402T Medicinal Chemistry-I	**BP402T (1)** Explain the various physiochemical properties in relation to biological activity.
	BP402T (2) Discuss drug metabolism.
	BP402T (3) Illustrate chemistry, SAR of medicinally important drug classes and mode of action at molecular level.
	BP402T (4) Describe pharmacological action of different drug classes and their Side effects.
	BP402T (5) Outline synthetic route of the important class of compounds.
BP406P Medicinal Chemistry-I	**BP406P (1)** Synthesize, recrystallize and understand reaction mechanisms involved in synthesis of medicinally important organic compounds and evaluate their physicochemical properties.
	BP406P (2) Develop the skill involved in thin layer chromatography techniques and purification of synthesized compounds by various techniques.
	BP406P (3) Develop the skill involved in column chromatography techniques and purification of synthesized compounds by various techniques.
	BP406P (4) Justify the use of physicochemical properties of drugs in pharmaceutical and biological system.
	BP406P (5) Interpret the importance of ionization constant and partition coefficient in pharmaceutical and biological system.
BP403T Physical Pharmaceutics-II	**BP403T (1)**Relate various physicochemical properties of drug and excipient molecules in designing the dosage forms.
	BP403T (2) Discuss various theories, laws & equation related to physicochemical properties of drug.
	BP403T (3) Compare various properties, formulation, and evaluation of dispersion systems.
	BP403T (4) Distinguish the principles of chemical kinetics & to use them for stability testing and determination of expiry date of formulations.
	BP403T (5) Explain rheological properties and their methods for measurement.
	BP403T (6) Demonstrate the behavior and mechanism of drugs and excipients in the formulation development and evaluation of dosage forms.
BP407P Physical Pharmaceutics-II	**BP407P (1)**Evaluate various rheological properties.
	BP407P (2) Analyze micromeretic properties of powder samples.
	BP407P (3) Calculate rate of reaction, energy of activation and order of any reaction
	BP407P (4) Appraise the concept of Accelerated stability studies
	BP407P (5) Determine stability of dispersions

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	BP407P (6) Interpret scientific data, represent in a tabular and/or graphical form.
BP404T Pharmacology-I	**BP404T (1)** Discuss the pharmacological actions of different categories of drugs.
	BP404T (2) Explain the mechanism of action at organ system/sub cellular/macromolecular levels.
	BP404T (3) Apply the basic pharmacological knowledge in the prevention and treatment of various diseases.
	BP404T (4) Observe the effects of drugs on animal by simulated experiments.
	BP404T (5) Appraise correlation of pharmacology with other bio medical sciences.
BP408P Pharmacology-I	**BP408P (1)** Describe pharmacology of prototype drug of General anesthetic, Anti-epileptic, Anti- depression, Anti-Psychosis, Anti-parkinsonism etc.
	BP408P (2) Recognize the clinical significance of various pharmacokinetics and pharmacodynamics parameters.
	BP408P (3) Explain preclinical screening of drugs using computer simulation and its interpretation.
	BP408P (4) Demonstrate bioassay methods using suitable isolated tissue preparations.
	BP408P (5) Analyse GABA-benzodiazpines receptor-chloride channel complex as neurological disorder target
	BP408P (6) Relate concept of central nervous system with its receptors. i.e dopaminergic and opioid receptor etc.
BP405T Pharmacognosy and Phytochemistry-I	**BP405T (1)** Discuss the definition, history, scope and development of Pharmacognosy.
	BP405T (2) Describe the techniques in the cultivation, processing, storage and production of crude drugs of natural origin.
	BP405T (3) Explain fundamental aspects of plant tissue culture.
	BP405T (4) Elaborate different types of secondary metabolites, their general properties, classification, and their test for identification.
	BP405T (5) Discuss the sources, chemical constituents and uses of plants products containing plant fibers, hallucinogens teratogens, and natural allergens.
	BP405T (6) Describe the pharmacognostic aspects and chemistry of primary metabolites and their sources.
BP409P Pharmacognosy and Phytochemistry-I	**BP409P (1)** Identify crude drugs using morphological, microscopical, physical characteristics & chemical tests.
	BP409P (2) Demonstrate skill of plant material sectioning, staining, mounting & determine quantitative microscopic features by drawing microscopical diagrams.

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	BP409P (3) Develop skill to analyse and evaluate crude drug material by conducting various physico-chemical parameters
	BP409P (4) Prepare brief report of field visit
Semester-V	
BP501T Medicinal Chemistry-II	**BP501T (1)** Discuss physicochemical properties of drugs.
	BP501T (2) Illustrate chemistry, SAR of medicinally important drug classes and mode of action at molecular level.
	BP501T (3) Describe pharmacological action of different drug classes.
	BP501T (4) Explain Side effects, adverse effects and therapeutic uses of different drug classes.
	BP501T (5) Outline synthetic route of the important class of compounds.
	BP501T (6) Acquire knowledge on thrust areas for further research.
BP502T Industrial Pharmacy-I	**BP502T (1)** Discuss various concepts of preformulation.
	BP502T (2) Elaborate formulation and evaluation of tablets, capsules and liquid orals using established procedures and technology with their defects and corrective approaches.
	BP502T (3) Explain the concept, types, pharmacopoeial specifications, techniques and equipments used in tablet coating.
	BP502T (4) Illustrate preformulation, formulation, and evaluation of parenteral and ophthalmic products.
	BP502T (5) Estimate packaging materials for various pharmaceutical dosage forms.
	BP502T (6) Discuss formulation of cosmetics such as lipsticks, shampoos, cold cream, vanishing cream, tooth pastes, hair dyes and sunscreens.
BP506P Industrial Pharmacy-I	**BP506P (1)** Design experiments showing influence of various additives on dosage form and stability studies.
	BP506P (2) Formulate and evaluate tablets, capsules and liquid orals.
	BP506P (3) Discuss pharmacopoeial specifications, techniques &equipments used in tablet coating.
	BP506P (4) Evaluate formulated parenteral and ophthalmic products.
	BP506P (5) Evaluate selected packaging materials for various pharmaceutical dosage forms.
	BP506P (6) Formulate and evaluate various cosmetics products.
BP503T Pharmacology-II	**BP503T (1)** Describe the different classes of drugs used in the treatment of diseases pertaining to cardio-vascular system.
	BP503T (2) Explain the Pharmacotherapy of drug acting on hemopoietic system.

	BP503T (3) Appraise the role of diuretic and antidiuretic drugs in various disorder.
	BP503T (4) Elaborate the pharmacology of autocoids and related drugs.
	BP503T (5) Explain the pharmacology of drug in the treatment of diseases pertaining to endocrine system.
BP507P Pharmacology-II	**BP507P (1)** Evaluate the pharmacological effects of variety ofdrugs on Frog heart preparation using software.
	BP507P (2) Examine effect of drugs by using suitable isolated tissue preparation.
	BP507P (3) Estimate unknown concentration of drugs by using various bioassay methods.
	BP507P (4) Calculate PA2 and PD2 value of drug using suitable isolated tissue preparation.
	BP507P (5) Demonstrate anti-inflammatory, analgesic and mast cell stabilization activity.
	BP507P (6) Interpret clinical case study.
BP504T Pharmacognosy and Phytochemistry-II	**BP504T (1)** Describe various techniques used in biosynthetic study for natural products with its applications.
	BP504T (2) Explain structural elucidation of phytoconstituentswith its contribution in drug discovery.
	BP504T (3) Discuss various natural products used as pharmaceutical excipients as allied industrial utility.
	BP504T (4) Recognize the need and significance of herbal drug analysis.
	BP504T (5) Elaborate quality control parameters for crude drugs and its derivatives.
	BP504T (6) Explain various types of extraction methods with applications for phytopharmaceuticals.
BP508P Pharmacognosy and Phytochemistry-II	**BP508P (1)** Explain extraction, isolation of phytoconstituents followed by TLC analysis.
	BP508P (2) Analyze sugar in natural gum by various chromatography techniques.
	BP508P (3) Evaluate quality control parameters for various phytoconstituents.
	BP508P (4) Determine proximate analysis of crude drugs.
	BP508P (5) Discuss various natural products used as pharmaceutical excipients as allied industrial utility.
	BP508P (6) Explain structural elucidation of phytoconstituents.
BP505T Pharmaceutical Jurisprudence	**BP505T (1)** Discuss definitions, schedules in the various pharmaceutical laws and obey pharmaceutical code of ethics.
	BP505T (2) Summarise in details various pharmaceutical Acts in India and their executions.

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	BP505T (3) Explain patents, procedure for patent application and IPR.
	BP505T (4) Illustrate role of the regulatory system for safety and effectiveness of medicine and their quality.
	BP505T (5) Elaborate on advance resources for intellectual property rights.
	BP505T (6) Describe revision and amendments in various Pharmaceutical Acts.
Semester-VI	
BP601T Medicinal Chemistry-III	**BP601T (1)** Discuss physicochemical properties of drugs.
	BP601T (2) Illustrate chemistry, SAR of medicinally important drug classes and mode of action at molecular level.
	BP601T (3) Describe pharmacological action of different drug classes.
	BP601T (4) Explain Side effects, adverse effects and therapeutic uses of different drug classes.
	BP601T (5) Outline synthetic route of the important class of compounds.
	BP601T (6) Acquire knowledge on thrust areas for further research.
BP607P Medicinal Chemistry-III	**BP607P (1)** Synthesize medicinally important organic compounds and evaluate their physicochemical properties.
	BP607P (2) Develop the skill involved in purification of synthesized compounds by various techniques.
	BP607P (3) Synthesis of medicinally important compounds or intermediates by Microwave method
	BP607P (4) Demonstrate use of physicochemical properties of drugs in pharmaceutical and biological system
	BP607P (5) Sketch the structures and chemical reactions by using different Softwares.
BP602T Pharmacology-III	**BP602T (1)** Describe pathophysiology and pharmacology of drug acting on Respiratory system.
	BP602T (2) Explain pathophysiology and pharmacology of drug acting on digestive system.
	BP602T (3) Appraise the role of chemotherapy and its agents like sulphonamide, cotrimoxazole, and antibiotics.
	BP602T (4) Explain mechanism of action, antimicrobial spectrum, resistance, adverse effect and uses of various chemotherapeutic agents.
	BP602T (5) Outline pharmacology of immunomodulators and their use as immunostimulant and immunosuppressant.

	BP602T (6) Apply the knowledge of Chrono pharmacology and toxicology in treatment of poisoning and related clinical symptoms of various drugs.
BP608P Pharmacology-III	**BP608P (1)** Demonstrate antiulcer activity, purgative activity and gastrointestinal motility by using different model.
	BP608P (2) Interpret acute oral, skin irritation and eye irritation toxicity studies by using different OECD guidelines.
	BP608P (3) Interpret different biostatistics method in different pharmacology experiment.
	BP608P (4) Illustrate bioassay methods using suitable isolated tissue preparation.
	BP608P (5) Demonstarte pyrogen test, effect of mydriatic as well as miotic and hypoglycemic effect on rabbit.
BP603T Herbal drug Technology	**BP603T (1)** Discuss development and evaluation of marketed cosmetic & nutraceutical formulations.
	BP603T (2) Describe need and significance of herbal drug analysis.
	BP603T (3) Explain development of NDDS in herbals.
	BP603T (4) Elaborate patenting process of herbal medicines.
	BP603T (5) Discuss importance of herbal drug industry in global contest.
	BP603T (6) Summarise various Ayurvedic dosage forms and nutraceuticals.
BP609P Herbal drug Technology	**BP609P (1)** Prepare herbal traditional/ folklore formulations.
	BP609P (2) Develop and evaluate marketed cosmetic and nutraceutical formulations.
	BP609P (3) Design pharmacognostic study for crude drugs with preformulation parameters for formulation.
	BP609P (4) Elaborate on various traditional dosage forms and nutraceuticals.
	BP609P (5) Discuss various natural products used as pharmaceutical excipients as allied industrial utility.
	BP609P (6) Evaluate quality control parameters for various phytoconstituents.
BP604T Biopharmaceutics and Pharmacokinetics	**BP604T (1)** Elaborate anatomy of human body.
	BP604T (2) Discuss various theories of dissolution of drug molecules.
	BP604T (3) Relate different mechanism of absorption of compounds with respect to their biological membrane.
	BP604T (4) Explain the linkage between absorption and distribution of drug molecules.
	BP604T (5) Discuss in detail various mechanism of eliminations for drug molecules.
BP605T	**BP605T (1)** Summaries scope and applications in pharmacy.

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Pharmaceutical Biotechnology	**BP605T (2)** Compile the role of gene transfer and genetic engineering techniques in field of molecular biotechnology.
	BP605T (3) Discuss rDNA technology and applications of human gene therapy as well as monoclonal antibody.
	BP605T (4) Appraise applications of genetic engineering.
	BP605T (5) Categories enzyme immobilization and discuss its applications.
	BP605T (6) Explain the process of effluent treatment and its applications.
BP606T Quality Assurance	**BP606T (1)**Discuss the cGMP aspects in a pharmaceutical industry.
	BP606T (2) Elaborate on responsibilities of QA & QC departments
	BP606T (3) Explain the scope of quality certifications applicable to pharmaceutical industries.
	BP606T (4) Summaries the importance of documentation, complaints, quality audit and quality review according toregulatory agencies.
Semester-VII	
BP701T Instrumental Methods of Analysis	**BP701T (1)** Discus the fundamental knowledge of principles and instrumentation of spectroscopic and chromatographic technique.
	BP701T(2) Interpret and critically evaluate scientific findings.
	BP701T(3) Illustrate the interaction of matter with electromagnetic radiations and justify its applications in drug analysis.
	BP701T(4) Classify the chromatographic separation methods and choose appropriate technique for analysis of drugs.
	BP701T(5) Design methods for quantitative & qualitative analysis of drugs using various analytical instruments.
BP705P Instrumental Methods of Analysis	**BP705P (1)** Experiment of the different types of analytical instrumental technique available for quality control of pharmaceuticals.
	BP705P (2) Practice various sampling techniques
	BP705P (3) Interpret the analytical data produced by different analytical techniques.
	BP705P (4) Predict the interaction of electromagnetic radiation with matter
	BP705P (5) Summarise capability of performing measurements on analytical instruments
BP702T Industrial Pharmacy II	**BP702T (1)** Explain the process of pilot plant and scale up of pharmaceutical dosage forms.

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	BP702T (2) Discuss the process of technology transfer from lab scale to commercial batch.
	BP702T (3) Summarise different Laws and Acts that regulate pharmaceutical industry.
	BP702T (4) Elaborate the approval process and regulatory requirements for drug products.
	BP702T (5) Describe the role and responsibility of regulatory agencies in the approval of drugs.
	BP702T (6) Explain the concept of quality management system.
BP703T Pharmacy Practice	**BP703T (1)** Classify hospitals and learn about hospital organization as well as pharmacist's roles and responsibilities.
	BP703T (2) Identify drug related problem and assess adverse drug reactions, interactions and their mechanisms.
	BP703T (3) Elaborate on pharmaceutical care service.
	BP703T (4) Explain the monitoring of drug therapy for patient.
	BP703T (5) Discuss pharmacy stores management, inventory control and rational drug therapy.
	BP703T (6) Interpret selected laboratory results of specific disease states.
BP704T Novel Drug Delivery System	**BP704T (1)** Explain principle and technology used in the design of sustained release and controlled release drug delivery systems.
	BP704T (2) Discuss criteria for selection of a drugs and polymers for the development of Novel drug delivery systems.
	BP704T (3) Elaborate the various approaches for development and evaluation of novel drug delivery systems.
	BP704T (4) Explain the formulation and characterization of transdermal drug Delivery systems.
	BP704T (5) Describe formulation and evaluation of Gastro retentive & Nasopulmonary drug delivery systems.
	BP704T (6) Discuss various approaches for the development of targeted drug Delivery systems and its applications.
Semester-VIII	
BP801T Biostatistics and Research Methodology	**BP801T (1)** Explain the measure of central tendency, dispersion and correlation.
	BP801T (2) Summarise the concept of regression analysis, probability theory, parametric and non-parametric test.
	BP801T (3) Discuss the designing of methodology.
	BP801T (4) Describe the basic concepts of clinical trial, research.
	BP801T (5) Explain the design and analysis of experiments as well as different types of graphical representation of data.
	BP801T (6) Discuss the ethical practices related to experiments.
BP802T	**BP802T (1)** Acquire high consciousness/realization of current issues related to health.

Social and Preventive Pharmacy	**BP802T (2)** Assess pharmaceutical problems within the country and worldwide.
	BP802T (3) Describe critical way of thinking based on current healthcare development.
	BP802T (4) Evaluate alternative ways of solving problems related to health and pharmaceutical issues.
BP803ET Pharma Marketing Management	**BP803ET (1)** Explain concepts, techniques and applications of the marketing in pharmaceutical industry.
	BP803ET (2) Describe strategies for product branding.
	BP803ET (3) Discuss techniques for product promotion.
	BP803ET (4) Elaborate pharmaceutical marketing channels and role of professional sales representative.
	BP803ET (5) Discuss price management, price regulation by authorities and emerging concepts in marketing.
BP804ET Pharmaceutical Regulatory Science	**BP804ET (1)** Explain the process of drug discovery and development.
	BP804ET (2) Discuss about regulatory authorities and agencies governing the manufacture and sale of pharmaceuticals.
	BP804ET (3) Elaborate regulatory approval process and their registration in Indian and international markets.
	BP804ET (4) Illustrate Product development, business, and strategy.
	BP804ET (5) Discuss intellectual property rights and various regulatory agencies.
BP805ET Pharmacovigilance	**BP805ET (1)** Discuss the importance of drug safety monitoring and the development of pharmacovigilance program.
	BP805ET (2) Explain international standards for classification of diseases and drugs.
	BP805ET(3) Describe about national and international pharmacovigilance program and the terminologies used.
	BP805ET(4) Recognize various methods of drug safety surveillance and communication in pharmacovigilance.
	BP805ET (5) Explain the methods to generate safety data during the phases of clinical trial and recognize the role of ICH and GCP guidelines.
	BP805ET (6) Explain pharmacogenomics of adverse drug reactions and evaluate drug safety in special population
BP809ET Cosmetic Science	**BP809ET (1)** Explain Indian and EU regulation for cosmetics and cosmeceuticals.
	BP809ET (2) Classify Cosmetics based on structure and function of skin, hair, teeth and gum.
	BP809ET (3) Formulate cosmetics based on their role and properties.

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	BP809ET (4) Appraise the role of herbs in cosmetics, SPF and BIS specification in cosmetics.
	BP809ET (5) Evaluate cosmetics for their performance using sophisticated instruments.
	BP8059T (6) Design cosmetics and cosmeceuticals that address the problems of skin, hair, and oral.
BP811T Advanced Instrumentation Techniques	**BP811T (1)** Explain principle, instrumentation and applications of various spectroscopic and chromatographic technique in Pharmaceutical research.
	BP811T (2) Interpret the spectrums and chromatogram obtained from methods of analysis.
	BP811T (3) Judge the research problems in Pharma. Analysis.
	BP811T (4) Examine and interpret the data obtained through experimentation as per regulatory requirements.
	BP811T (5) Discuss different analytical techniques for the assay of various APIs and formulations as per Pharmacopoeial standards.
BP812ET Dietary Supplements & Nutraceuticals	**BP812ET (1)** Elaborate various types of nutraceuticals.
	BP812ET (2) Explain importance of dietary supplements in global contest.
	BP812ET (3) Discuss current status of nutraceuticals in market.
	BP812ET (4) Summarise the importance of antioxidant principles in nutraceuticals.
	BP812ET (5) Appraise the significance of free radicals as functional food.
	BP812ET (6) Explain regulatory aspects of functional foods and nutraceuticals.

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Dr. D. Y. Patil Pratishthan's

Dr. D. Y. Patil College of Pharmacy,
Akurdi, Pune-411044

M. PHARM COURSE OUTCOMES

Course	Outcomes
Department of Pharmaceutics	
Semester-I	
MPAT101T Modern Pharmaceutical Analytical Techniques	**MPAT101T (1)** Explain principle, instrumentation of various spectroscopic and chromatographic technique and their applications in Pharmaceutical research.
	MPAT101T (2) Interpret the spectrums and chromatogram of different methods of analysis.
	MPAT101T (3) Judge the research problems in Pharma. Analysis.
	MPAT101T (4) Examine and interpret the data obtained through experimentation and report the results as per regulatory requirements.
	MPAT101T (5) Utilize different analytical instruments for the assay of various APIs and formulations as per Pharmacopoeial standards.
MPH102T Drug Delivery System	**MPH102T (1)** Compare the concepts of development for novel drug delivery systems.
	MPH102T (2) Signify pathophysiological conditions for development of novel drug delivery systems.
	MPH102T (3) Justify the criteria for selection of drugs and polymers for the development of novel drug delivery systems.
	MPH102T (4) Evaluate novel drug delivery systems.
	MPH102T (5) Develop new technologies utilized for development of new dosage forms.
	MPH102T (6) Defend the recent developments for drug delivery, as per industry need.
MPH103T Modern Pharmaceutics	**MPH103T (1)** State and perform various elements of preformulation studies.
	MPH103T (2) Differentiate between the Compaction, compression and consolidation parameters
	MPH103T (3) Imbibe the Industrial Management and GMP Considerations
	MPH103T (4) Practice the optimization techniques and pilot plant Scale Up techniques.
	MPH103T (5) Validate and evaluate various processes, dosage forms and equipment's.

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	MPH103T (6) Estimate dissolution, diffusion and pharmacokinetic parameters from Pharmaceuticals point of view.
MPH104T Regulatory Affair	**MPH104T (1)** Explain the importance of documentation in Pharma industry with regulatory requirements for product approval process.
	MPH104T (2) Appraise post approval regulatory requirements for drug products with submission of global documents in CTD and ECTD formats for different countries.
	MPH104T (3) Propose the non-clinical drug development approvals for conducting clinical trials.
	MPH104T (4) Elaborate pharmacovigilance and process of monitoring in clinical trials
MPH105P Pharmaceutics Practical I	**MPH105P (1)** Elaborate the technique and apply skills in formulating dosage forms.
	MPH105P (2) Use factorial design technique to get the formulation of desired characteristics.
	MPH105P (3) Explain and apply the different types of analytical instrumental technique available for quality control of pharmaceuticals. (API's & Formulations).
	MPH105P (4) Interpret scientific data, represent the data in a tabular and/or graphical form.
	MPH105P (5) Demonstrate the effect of the physico-chemical properties on pharmaceutical systems
Semester-II	
MPH201T Molecular Pharmaceutics	**MPH201T (1)** Interpret the events, concepts and biological process in drug targeting.
	MPH201T (2) Differentiate, formulate and evaluate various novel targeted drug delivery systems.
	MPH201T (3) Summarize the process for Tumor targeting and brain specific delivery.
	MPH201T (4) Appraising the need of pulmonary system, differentiate, formulate and evaluate nasal drug delivery system.
	MPH201T (5) Summarize nucleic acid based therapeutic delivery system.
MPH202T Advanced Biopharmaceutics & Pharmacokinetics	**MPH202T (1)** Compile the basic concepts in biopharmaceutics and pharmacokinetics with parameters that best describe process of drug absorption.
	MPH202T (2) Elaborate biopharmaceutics considerations in drug product design and its performance.
	MPH202T (3) Develop pharmacokinetic models and parameters that best describe process of drug ADME.
	MPH202T (4) Defend use of Bioavailability and Bioequivalence studies for new drugs or dosage forms, as per industry need.

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	MPH202T (5) Estimate the applications of pharmacokinetics and pharmacodynamics of biotechnology drugs.
MPH203T **Computer Aided Drug Development**	**MPH203T (1)** Discuss and correlate studies, which is inclusive of history of computers, research and development and use of computers in research.
	MPH203T (2) Elaborate Computational Modeling of Drug Disposition.
	MPH203T (3) Predict the role of computers in formulation development with optimization techniques.
	MPH203T (4) Compile Computer-aided biopharmaceutical characterization.
	MPH203T (5) Discuss with peers Artificial Intelligence (AI) and Robotics.
MPH204T **Cosmetic & Cosmeceuticals**	**MPH204T (1)** Describe the regulatory provisions related to the import and manufacture of cosmetics as per the Drugs and Cosmetics Act 1940 and the Rules 1945.
	MPH204T (2) Discuss key building blocks for various formulations.
	MPH204T (3) Explain the various problems related to the skin and hair.
	MPH204T (4) Design cosmeceuticals for various skin, hair and dental problems.
	MPH204T (5) Describe the guidelines for the regulation of herbal cosmetics used in private bodies.
	MPH204T (6) Design cosmetics and cosmeceuticals of desired safety, stability and efficacy with technologies involved in their manufacturing.
MPH205P Pharmaceutics **Practical-II**	**MPH205P(1)** Elaborate the technique and apply skills in formulating dosage and cosmetic forms.
	MPH205P(2) Apply software to get the formulation of desired characteristics.
	MPH205P(3) Interpret scientific data, represent the data in a tabular and/or graphical form.
	MPH205P(4) Interpret Pharmacokinetic and pharmacodynamics data perform data analysis using computer Softwares and give conclusion.
	MPH205P(5) Perform Pharmacokinetics studies *in-vitro.*
	MPH205P(6) Compare between marketed formulations for drug release.
Department of Pharmaceutical Quality Assurance	
Semester-I	
MPAT101T	**MPAT101T(1)** Explain principle, instrumentation of various spectroscopic and chromatographic technique and their applications in Pharmaceutical research.

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Modern Pharmaceutical Analytical Techniques	**MPAT101T(2)**Interpret the spectrums and chromatogram of different methods of analysis.
	MPAT101T(3) Judge the research problems in Pharma. Analysis.
	MPAT101T(4) Examine and interpret the data obtained through experimentation and report the results as per regulatory requirements.
	MPAT101T(5) Utilize different analytical instruments for the assay of various APIs and formulations as per Pharmacopoeial standards.
MQA102T **Quality Management System**	**MQA102T (1)** Discuss the importance of quality.
	MQA102T (2) Identify and use tools for quality improvement.
	MQA102T (3) Locate, Evaluate and Analyse issues in quality.
	MQA102T (4) Establish parameters for quality evaluation of pharmaceuticals.
	MQA102T (5) Prepare, Summarise and build methods for stability testing of drug and drug substances.
	MQA102T (6) Compose statistical approaches for quality.
MQA103T **Quality Control and Quality Assurance**	**MQA103T (1)** Compile responsibilities of QA and QC and discuss concept of Good Laboratory Practices (GLP), QSEM and CPCSEA guidelines.
	MQA103T (2) Elaborate Current Good Manufacturing Practices (cGMP) in Pharmaceutical Industry.
	MQA103T (3) Evaluate raw materials, finished products, packaging materials and in process quality control tests for different Pharmaceutical formulations.
	MQA103T (4) Discuss importance of documentation and the scope of quality certifications applicable to Pharmaceutical Industries.
	MQA103T (5) Design manufacturing operations and packaging operations in Pharmaceutical Industry
MQA104T **Product Development and Technology Transfer**	**MQA104T (1)** Describe new product development process and informational content for Investigational new drug application.
	MQA104T (2) Discuss preformulation and its impact on product development.
	MQA104T (3) Sketch and discuss design layout of Pilot plant for different dosage forms.
	MQA104T (4) Explain the significance of Pharmaceutical dosage form and their packaging requirements.
	MQA104T (5) Explain necessary information to transfer technology from R&D to actual manufacturing by sorting out various information obtained during R&D.
MQA105P Pharmaceutical	**MQA105P (1)**Analyze drugs and formulations by using various sophisticated analytical instruments

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Quality Assurance Practical-I	**MQA105P(2)** Evaluate Quality control tests for tablet, capsules, parenterals and ointment.
	MQA105P(3) Determine the process capability, stability study protocol, accelerated stability studies.
	MQA105P(4) Determine solubility of drugs using surfactant systems and co-solvency method.
Semester-II	
MQA201T **Hazards and Safety Management**	**MQA201T(1)** Summarize multidisciplinary nature of environmental studies and various natural resources.
	MQA201T(2) Discuss concept, structure and function of an Ecosystem.
	MQA201T(3) Compile sources and types of Air based hazards.
	MQA201T(4) Adopt the types of chemical based hazards and their prevention.
	MQA201T(5) Select preventive measure and management system for fire and explosion.
	MQA201T(6) Elaborate rules and guidelines for risk assessment and management.
MQA202T Pharmaceutical Validation	**MQA202T (1)** Summarize concepts of calibration, qualification and validation.
	MQA202T (2) Evaluate qualification of manufacturing equipment's and analytical instruments.
	MQA202T (3) Compile qualification of laboratory equipment's and validation of utility system.
	MQA202T (4) Design process validation of different dosage forms and validate analytical method for estimation of different drugs.
	MQA202T (5) Elaborate cleaning validation of equipment's and computer system validation.
	MQA202T (6) Compile concepts of Intellectual property, patents, copyright, trademark and significance of Transfer Technology.
MQA203T	**MQA203T (1)** Justify the importance of auditing, parameters involved, departments.
	MQA203T (2) Explain design and develop the methodology for pre auditing, auditing and post auditing of the facility

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Audits and Regulatory Compliance	**MQA203T (3)** Formulate the audit process, constitute the team required to complete the process and assign the role to each member.
	MQA203T (4) Develop the auditing report, authorise the report, investigate NCs, suggest and follow up compliance audit
	MQA203T (5) Prepare the check list for auditing the departments signifying the importance of each component.
	MQA203T (6) Discuss and appraise a pre audit list which shall be the base for auditing for GAMP.
MQA204T **Pharmaceutical Manufacturing Technology**	**MQA204T(1)** Describe the common practice in the pharmaceutical industry developments, plant layout and production planning.
	MQA204T(2) Discuss principles and practices of aseptic process technology, non-sterile manufacturing technology and packaging technology.
	MQA204T(3) Explain production principles and practices of non-sterile manufacturing process technology.
	MQA204T(4) Elaborate the process of selection of Containers and closures for pharmaceuticals.
	MQA204T(5) Explain principles and implementation of Quality by design (QbD) and process analytical technology (PAT) in pharmaceutical manufacturing.
MQA205P **Pharmaceutical Quality Assurance Practical II**	**MQA205P (1)** Analyse drugs and their formulations by various analytical instruments.
	MQA205P (2) Validate sterile and non-sterile dosage form by Process validation
	MQA205P (3) Measure qualification of Pharmaceutical equipment's and Analytical instruments
	MQA205P (4) Validate equipment by cleaning validation method.
Department of Pharmaceutical Chemistry	
Semester-I	
MPAT101T **Modern Pharmaceutical Analytical Techniques**	**MPAT101T (1)** Explain principle, instrumentation of various spectroscopic and chromatographic technique and their applications in Pharmaceutical research.
	MPAT101T (2) Interpret the spectrums and chromatogram of different methods of analysis.
	MPAT101T (3) Judge the research problems in Pharma. Analysis.
	MPAT101T (4) Examine and interpret the data obtained through experimentation and report the results as per regulatory requirements.

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	MPAT101T (5) Utilize different analytical instruments for the assay of various APIs and formulations as per Pharmacopoeial standards.
MPC102T **Advanced Organic Chemistry – I**	**MPC102T (1)** Explain the different organic intermediates involved in determining the reaction mechanism.
	MPC102T (2) Elaborate the mechanism and applications of SN1, SN2, E1, E2 and various named reactions
	MPC102T (3) Discuss the applications of various synthetic reagents
	MPC102T (4) Explain the various protecting and de-protecting groups
	MPC102T (5) Describe the chemistry, synthesis and mechanism of reactions in heterocyclic compounds
	MPC102T (6) Compile the principle, process and applications of Synthon approach and retrosynthesis.
MPC103T **Advanced Medicinal Chemistry**	**MPC103T (1)** Discuss various stages and techniques of drug discovery and their role in drug research
	MPC103T (2) Appraise the structural activity relationship and MOA of the important class of drugs and role of stereochemistry on drug action
	MPC103T (3) Apply peptidomimetics approach and applications
	MPC103T (4) Explain types of Enzyme inhibition and its application in medicine
	MPC103T (5) Elaborate prodrug and Analog development along with its applications
	MPC103T (6) Interpret techniques of combating drug resistance
MPC104T **Chemistry of Natural Products**	**MPC104T (1)** Discuss the different types of natural compounds, their chemistry and medicinal importance.
	MPC104T (2) Explain the importance of natural compounds as lead molecules for new drug discovery.
	MPC104T (3) Illustrate rDNA technology tool for new drug discovery.
	MPC104T (4) Elaborate chemistry and physiological significance of vitamins.
	MPC104T (5) Summarise general and advanced methods of structural elucidation of compounds of natural origin.
	MPC104T (6) Describe isolation, purification and characterization of simple chemical constituents from the natural source
MPC105P **Pharmaceutical Chemistry Practical I**	**MPC105P (1)** Analyze Pharmacopoeial compounds by various instrumental techniques
	MPC105P (2) Estimation of components by fluorimetry and flame photometry
	MPC105P (3) Synthesize compounds based on rearrangement reaction
	MPC105P (4) Perform purification and characterization of medicinally important synthesized compounds
	MPC105P (5) Estimation of elements and functional groups in organic natural compounds

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	MPC105P (6) Perform isolation and typical degradation reactions on plant constituents
Semester-II	
MPC201T **Advanced Spectral Analysis**	**MPC201T (1)** Correlate different analytical data using discriminate instruments.
	MPC201T (2) Aanalyze and conclude the data of unknown structures.
	MPC201T (3) Evaluate data of hyphenated instruments.
	MPC201T (4) Discuss structural elucidation of organic and natural compounds by IR, NMR and MASS spectral data
MPC202T **Advanced Organic Chemistry –II**	**MPC202T (1)** Describe the principles and applications of Green chemistry
	MPC202T (2) Illustrate the concept, principle and applications of stereochemistry and asymmetric synthesis
	MPC202T (3) Explain the chemistry of peptide.
	MPC202T (4) Elaborate the concept of Photochemical reactions
	MPC202T (5) Discuss the principles of different types of pericyclic reactions.
	MPC202T (6) Explain the applications of various catalysis used in the reaction.
MPC203T **Computer Aided Drug Design**	**MPC203T (1)** Predict and analyzed molecular properties of new molecules and explain various drug design methods
	MPC203T (2) Elaborate the concept of pharmacophore mapping and Virtual Screening
	MPC203T (3) Discuss the Molecular Modeling and Docking technique.
	MPC203T (4) Assess the role of computer aided drug design in drug discovery
	MPC203T (5) Discuss history and development of QSAR
	MPC203T (6) Apply statistically QSAR based applications.
MPC204T **Pharmaceutical Process Chemistry**	**MPC204T(1)** Develop synthetic routes that is safe, cost-effective, environmentally friendly, and efficient.
	MPC204T(2) Impart knowledge on the development and optimizationof a synthetic route/s.
	MPC204T(3) Discuss pilot plant procedure for the manufacture ofActive Pharmaceutical Ingredients and new chemical entities for the drug development phase.
	MPC204T(4) Create and carry out work up and separation procedure.
	MPC204T(5) Predict the outcome of organic reactions using a basic understanding of the general reactivity of functional groups and mechanism.

	MPC204T(6) Explain principles and applications of modern chemical instrumentation, experimental design, and data analysis.
MPC205P **Pharmaceutical Chemistry Practical II**	**MPC205P (1)** Synthesize organic compounds by adapting different approaches
	MPC205P (2) Interpretation and identification of organic compounds by various analytical techniques
	MPC205P (3) Perform synthesis of organic compounds by various synthetic route as well as techniques
	MPC205P (4) Apply software's for physicochemical and ADMET properties of drug molecules
	MPC205P (5) Perform experiments based on various computer aided drug design techniques
	MPC205P (6) Reflect the requirement of API through case studies as per regulatory guidelines
Department of Pharmacology	
Semester-I	
MPAT101T **Modern Pharmaceutical Analytical Techniques**	**MPAT101T (1)** Explain principle, instrumentation of various spectroscopic and chromatographic technique and their applications in Pharmaceutical research.
	MPAT101T (2) Interpret the spectrums and chromatogram of different methods of analysis.
	MPAT101T (3) Judge the research problems in Pharma. Analysis.
	MPAT101T (4) Examine and interpret the data obtained through experimentation and report the results as per regulatory requirements.
	MPAT101T (5) Utilize different analytical instruments for the assay of various APIs and formulations as per Pharmacopoeial standards.
MPL102T **Advanced Pharmacology-I**	**MPL102T (1)** Predict Pharmacokinetic and Pharmacodynamics process of lipophilic and hydrophilic drugs.
	MPL102T (2) Differentiate pharmacological actions of drug acting on autonomic nervous system.
	MPL102T (3) Relate concept of drug action on central nervous system with its receptors.
	MPL102T (4) Describe mechanism and pharmacology of prototype drugs acting on CVS disorders and explain their clinical use.
	MPL102T (5) Illustrate feedback mechanism using mechanism and pharmacological action of hormones, autocoids and their antagonists.
MPL103T	**MPL103T (1)** Describe the various animals used in the drug discovery process.

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Pharmacological and Toxicological Screening Methods–I	**MPL103T (2)** Explain good laboratory practices in maintenance and handling of experimental animals.
	MPL103T (3) Appraise the regulations and ethical requirement for the usage of experimental animals.
	MPL103T (4) Discuss the various preclinical *in-vitro, in-vivo* and other possible animal alternative models for the screening various pharmacological activities.
	MPL103T (5) Elaborate general principles and evaluation of Immunoassay methods.
MPL104T **Cellular and Molecular Pharmacology**	**MPL104T (1)** Analyze the receptor signal transduction processes.
	MPL104T (2) Construct the molecular pathways affected by drugs.
	MPL104T (3) Explain mechanisms and applicability of molecular pharmacology, genomic and proteomic tools.
	MPL104T (4) Distinguish the process of Pharmacogenomics.
	MPL104T (5) Interpret the concept of Immunotherapeutic.
	MPL104T (6) Interpret various Cell culture techniques.
MPL105P Pharmacology Practical-I	**MPL105P (1)** Demonstrate route of drug administration, blood withdrawal techniques.
	MPL105P (2) Evaluate of effect of drug on CNS activity, analgesic activity, Anti-diabetic activity, Anti-inflammatory activity, diuretic activity, antiulcer activity etc.
	MPL105P (3) Estimate DNA/RNA isolated from biological sample using various techniques.
	MPL105P (4) Demonstrate MTT assay, gel electrophoresis, gene amplification and Protein quantification.
	MPL105P (5) Explain the principle, procedure and applications of enzyme inhibiton activity, pharmacokinetics studies, apoptosis determination etc.
	MPL105P (6) Exhibit the extraction techniques of drug from biological samples and their estimation using various analytical techniques.
Semester-II	
MPL201T **Advanced Pharmacology II**	**MPL201T (1)** Illustrate feedback mechanism using mechanism and pharmacological action of drug acting on endocrine systems.
	MPL201T (2) Relate concept of mechanism and resistance of drugs acting microbes, fungus, virus and tuberculosis.
	MPL201T (3) Discuss the pharmacotherapy of COPD, Asthma, constipation, diarrhea, Ulcer, inflammation, Rheumatoid Arthritis, immune disorders etc.
	MPL201T (4) Relate significance of rhythm, cycles and biological clock for application of chronotherapy in various disease conditions.

	MPL201T (5) Explain antioxidant scavenging effects on free radicalsto cure diabetes, neurodegenerative diseases and cancer etc.
	MPL201T (6) Conclude the recent advances in the treatment of Alzhemier's disease, Parkinson's disease, cancer and diabetes mellitus.
MPL202T Pharmacological and Toxicological Screening Methods–II	**MPL202T (1)** Summarise the various types of toxicity studies.
	MPL202T (2) Discuss the importance, ethical and regulatory requirements for various type of toxicity studies.
	MPL202T (3) Outline the significance of reproductive toxicity, teratogenicity, Genotoxicity, carcinogenicity studies.
	MPL202T (4) Describe the significance of IND enabling studies and safety pharmacology studies.
	MPL202T (5) Recognize the importance and applications of toxicokinetics studies and alternative methods to animal toxicity testing.
	MPL202T (6) Demonstrate the practical skills require for conducting the preclinical toxicity studies.
MPL203T Principles of Drug Discovery	**MPL203T (1)** Illustrate various stages in modern drug discovery process.
	MPL203T (2) Appraise role of genomics, proteomics and bioinformatics in drug discovery.
	MPL203T (3) Discuss the different methods for lead identification.
	MPL203T (4) Explain different approaches for rational drug design.
	MPL203T (5) Elaborate role of classical target and biomarker in drug discovery.
	MPL203T (6) Illustrate role of *in-vitro* screening technique in drug discovery
MPL204T Clinical Research and Pharmacovigilance	**MPL204T (1)** Elaborate the basic concept of clinical research.
	MPL204T (2) Discuss regulatory requirements for conducting clinical trial.
	MPL204T (3) Summarise the types of clinical trial designs.
	MPL204T (4) Explain the responsibilities of key players involved in clinical trials
	MPL204T (5) Describe in detail about safety monitoring, reporting and close-out activities.
	MPL204T (6) Illustrate the principles of Pharmacovigilance.
MPL205P	**MPL205P (1)** Demonstrate the determination of unknown concentration of sample by Bioassay method using chicken ilium preparation.
	MPL205P (2) Illustrate the drug effect on rat BP, heart rate and ECG using computer simulation techniques.

Pharmacology Practical II	**MPL205P (3)** Study the acute oral toxicity, dermal toxicity, repeated dose toxicity studies and drug mutagenicity study as per OECD guidelines.
	MPL205P (4) Assess the ADR reporting and monitoring protocol.
	MPL205P (5) Design the protocol for Clinical trial studies.
	MPL205P (6) Evaluate the efficacy of drugs using In-silico studies like docking studies, Pharmacophore based screening and QSAR studies.

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Pharmacy Council of India, New Delhi. Recognized by : Government of Maharashtra
Affiliated to Savitribai Phule Pune University, Pune

Dr. Sanjay D. Patil
President

Padmashree Dr. D. Y. Patil
Founder

Shri. Satej D. Patil
Vce-President & Chairman

Dr. N. S. Vyawahare
Principal

Sample copy of Course outcomes prepared by Faculty

SYLLABUS PLAN

Theory/Practical: Theory

Subject code: BP 502 T

Subject: Industrial Pharmacy-I

Class: Third year

Semester: V

No of Hrs. assigned: 4Hrs/week

No of hours planned : 45

Department: Pharmaceutics

Course Description: Course enables the student to understand and appreciate the influence of pharmaceutical additives and various pharmaceutical dosage forms on the performance of the drug product. Industrial Pharmacy is a discipline which includes manufacturing, development, marketing and distribution of drug products including quality assurance of these activities. This broad research area relates to different functions in the pharmaceutical industry and having contact areas with engineering and economics.

Course Objectives:

Upon completion of the course the student shall be able to

1. Illustrate various pharmaceutical dosage forms and their manufacturing techniques.
2. Describe various factors to be considered in development of pharmaceutical dosage forms
3. Formulate solid, liquid and semisolid dosage forms and evaluate them for their quality

Course Outcomes:

CO1: Assess the physicochemical properties of drugs as a tool in the optimization of solid and liquid dosage forms.

CO2: Formulate and evaluate tablets, and liquid orals using established procedures and technology.

CO3: Formulate and evaluate capsules and pallets using established procedures and technology.

CO4: Appraise the formulation and evaluation of different types of parenteral and ophthalmic dosage forms with their packaging considerations.

CO5: Formulate and evaluate cosmetics and Aerosols based on their role with the packaging system.

CO6: Select and evaluate appropriate packaging materials for various pharmaceutical dosage forms.

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TEACHING LEARNING OUTCOMES

Chapter No.	Name of the Chapter	Co mapped	Teaching Learning outcomes
1	Preformulation	CO1	502.1 Discuss introduction to preformulation goals and objectives, Drug discovery process
			502.2 Explain solid state properties- bulk characterization
			502.3 Explain Liquid state properties-solubility studies
2	Tablets	CO2	502.4 Discuss the introduction and types of tablets
			502.5 Discuss the types of tablets continued
			502.6 Explain the additives used in tablets
			502.7 Appraise the knowledge of granulation mechanism and processes
			502.8 Evaluate of granulation
			502.9 Justify the physics of tablet compression
			502.10 Explain tablet compression machines
			502.11 Summarize the manufacturing problems and remedies thereof.
			502.12 Elaborate Quality control for tablets
			502.13 Discuss Packaging and labeling strips, blister and bulk packaging
3	Tablet coating	CO2	502.14 Explain Advantages and disadvantages, Types of coating , ideal properties for coating
			502.15 Describe Sugar coating process
			502.16 Discuss Film coating and enteric coating process
			502.17 Elaborate Materials used for film coating and enteric coating
			502.18 Explain Process parameters affecting coating
			502.19 Discuss Manufacturing problems and remedies thereof.
			502.20 Explain Compression Coating Evaluation of coated tablets
4	Pelletization	CO3	502.21 Discuss introduction, formulation requirements of Pellets
			502.22 Explain Pelletization process, equipments for manufacture of pellets
			502.23 Describe Evaluation of pellets
5	Capsules	CO3	502.24 Discuss Advantages and disadvantages of capsules, Raw material for capsule shell
			502.25 Elaborate preparation of hard capsule shell
			502.26 Explain study of Capsule sizes and standards and defects thereof
			502.27 Discuss Formulation development
			502.28 Explain Capsule filling principles and equipments
			502.29 Describe Q.C Parameters problems and remedies thereof.

			502.30 Discuss Soft gelatin capsule formulation development
			502.31 Elaborate Manufacturing , processing and equipment
			502.32 Outline Plant layout of Capsule Manufacturing plant
6	Liquid orals:	CO2	502.33 Discuss Preformulation of liquid orals
			502.34 Formulation and manufacturing consideration of syrups and elixirs
			502.35 Explain Suspension theories
			502.36 Describe Suspensions formulation and evaluation
			502.37 Explain Emulsion theories
			502.38 Discuss Emulsion formulation and evaluation
7	Cosmetics	CO5	502.39 Introduction to cosmetics & their classification
			502.40 Discuss preparation and evaluation shampoos
			502.41 Discuss preparation and evaluation of lipsticks
			502.42 Discuss preparation and evaluation cold cream and vanishing cream
			502.43 Discuss preparation and evaluation tooth pastes
			502.44 Discuss preparation and evaluation hair dyes
			502.45 Discuss preparation and evaluation sunscreens
8	Aerosol	CO5	502.46 Definition, propellants containers, valves, types of aerosol systems
			502.47 Discuss preformulation, formulation and manufacture of aerosols
			502.48 Explain Evaluation of aerosols; Quality control and stability studies.
9	Parenteral Products	CO4	502.49 Describe definition, types, advantages and limitations. Preformulation factors and essential requirements, vehicles, additives, importance of isotonicity of Parenteral products.
			502.50 Discuss production procedure, production facilities and controls, aseptic processing
			502.51 Formulation of injections, sterile powders, large volume parenterals and lyophilized products.
			502.52 Discuss containers and closures selection, filling and sealing of ampoules, vials and infusion fluids.
			502.53 Explain Quality control tests of parenteral products.
10	Ophthalmic Preparations:	CO4	502.54 Explain formulation considerations of ophthalmic preparations
			502.55 Discuss formulation, methods of preparation, labeling, containers; evaluation of ophthalmic preparations
11	Packaging Materials Science:	CO6	502.56 Explain materials used for packaging of pharmaceutical products,
			502.57 Discuss factors influencing choice of containers, legal and official requirements for

			containers, 502.58 Explain stability aspects of packaging materials, quality control tests

Ms. N. Kaushal Subject Teacher	Dr. S. P. Chaudhari HOD	Dr. S. P. Chaudhari Academic Coordinator	Dr. N. S. Vyawahare Principal

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Akurdi, Pune-411 044.

Dr. D. Y. Patil Pratishthan's Dr. D. Y. Patil College of Pharmacy ★ Akurdi, Pune - 44.

Subject: Pharmacognosy & Phytochemistry –II **Class:** S.Y.B.Pharm
Subject code:2.4.5 T

Course description:
Pharmacognosy and Phytochemistry-II deals with the evolutionary significance of the alkaloid and terpenoid formation in the plants and understand the medicinal significance of these molecules.

Course outcomes related to knowledge, cognitive skills & attitude:
on completion of following theory topics, learner should be able to:
2.4.5.1 Elaborate the concept of metabolites.
2.4.5.2 Summarise the pharmacognostic study of various categories of metabolites.
2.4.5.3 Determine extracted metabolites by quantitative method.
2.4.5.4 Analyse the qualitative aspects of crude drugs.
2.4.5.5 Deduce the use of marketed derivatives of alkaloids.
2.4.5.6 Explain the industrial applications of secondary metabolites

Course learning outcome related to knowledge, skill and attitude:
By the end of this course, the student will be able to:
2.4.5.1 Demonstrate skill of plant material sectioning, staining, mounting & focusing.
2.4.5.2. Identify the parts of plants from its morphological & microscopical features by applying experimental & theoretical knowledge of morphology & anatomies obtained in theory classes and draw the same.
2.4.5.3. Conduct extractions/isolations & explain significance of use of various chemicals & physical conditions.
2.4.5.4. Conduct various analytical parameters of volatile oils & judge the quality of volatile oils.

Chapter	Topic	Teaching Learning outcomes related to Knowledge and cognitive skills
On completion of theory student will be able to		
1.	Alkaloids	2.4.5.1 Define and classify alkaloids 2.4.5.2 Explain the occurrence, properties and nomenclature of alkaloids 2.4.5.3 Explain the chemistry including biogenesis, qualitative/ quantitative analysis. 2.4.5.4 Describe the pyridine-piperidine alkaloid alongwith highlight on tobacco plant 2.4.5.5 Describe the tropane alkaloid alongwith highlight on Belladonna plant 2.4.5.6 Discuss the pharmacognostic profile of Datura plant 2.4.5.7 Discuss the pharmacognostic profile of Coca plant 2.4.5.8 Describe the Quinoline&Isoquinoline alkaloid 2.4.5.9 Discuss the pharmacognostic profile of Cinchona plant 2.4.5.10 Discuss the pharmacognostic profile of Ipecac plant 2.4.5.11 Discuss the pharmacognostic profile of Opium plant 2.4.5.12 Discuss the pharmacognostic profile of Opium plant 2.4.5.13 Describe the Indole alkaloid 2.4.5.14 Discuss the pharmacognostic profile of Ergot plant 2.4.5.15 Discuss the pharmacognostic profile of Rauwolfia plant 2.4.5.16 Discuss the pharmacognostic profile of Catharanthus plant 2.4.5.17 Discuss the pharmacognostic profile of Nux-vomica seed

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		2.4.5.18 Describe the Imidazole alkaloid alongwith highlight on Pilocarpus plant 2.4.5.19 Describe the Steroidal alkaloid 2.4.5.20 Discuss the pharmacognostic profile of Veratrum plant 2.4.5.21 Discuss the pharmacognostic profile of Kurchi plant 2.4.5.22 Describe the Alkaloidal amine alkaloid 2.4.5.23 Discuss the pharmacognostic profile of Ephedra plant 2.4.5.24 Discuss the pharmacognostic profile of Colchicum plant 2.4.5.25 Describe the Glycoalkaloidalongwith highlight on Solanum plant species 2.4.5.26 Describe the Purine alkaloid alongwith highlight on Coffee plant 2.4.5.27 Discuss the pharmacognostic profile of Tea plant
2.	Terpenoids& Resins	2.4.5.28 Define and classify the different trepenoids 2.4.5.29Explain the occurrence, physicochemical properties and nomenclature of terpenoids 2.4.5.30 Explain the general biogenisis and qualitative/ quantitative analysis of terpenoids 2.4.5.31 Discuss the Lower terpenoidsalongwith a major focus on Clove plant. 2.4.5.32 Explain the pharmacognostic profile of Cinnamon plant 2.4.5.33 Explain the pharmacognostic profile of Coriander plant 2.4.5.34 Explain the pharmacognostic profile of Lavender plant 2.4.5.35 Explain the pharmacognostic profile of Sandal wood plant 2.4.5.36 Explain the pharmacognostic profile of Artemesia plant 2.4.5.37 Discuss the Diterpenoidsalongwith a major focus on Taxus plant. 2.4.5.38 Explain the pharmacognostic profile of Coleus plant 2.4.5.39 Discuss the Triterpenoidsalongwith a major focus on Ginseng plant. 2.4.5.40 Discuss the Tetraterpenoidsalongwith a major focus on Annato plant. 2.4.5.41 Explain the pharmacognostic profile of Saffron plant 2.4.5.42Define and classify resins 2.4.5.43 Explain its physicochemical properties and qualitative/ quantitative analysis 2.4.5.44 Explain the pharmacognostic profile of Podophyllum&Guggul plant 2.4.5.45 Explain the pharmacognostic profile of Boswellia& Cannabis plant

Note: The evaluation of the students will be made on the basis of

1. Assignment
2. Quiz or Multiple choice questions test,
3. Pretest including short and extended questions,
4. Mid-term examination, and
5. Final examination.

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Subject: Pharmacognosy & Phytochemistry –II **Subject code:**2.4.5P		**Class:** S.Y.B.Pharm
Practical No	**Type of Practical**	**Course learning outcome related to knowledge, skill and attitude**
On completion of practical course student will be able to-		
1.	Study of Crude drugs morphology, microscopy& powdered characteristics of crude drugs	2.4.5. 1.P- Identify the given unknown crude drug based on morphological, microscopical characters, chemical / histochemical tests for following crude drugs in entire and in powdered form- Rauwolfia 2.4.5.2. P- Identify the given unknown crude drug based on morphological, microscopical characters, chemical / histochemical tests for following crude drugs in entire and in powdered form- Cinchona, Kurchi 2.4.5.3.P- Identify the given unknown crude drug based on morphological, microscopical characters, chemical / histochemical tests for following crude drugs in entire and in powdered form- Ephedra 2.4.5.4.P- Identify the given unknown crude drug based on morphological, microscopical characters, chemical / histochemical tests for following crude drugs in entire and in powdered form- Nux-vomica
2.	To determine the solubility, specific gravity of the given volatile oil samples.	2.4.5.5.P- Identify the solubility of volatile oil 2.4.5.6.P- Identify the specific gravity of the given volatile oil
3.	Extraction, Isolation, evaluation by chromatography	2.4.5.7.P- Extract and analyse Caffeine on the basis of TLC 2.4.5.8.P- Extract and analyseEugenol on the basis of TLC
4.	Determination of volatile oil content	2.4.5.9.P- Determine and analyse (TLC analysis) volatile oil content by Clevenger apparatus (Mentha and Eucalyptus oil)
5.	Identification of unorganized crude drugs.	2.4.5.10.P- Explain various folklore drugs along with its morphological characters

Note: The evaluation of the students will be made on the basis of Four components:
1. Lab notebook. Each report in the lab notebook will be graded based on the following criteria: organization, Discussing of the experiment, clearness, completeness, readability and internal coherence.
2. Global laboratory skills. In each experiment the level of performance will be assessed considering care on formulation and evaluation of the experiment/preparation, housekeeping, attendance and punctuality.
3. Type of container selected and label of the product.
4. Final oral examination.

Ms. S. W. Jadhav **Subject Teacher**	**Dr. R. S. Karodi** **HOD**	**Dr. S. P. Chaudhari** **Academic Coordinator**	**Dr. N. S. Vyawahare** **Principal**

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Akurdi,Pune 411044
Institute code-635

Term Plan M Pharm Sem –I 2021-2022

Subject:_Modern Pharmaceutics(T) | Subject Code:MPH103(T)
Name of the Faculty: Mrs. Shilpa. P. Chaudhari | H.O.D: Dr.(Mrs) S.P.Chaudhari
Probable Hours Available: 45 hrs | Extra Lectures Planned: Nil
Total Lectures Planned: _45___. | Tutorial Sessions available 15hrs
Planning for tutorial Sessions: 15hrs | Total Sessions planned: 45+15=60

Course Description: Course designed to impart advanced knowledge and skills required to learn various aspects and concepts at pharmaceutical industries

- Course Outcome: Upon completion of the course, student will be able to

CO1 State and perform various elements of preformulation studies.
CO2 Differentiate between the Compaction, compression and consolidation parameters
CO3 Imbibe the Industrial Management and GMP Considerations.
CO4 Practice the Optimization Techniques & Pilot Plant Scale Up Techniques
CO5 Validate and evaluate various Processes , dosage forms and equipments.
CO6 Estimate dissolution, diffusion and pharmacokinetic parameters from Pharmaceuticals point of view.

	Knowledge	Planning	Problem Solving	Modern tool usage	Leader ship	Professional identity	Ethics	Commun ication	Pharmacist and society	Environment and sustainability	Life long learning
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	2	2					1	1	2	2
CO2	3	2	2	2	2	2		2		2	2
CO3	3	1	2	3	2	3	3	2	2	3	2
CO4	3	2	2	3	2	3	3	3	2	1	2
CO5	3	2	2	3	2	3	3	2	2	2	3
CO6	3	3	3	3	3	3	3	3	1	1	2

Books Referred:

1 Leon Lachman; Liberman A. Herbert; Joseph L Kanig; "The theory and Practice of Industrial Pharmacy"; 3rd edition; Varghese Publishing house, Dadar;412-430,804-834
2. Herbert A . Liberman; Leon Lachman; Joseph B.Schwartz; " Pharmaceutical Dosage forms: Tablets" Volume 1 ; 2nd edition; Marcel Dekkar series ; .1-69
3. Herbert A . Liberman; Leon Lachman; Joseph B.Schwartz; " Pharmaceutical Dosage forms: Tablets" Volume 2 ; 2nd edition; Marcel Dekkar series ; 201-241
4. Herbert A . Liberman; Leon Lachman; Joseph B.Schwartz; " Pharmaceutical Dosage forms: Tablets" Volume 3 ; 2nd edition; Marcel Dekkar series ;
5. Larry L .Augsburger; Stephen W.Hoag ; "" Pharmaceutical Dosage forms: Tablets" Volume 1: Unit Operatiuons and mechanical Properties; 3rd edition;informa healthcare New York London; 465-484, 555-619.
6. Larry L .Augsburger; Stephen W.Hoag ; "" Pharmaceutical Dosage forms: Tablets" Volume 2: Rational Design and formulation; 3rd edition;informa healthcare New York London;
7. Larry L .Augsburger; Stephen W.Hoag ; "" Pharmaceutical Dosage forms: Tablets" Volume 3: Manufacture and process control; 3rd edition;informa healthcare New York London;,
8. Herbert A . Liberman;Martin M Riger; Gilbert S. Banker; "Pharmaceutical Dosage forms: Disperse Systems";Volume 1;2nd edition; Marcel Dekkar series: 17-43

Dr N S Vyawahare

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Session wise TLO

Chapter No.	Name of the Chapter	No.	Teaching Learning Outcomes chapter wise
1	Preformulation- CO-1 State and perform various elements of preformulation studies	1.	Discuss the Concept of Preformulation with respect to solubility and stability of dosage form
		2.	Plan the preformulation studies for Bulk characterization/Solubility studies/stability studies of API
		3.	Based on properties of API and excipient formulate the dosage form Describe the selection of Emulsifiers based on RHLB calculations
		4.	Demonstrate the use of various equipments in the formulation and evaluation of dosage forms
		5.	Argue for the selection of excipients and formulation design in dosage formulation
		6.	Formulate and evaluate the dosage form using sophisticated Equipment s
		7.	Evaluate the dosage form as per Pharmacopeial guidelines
		8.	Perform and interpret Compatibility between various formulation ingredients using FTIR and DSC
		9.	Discuss the rationale behind formulation of dosage form
		10.	Discuss the formulation layout as per C GMP guidelines
		11.	Explore the newer excipients for selection in Dosage forms
2.	Validation CO5 Validate and evaluate various Processes , dosage forms and equipments	12	Signify the need of validation along with role of each personnel involved in validation
		13	Compare between types of process validation
		14	Differentiate between ICH and WHO guidelines for Calibration and validation.
		15	Define and differentiate between Process and equipment validation
		16	Explain validation of Any one dosage form
		17	Calculate the challenges in tech transfer from lab to pilot plant
		18	Validate any one Pharmaceutical equipment in detail
3.	cGMP & Industrial Management CO3 Imbibe the Industrial Management and GMP Considerations	19	Reflect Practice c-GMP during dosage form manufacturing
		20	Practice Total Quality management in product development
		21	Discuss in brief the process of production management.
		22	Draw the layout of Building of Pharmaceutical industry area wise
		23	Write a note on sales forecasting
		24	Discuss interpersonal and industrial relationship
		25	Explain the methods of budget and cost control in production
		26	Practice inventory management and control
		27	Explain material management
4.	Compression and compaction: CO2 Differentiate between the Compaction, compression and consolidation parameters	28	Define and differentiate between compaction , compression and consolidation with suitable example
		29	Draw and interpret various compaction profiles with suitable examples
		30	Give significance of Heckal and Kawakita analysis
		31	Discuss different types of deformation taking place during compaction.
		32	Explain solubility phenomenon in relation to activity coefficient and gibbs free energy.
		33	Discuss in brief force distribution mechanism with its significance
		34	Explain in detail Physics of tablet compression
		35	Explain effect of Friction during compression of tablet
5.	Dissolution and diffusion CO6 Estimate dissolution, diffusion and pharmacokinetic parameters from	36	Compare between Dissolution and diffusion
		37	Discuss various dissolution models in interpretation of release profile of drug
		38	Practice the concept of similarity factor in vitro release profile
		39	Define and differentiate between Pharmacokinetic and Dissolution parameters
		40	Significance of statistics in Pharmaceuticals

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	Pharmaceutica ls point of view		
6	Optimization CO4 Practice the Optimizatio n Techniques & Pilot Plant Scale Up Techniques	41	Discuss the concept of optimization
		42	Explain different methods of optimization in detail
		43	Describe the selection process of design so as to optimize the formulation with minimum run l
		44	Optimize the formulation using design expert software
		45	Demonstrate the role of software parameters in optimization
		46	List and Practice dependent variables for different dosage forms required during analysis of formulation development.
		47	Reflect the ethical behavior during analysis of result while using software
		48	Interpret the observations obtained from use of software during optimization
		49	Signify the role of optimization in formulation development during pandemic
		50	Signify how use of optimization technique contribute to environment and sustainability
		51	Inculcate new technologies and recent development in optimization during formulation development

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HOD
Dr. S. P. Chaudhari

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Pharmacy Council of India, New Delhi. Recognized by : Government of Maharashtra
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President

Padmashree Dr. D. Y. Patil
Founder

Shri. Satej D. Patil
Vce-President & Chairman

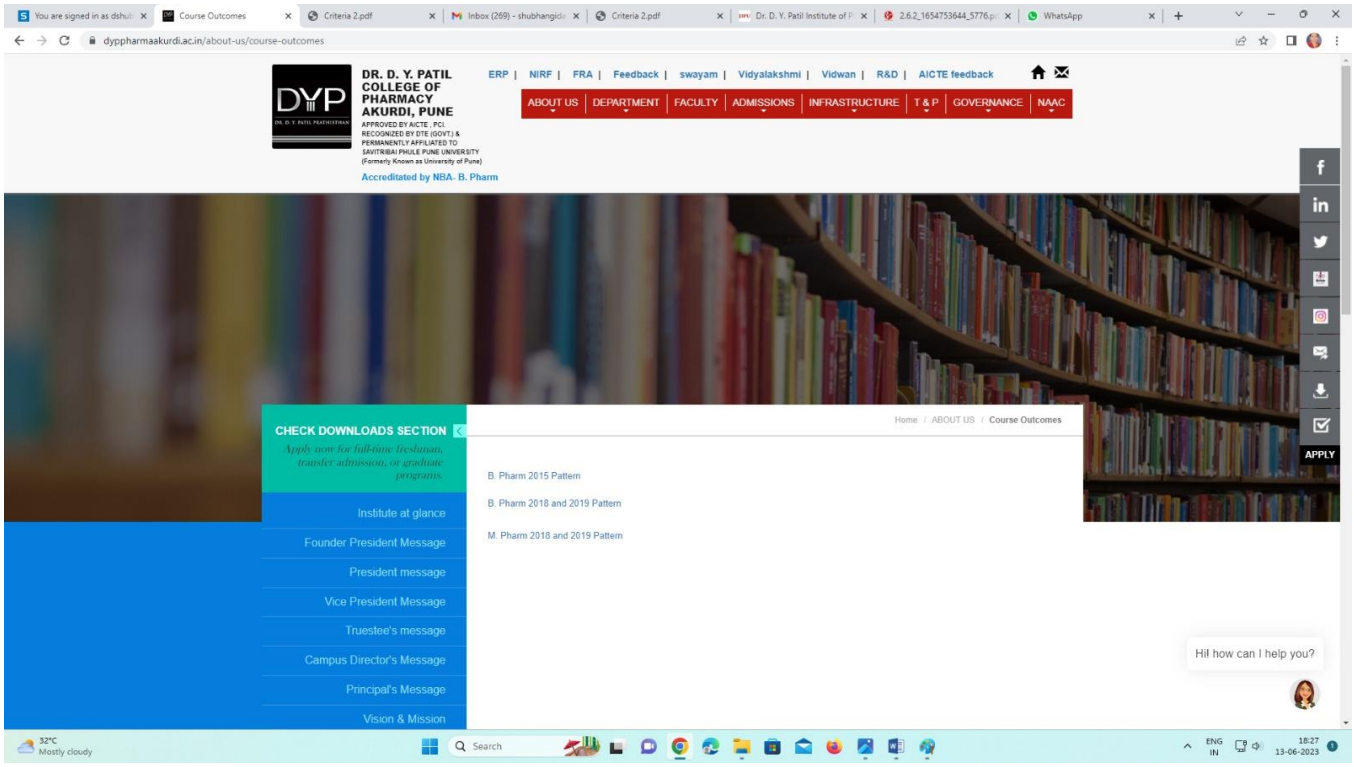
Dr. N. S. Vyawahare
Principal

Ref. No. : DYPCOP/
Date :

Dissemination of Course Outcomes

Dissemination of Course outcomes

1. College Website



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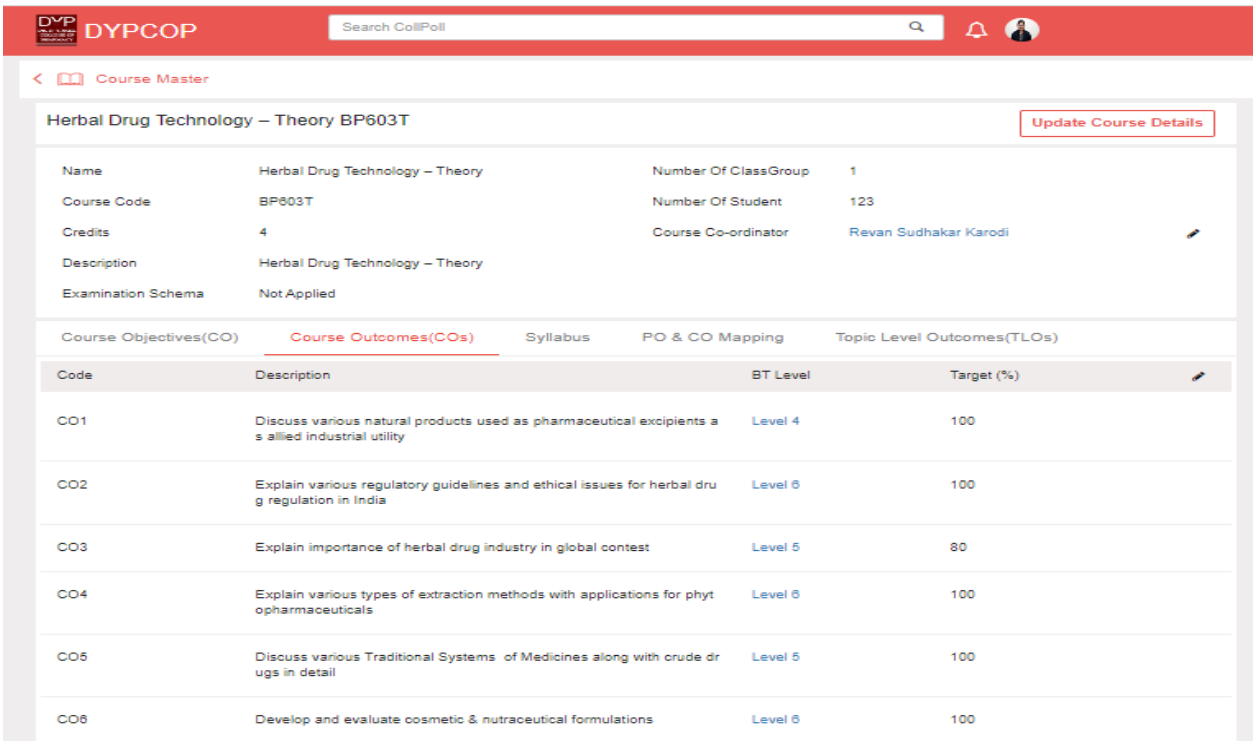

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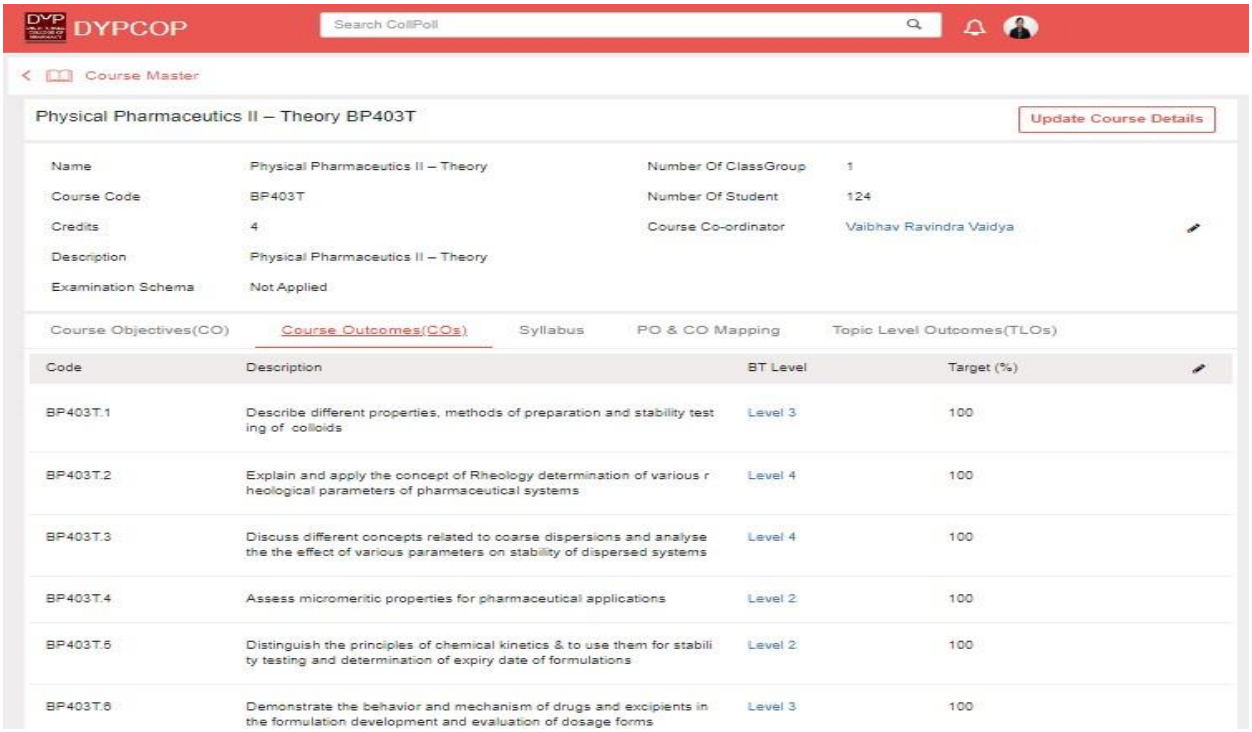

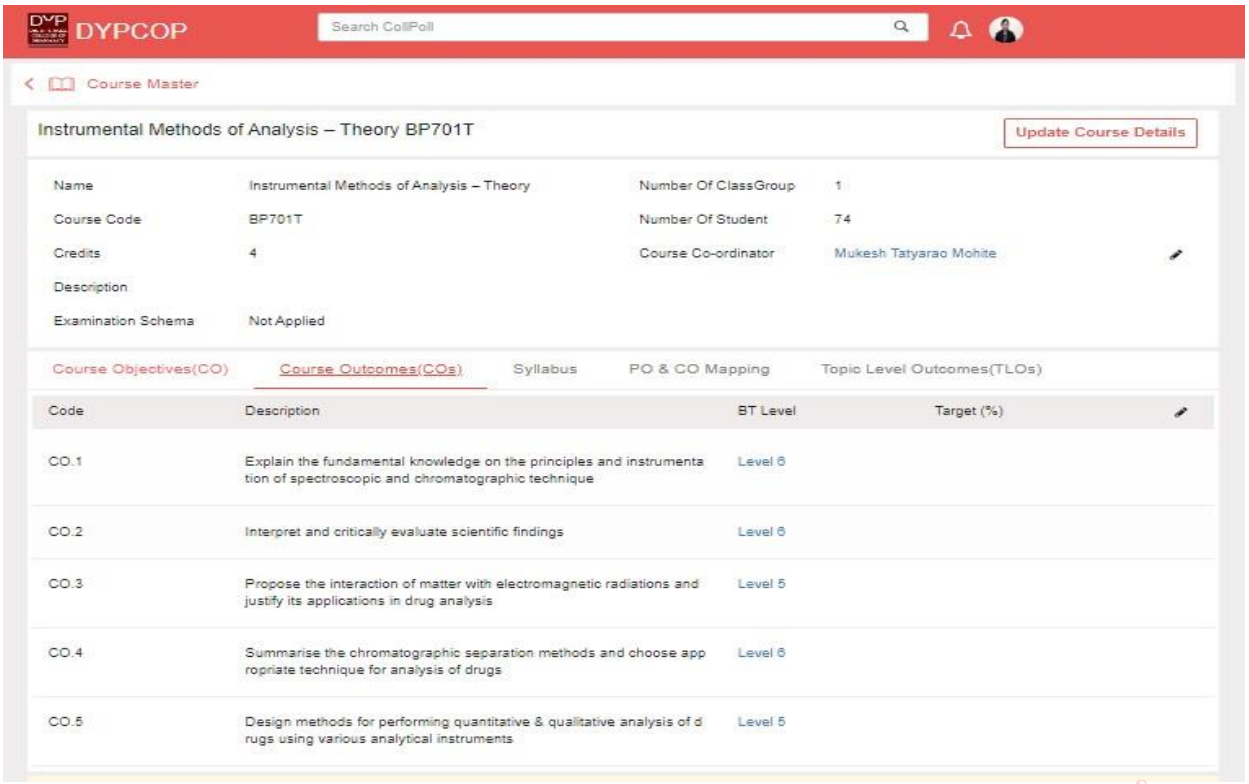

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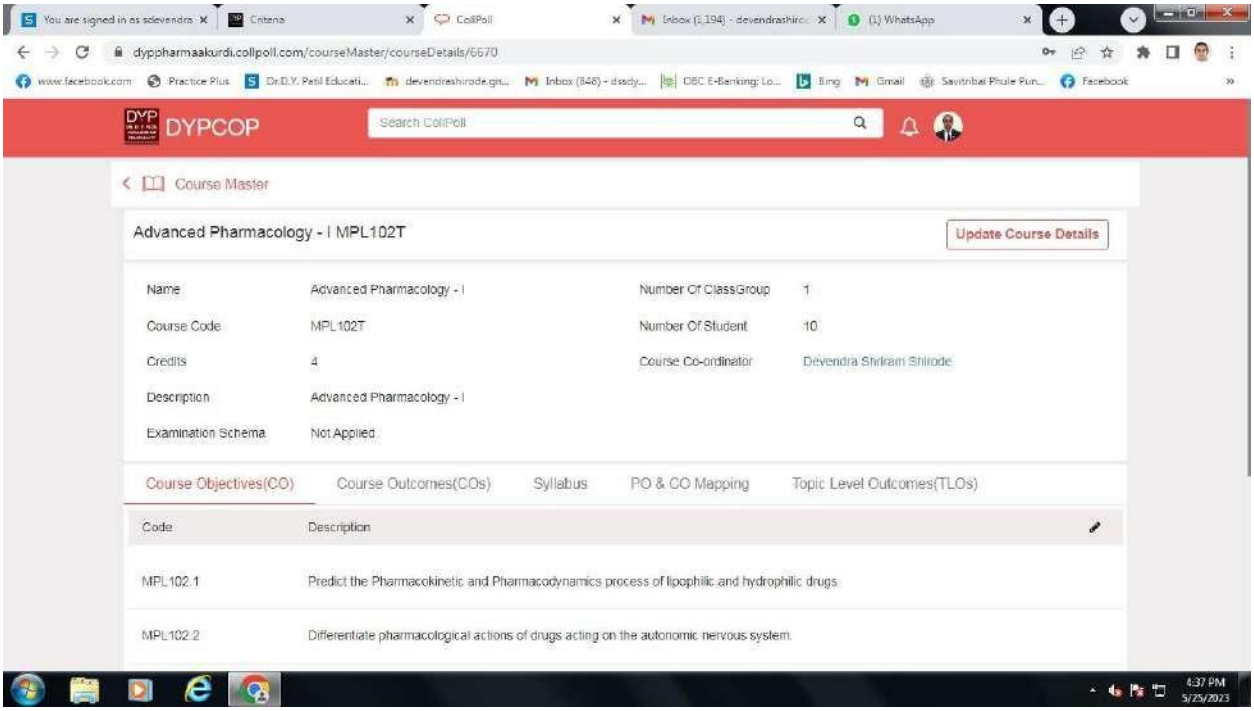

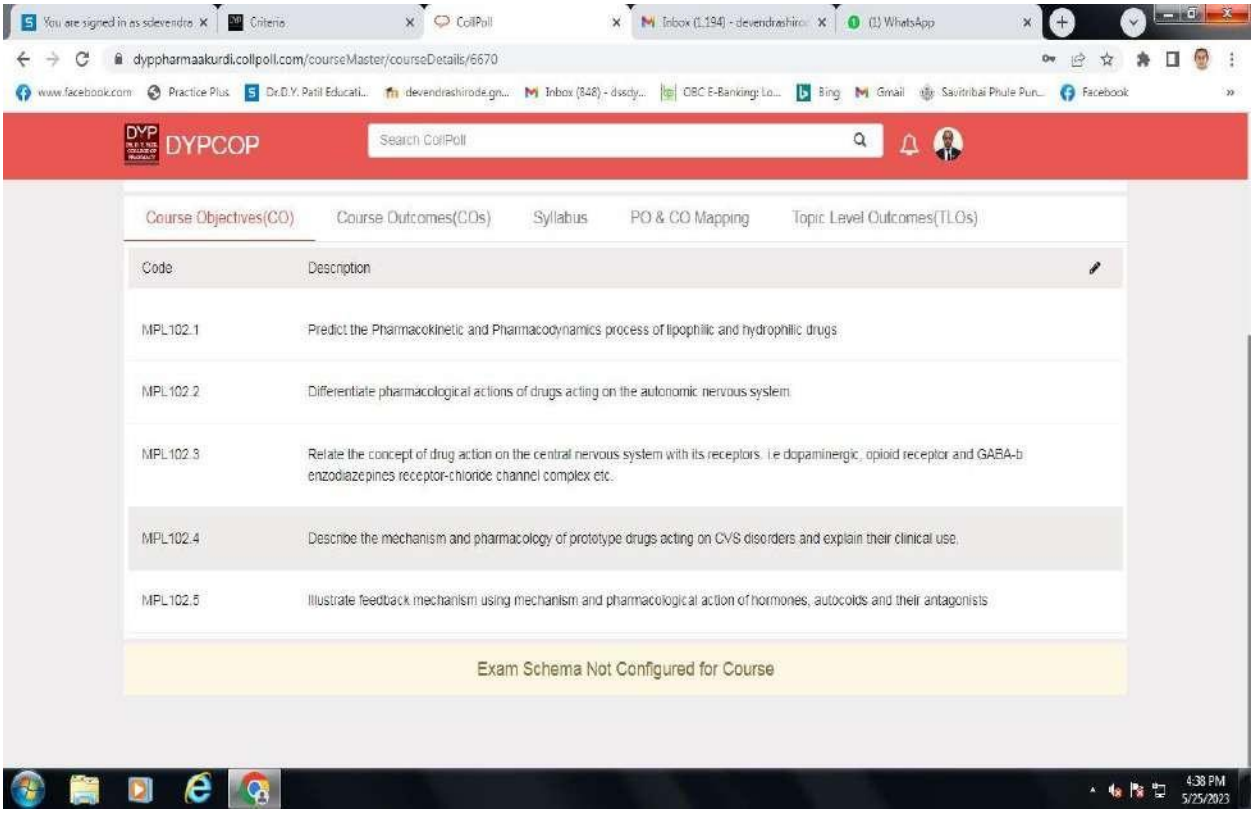

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3. Journal:

List of Books:

1. Organic Chemistry by Morrison and Boyd
2. Organic Chemistry by I .L. Finar, Volume-I
3. Textbook of Organic Chemistry by B. S. Bahl & Arun Bahl.
4. Organic Chemistry by P. L. Soni
5. Practical Organic Chemistry by Mannand Saunders.
6. Vogel's text book of Practical Organic Chemistry
7. Advanced Practical organic chemistry by N. K. Vishnoi.
8. Introduction to Organic Laboratory techniques by Pavia, Lampmanand Kriz.
9. Reaction and reaction mechanism by Ahluwaliah /Chatwal.

Course Outcomes:

CO1- Elaborate various concepts of organic chemistry.

CO2- Summarize the structure, nomenclature, uses and type of Isomerism of the organic compounds.

CO3- Elaborate reactions, Name reactions, its mechanism and orientation of reactions, its different classes of organic compounds,

CO4- Elaborate account for / Stability of compounds.

CO5- Prepare and examine various organic compounds.

CO6- Construct molecular models and novel advancements in organic chemistry.

Program Outcomes:

1) Pharmacy knowledge 2) Planning ability 3) Problem analysis 4) Modern tool usage 5) Leadership skills 6) Professional Identity 7) Pharmaceutical Ethics 8) Communication 9) The Pharmacist and Society 10) Environment and sustainability 11) Life-Long learning.

Course Outcomes from Physical Pharmaceutics II

On completion of course student will be able to:

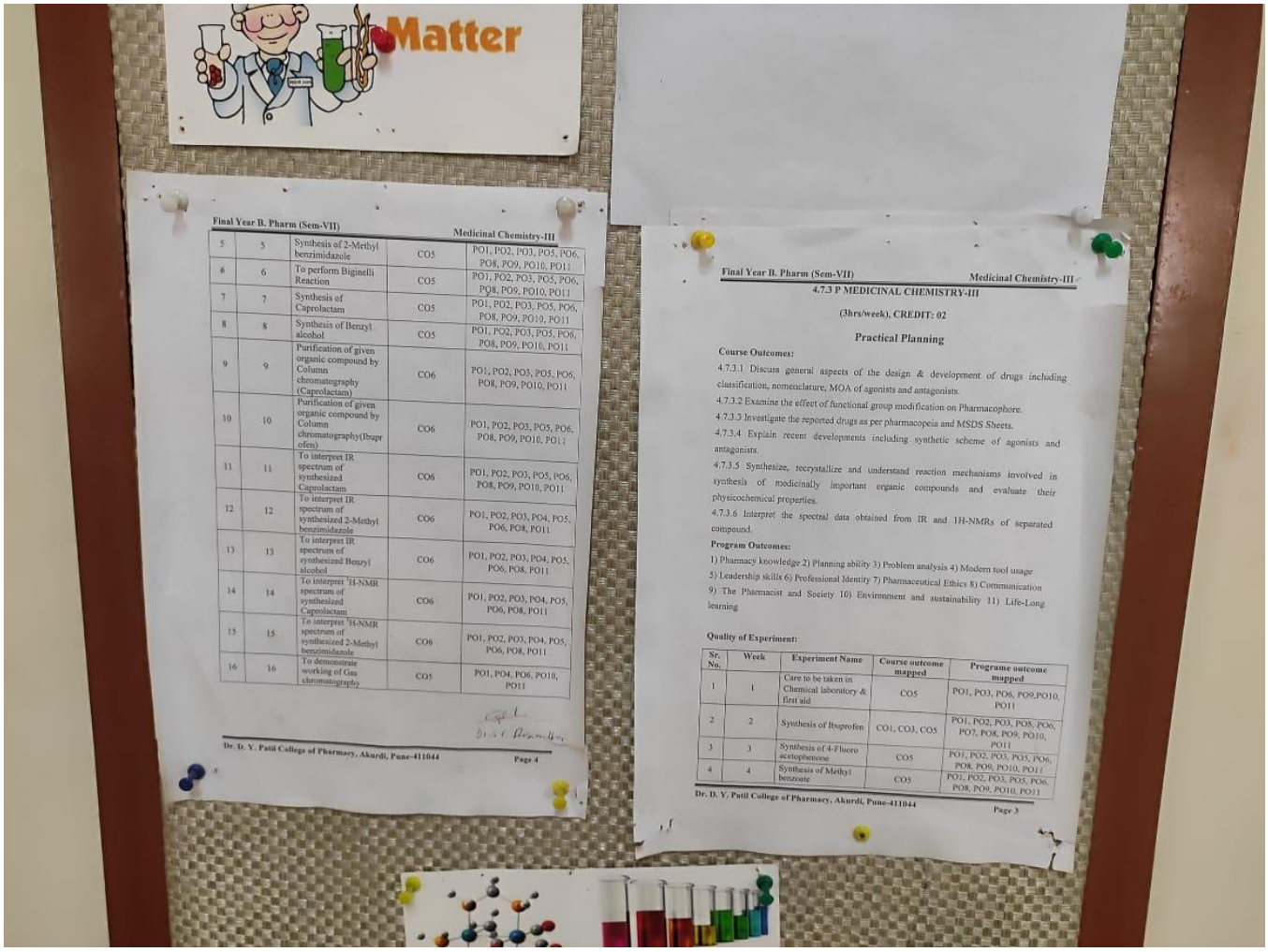
1. Relate various physicochemical properties of drug and excipient molecules in designing the dosage forms
2. Distinguish the principles of chemical kinetics & to use them for stability testing and determination of expiry date of formulations
3. Demonstrate the behavior and mechanism of drugs and excipients in the formulation development and evaluation of dosage forms.
4. Evaluate different physicochemical properties of drug molecule
5. Compare between different types of of dispersion with respect to their stability
6. Select viscosity modifier to create and modify flow patterns in liquid formulation.

Program Outcomes

1) Pharmacy Knowledge 2) Planning ability 3) Problem analysis 4) Modern tool usage 5) Leadership skills 6) Professional identity 7) pharmaceutical Ethics 8) communication 9) pharmacist and society 10) environment and sustainability 11) lifelong learning

Title of Experiment	Course outcome mapped	Program outcomes Mapped
Determination of particle size, particle size distribution using sieving method.	CO1, CO3, CO5	PO1,PO2,PO3,PO5,PO7,PO8,PO 11
Determination of particle size, particle size distribution using Microscopic method	CO1, CO3, CO5	PO1,PO2,PO3,PO5,PO7,PO8,PO 11
Determination of bulk density, true density and porosity.	CO1, CO3, CO5	PO1,PO2,PO3,PO5,PO7,PO8,PO 11
Determination of angle of repose and influence of lubricant on angle of repose	CO1, CO3, CO5	PO1,PO2,PO3,PO5,PO7,PO8,PO 11
Determination of viscosity of liquid using Ostwald's viscometer	CO1, CO3, CO5, CO6	PO1,PO2,PO3,PO5,PO7,PO8,PO 11
Determination of sedimentation volume with effect of different suspending agent	CO1, CO3, CO5, CO6	PO1,PO2,PO3,PO5,PO7,PO8,PO 11
Determination of sedimentation volume with effect of different concentration of single suspending agent.	CO1, CO3, CO5, CO6	PO1,PO2,PO3,PO5, PO6,PO7,PO8,PO11
Determination of viscosity of semisolid by using Brookfield viscometer.	CO1, CO3, CO5, CO6	PO1,PO2,PO3, PO4, PO5, PO6,PO7,PO8,PO11
Determination of reaction rate constant first order.	CO2	PO1,PO2,PO3,PO5,PO6,PO7,PO 8, PO11
Determination of reaction rate constant second order.	CO2	PO1,PO2,PO3,PO5,PO7,PO8,PO 11
Accelerated stability studies.	CO2	PO1,PO2,PO3,PO5,PO7,PO8,PO 11
Determination of Cloud point and Krafft point of given surfactant	CO5	PO1,PO2,PO3,PO5,PO7,PO8,PO 11
Determination of effect of salts on stability of hydrophobic sols.	CO5	PO1,PO2,PO3,PO5,PO7,PO8,PO 11

4. Lab Display:



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Pharmacy Council of India, New Delhi. Recognized by : Government of Maharashtra
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Dr. Sanjay D. Patil
President

Padmashree Dr. D. Y. Patil
Founder

Shri. Satej D. Patil
Vce-President & Chairman

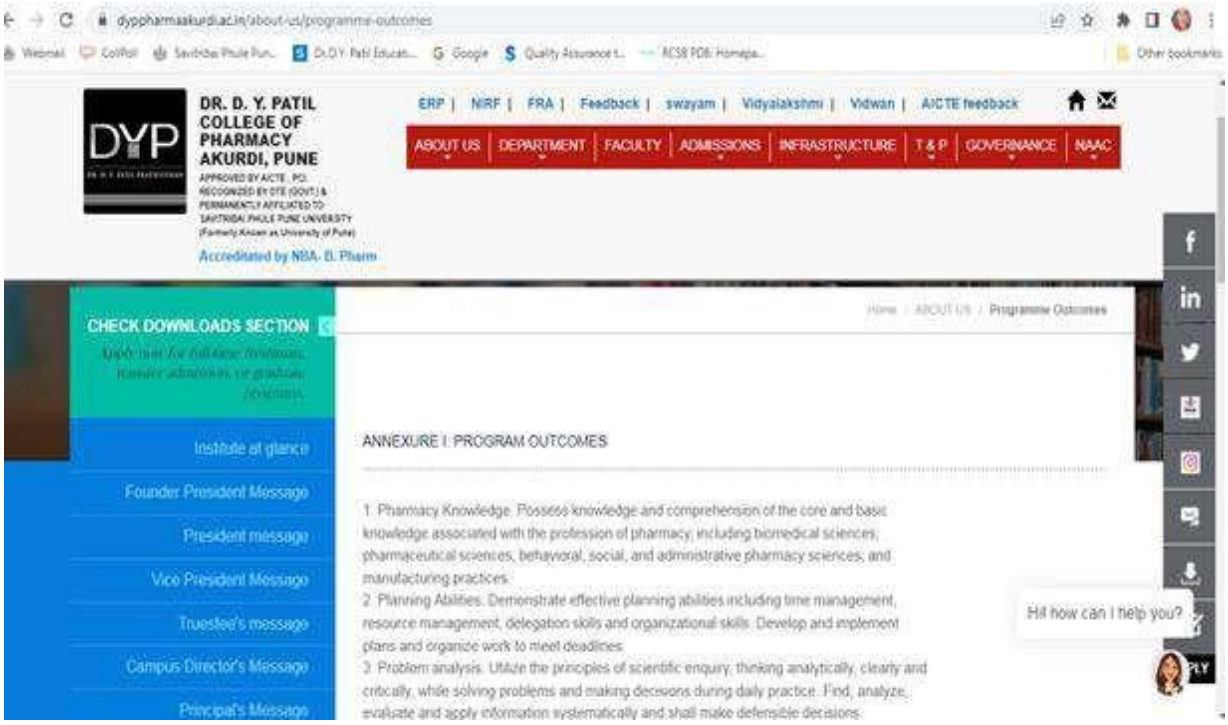
Dr. N. S. Vyawahare
Principal

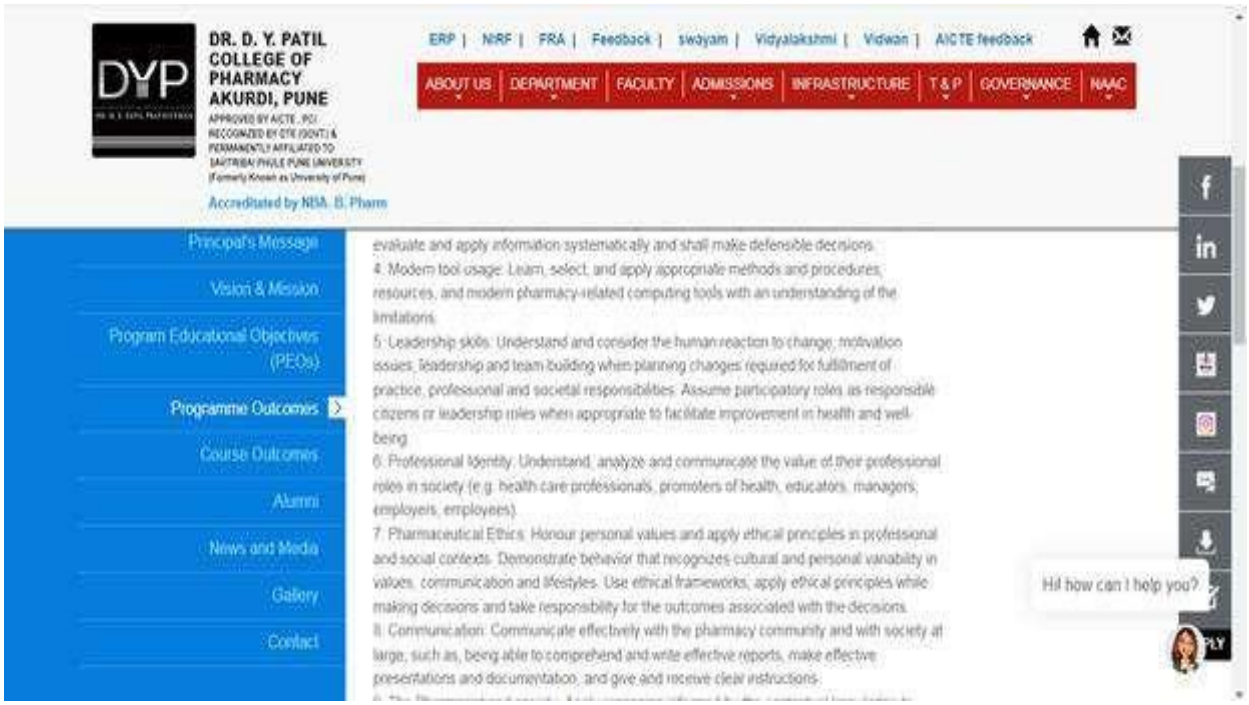
Ref. No. : DYPCOP/
Date :

Dissemination of Program Outcomes

Dissemination of Program Outcomes

1. College website:





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2. Journal:

Course outcomes of Pharmaceutical Analysis I

102.1 Elaborate scope, different techniques of Pharmaceutical analysis, different types of errors and limit tests.

102.2 Summarize concept of different types of volumetric titrations.

102.3 Explain principle, construction and applications of different types of electrochemical methods of analysis.

102.4 Analyze inorganic compounds by volumetric titration methods and electro-analytical methods.

102.5 Summarize preparation and standardization of primary and secondary standards.

102.6 Develop analytical skills.

Program Outcomes:

1)Pharmacy knowledge, 2)Planning ability, 3) Problem analysis, 4) Modern tool usage, 5) Leadership skills, 6) Professional Identity, 7) Pharmaceutical Ethics, 8) Communication 9) The Pharmacist and Society, 10) Environment and sustainability, 11) Life-Long learning.

Quality of Experiments

Sr. No.	Experiment Name	Course outcomes mapped	Program outcomes mapped
1	To prepare and standardize 0.1 M Sodium Hydroxide	CO1,CO2, CO4, CO5, CO6	PO1,PO2,PO3, PO5, PO6, PO7, PO8, PO9,PO10, PO11
2	To prepare and standardize 1 M Sodium Hydroxide.	CO1,CO2, CO4, CO5, CO6	PO1,PO2,PO3, PO5, PO6, PO7, PO8, PO9,PO10, PO11
3	To prepare and standardize 0.1 M sodium Thiosulphate solution	CO1,CO2, CO4, CO5, CO6	PO1,PO2,PO3, PO5, PO6, PO7, PO8, PO9, PO11
4	To prepare and standardize 0.02 M of Potassium Permanganate	CO1,CO2, CO4, CO5, CO6	PO1,PO2,PO3, PO5, PO6, PO7, PO8, PO9, PO11
5	To prepare and standardize 0.1 M of Ceric ammonium sulphate	CO1,CO2, CO4, CO5, CO6	PO1,PO2,PO3, PO5, PO6, PO7, PO8, PO11

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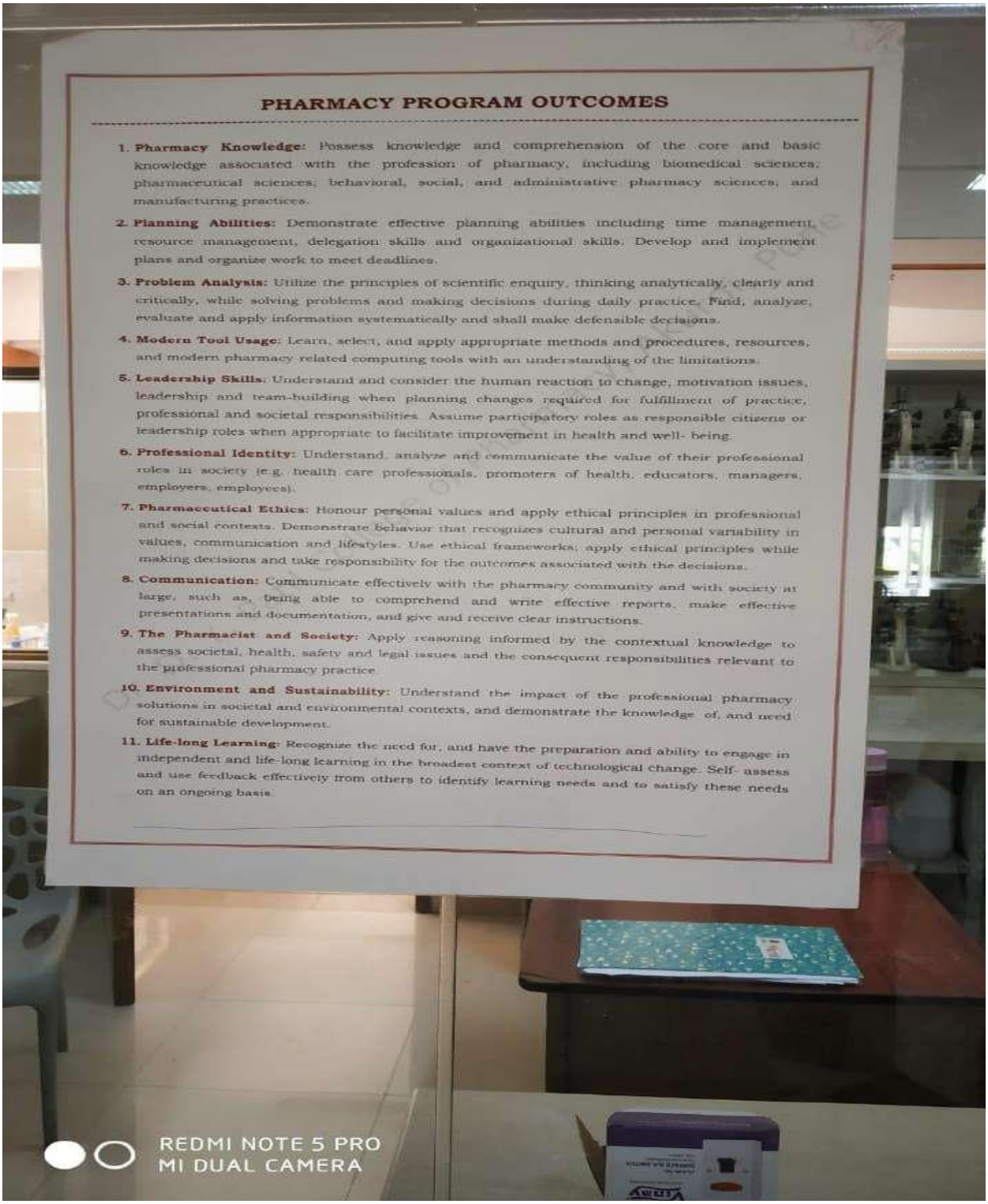
3. Laboratory:



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4. Corridor:

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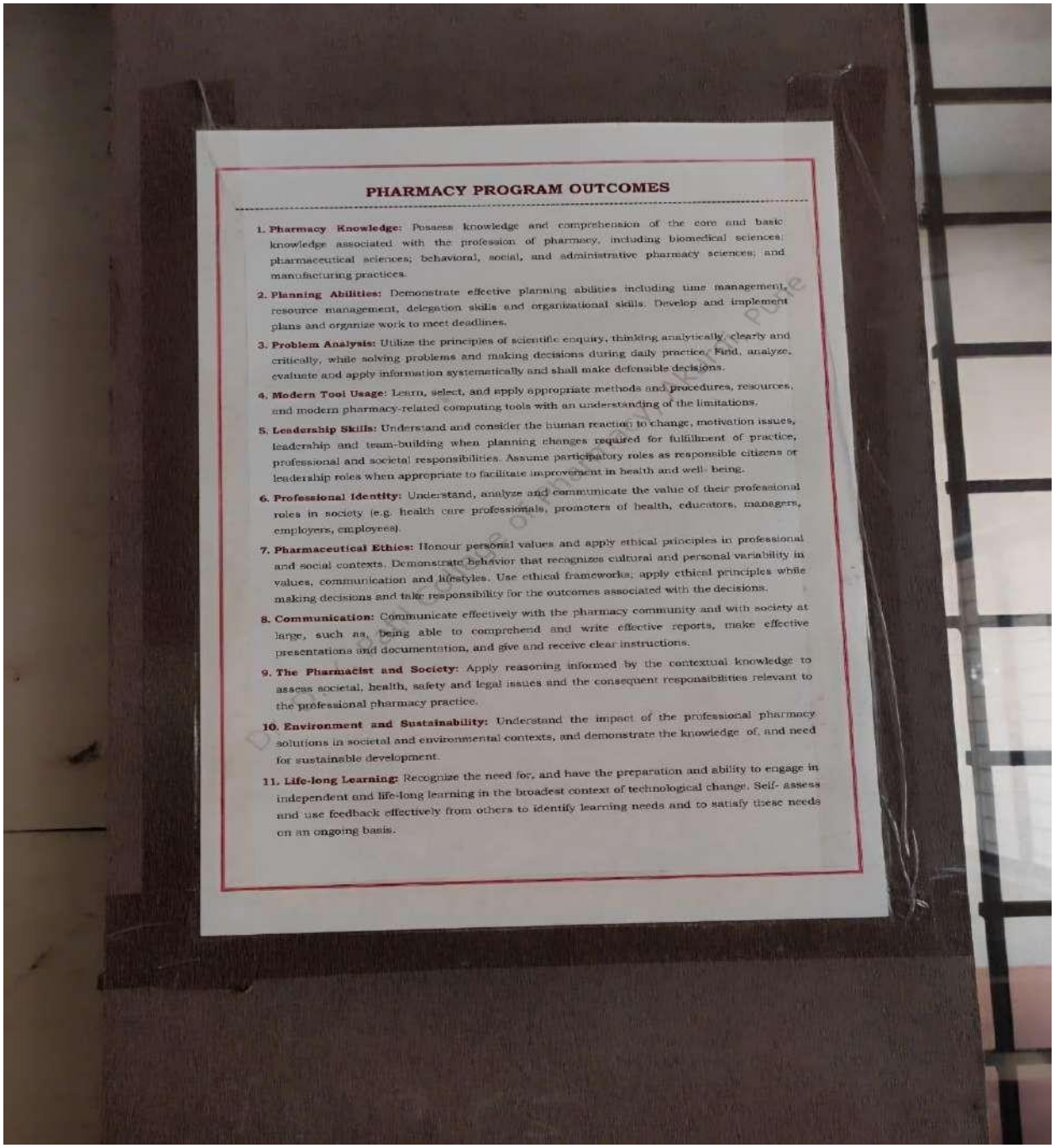
5. Class room



PHARMACY 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 well- being.
6. **Professional Identity:** Understand, analyze and communicate the value of their professional roles in society (e.g. health care professionals, promoters of health, educators, managers, employers, employees).
7. **Pharmaceutical Ethics:** Honour personal values and apply ethical principles in professional and social contexts. Demonstrate 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.

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President

Padmashree Dr. D. Y. Patil
Founder

Shri. Satej D. Patil
Vce-President & Chairman

Dr. N. S. Vyawahare
Principal

Sample copy of Question Paper Designed and mapped with Course outcomes and Programme outcomes

Dr. D. Y. Patil Pratishthan's
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Akurdi, Pune-44

2021-22

Theory/Practical: Theory

Subject: Industrial Pharmacy-I

Semester: V

No of hours planned : 45

Subject code: BP 502 T

Class: Third year

No of Hrs. assigned: 3Hrs/week

Department: Pharmaceutics

Course Objectives:

Upon completion of the course the student shall be able to

1. Illustrate various pharmaceutical dosage forms and their manufacturing techniques.
2. Describe various factors to be considered in development of pharmaceutical dosage forms
3. Formulate solid, liquid and semisolid dosage forms and evaluate them for their quality

Course Outcomes: (Theory)

BP502T (1) Discuss various concepts of preformulation.

BP502T (2) Elaborate formulation and evaluation of tablets, capsules and liquid orals using established procedures and technology with their defects and corrective approaches.

BP502T (3) Explain the concept, types, pharmacopoeial specifications, techniques and equipments used in tablet coating.

BP502T (4) Illustrate preformulation, formulation, and evaluation of parenteral and ophthalmic products.

BP502T (5) Estimate packaging materials for various pharmaceutical dosage forms.

BP502T (6) Discuss formulation of cosmetics such as lipsticks, shampoos, cold cream, vanishing cream, tooth pastes, hair dyes and sunscreens.

CO-PO Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	1	-	2	-	-	1	-	-	1	-	1
CO2	3	1	1	3	-	3	-	-	3	-	3
CO3	1	2	3	2	-	1	-	-	-	-	1
CO4	3	3	-	-	-	3	-	-	3	-	3
CO5	2	2	-	-	-	2	-	-	2	-	2
CO6	2	2	-	-	-	2	-	-	2	-	2
Avg	2	2	2	2.5	-	2	-	-	2.2	-	2

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Course Outcomes: (Practical)

BP506P (1) Design experiments showing influence of various additives on dosage form and stability studies.

BP506P (2) Formulate and evaluate tablets, capsules and liquid orals.

BP506P (3) Discuss pharmacopoeial specifications, techniques &equipments used in tablet coating.

BP506P (4) Evaluate formulated parenteral and ophthalmic products.

BP506P (5) Evaluate selected packaging materials for various pharmaceutical dosage forms.

BP506P (6) Formulate and evaluate various cosmetics products.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	1	1	-	-	1	1	-	1	1	-	1
CO2	3	3	-	-	3	3	-	3	3	-	3
CO3	1	1	-	-	1	1	-	1	1	-	1
CO4	3	3	-	-	3	3	-	3	3	-	3
CO5	1	1	-	-	1	1	-	1	1	-	1
CO6	1	1	-	-	1	1	-	1	1	-	1
Avg	1.67	1.67	-	-	1.67	1.67	-	1.67	1.67	-	1.667

SESSIONAL PAPER MAPPING

SESSIONAL 1

Q. NO.	Question	CO Mapped	BT level	PO Mapped
Q 1. SOLVE ANY 5 QUESTIONS				
1.	Justify the role of disintegrants in tablet and give two examples.	2	6	PO1, PO2, PO3, PO4, PO6, PO9, PO11
2.	Illustrate hydrates and solvates give examples?	1	4	PO1, PO3, PO6, PO9, PO11
3.	Justify the mechanism involved in Dry Granulation.	1	6	PO1, PO3, PO6, PO9, PO11
4.	Explain tablet troches and lozenges	2	6	PO1, PO2, PO3, PO4, PO6, PO9, PO11
5.	Explain the role of lubricants in tablets	2	6	PO1, PO2, PO3, PO4, PO6, PO9, PO11
6.	Justify chewable tablets	2	6	PO1, PO2, PO3, PO4, PO6, PO9, PO11
7.	Define granulation and their types.	2	1	PO1, PO2, PO3, PO4, PO6, PO9, PO11
Q 2. SOLVE ANY 2 QUESTIONS				
8.	Summarise the importance of partition co-efficient in the drug design with suitable examples.	1	6	PO1, PO3, PO6, PO9, PO11

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9.	Assess on dry granulation (roller compaction) technique and list out advantages and disadvantages	2	6	PO1, PO2, PO3, PO4, PO6, PO9, PO11
10.	Explain diluents and disintegrants used in tablet preparation	2	6	PO1, PO2, PO3, PO4, PO6, PO9, PO11
Q 2. SOLVE ANY 1 QUESTIONS				
11.	Explain different excipients and their functions used in the tablets	2	6	PO1, PO2, PO3, PO4, PO6, PO9, PO11
12.	Explain preformulation studies involved in development of tablet dosage forms	1	6	PO1, PO3, PO6, PO9, PO11

SESSIONAL II

Q. NO.	Question	CO Mapped	BT level	PO Mapped
Q 1. SOLVE ANY 5 QUESTIONS				
1.	Justify the role of additives in cosmetics	5	6	PO1, PO2, PO6, PO9, PO11
2.	Explain use of Parentrals	4	5	PO1, PO2, PO6, PO9, PO11
3.	Explain capsule	3	5	PO1, PO2, PO3, PO4, PO6, PO11
4.	Appraise the knowledge regarding hard gelatin capsule	3	6	PO1, PO2, PO3, PO4, PO6, PO11
5.	Justify the term bloom strength	3	6	PO1, PO2, PO3, PO4, PO6, PO11
6.	Summarise the soft gelatin capsule	3	6	PO1, PO2, PO3, PO4, PO6, PO11
7.	Predict the term packaging	6	6	PO1, PO2, PO6, PO9, PO11
Q 2. SOLVE ANY 2 QUESTIONS				
8.	Explain formulation of pallets	3	5	PO1, PO2, PO3, PO4, PO6, PO11
9.	Justify the packaging materials for pharmaceuticals	6	6	PO1, PO2, PO6, PO9, PO11
10.	Explain ophthalmic formulations	4	6	PO1, PO2, PO6, PO9, PO11
Q 2. SOLVE ANY 1 QUESTIONS				

11.	Explain formulation and building blocks of aerosols	5	5	PO1, PO2, PO6, PO9, PO11
12.	Summarise the sterilization process	4	6	PO1, PO2, PO6, PO9, PO11

ASSIGNMENT MAPPING

TERM PAPER

Q. NO.	Question	CO Mapped	BT level	PO Mapped
1.	Explain film coating of tablets	2	6	PO1, PO2, PO3, PO4, PO6, PO9, PO11
2.	Classify capsule filling machines.	3	6	PO1, PO2, PO6, PO9, PO11
3.	Evaluate granules	2	6	PO1, PO2, PO3, PO4, PO6, PO9, PO11
4.	Appraise the knowledge regarding dry granulation	2	6	PO1, PO2, PO3, PO4, PO6, PO9, PO11
5.	Justify the term cosmetics	5	6	PO1, PO2, PO6, PO9, PO11

OPEN BOOK TEST

Q. NO.	Question	CO Mapped	BT level	PO Mapped
1.	Draw a table of marketed formulations of vials used in parenteral with its formulation.	4	6	PO1, PO2, PO6, PO9, PO11
2.	Draw a labeled diagram of tablet punching machine	1	6	PO1, PO3, PO6, PO9, PO11
3.	Classify packaging material for pharmaceuticals	6	6	PO1, PO2, PO6, PO9, PO11

Ms. N. Kaushal
Subject Teacher

Dr. S. P. Chaudhari
HOD

Dr. S. P. Chaudhari
IQAC Coordinator

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2020-21

Theory/Practical: Theory

Subject code: MPC203T

Subject: Computer aided drug design

Class: First year M. Pharm

Semester: II

No of Hrs. assigned: 4 Hrs/week

No of hours planned : 60

Department: Pharmaceutical Chemistry

Course Objectives:

At completion of this course it is expected that students will be able to understand

- Role of CADD in drug discovery
- Different CADD techniques and their applications
- Various strategies to design and develop new drug like molecules.
- Working with molecular modeling software's to design new drug molecules
- The in silico virtual screening protocols

Course Outcomes: (Theory)

MPC203T (1) Predict and analyzed molecular properties of new molecules and explain various drug design methods.

MPC203T (2) Elaborate the concept of pharmacophore mapping and Virtual Screening.

MPC203T (3) Discuss the Molecular Modeling and Docking technique.

MPC203T (4) Assess the role of computer aided drug design in drug discovery.

MPC203T (5) Discuss history and development of QSAR.

MPC203T (6) Apply statistically QSAR based applications.

CO-PO Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	3	3	3	-	3	-	3	-	-	3
CO2	3	3	3	3	-	3	-	3	-	-	3
CO3	3	3	3	3	-	3	-	3	-	-	3
CO4	1	1	1	1	-	1	-	1	-	-	1
CO5	1	1	1	1	-	1	-	1	-	-	1
CO6	2	2	2	2	-	2	3	2	-	-	2
Avg	2.17	2.17	2.17	2.17	-	2.17	3.00	2.17	-	-	2.17

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SESSIONAL PAPER MAPPING

SESSIONAL 1

Q. NO.	Question	CO Mapped	BT level	PO Mapped
Q.1Answer the following (Any one) (10)				
a	Discuss various models used for predication of ADMET properties	1	6	PO1, PO2, PO3, PO4, PO6, PO8,PO11
b	Summarize the Pharmacophore mapping process and its applications	2	6	PO1, PO2, PO3, PO4, PO6, PO8,PO11
Q.2 Answer the followings (Any two) (10)				
a	Elaborate the concept of De novo drug design and it's application.	1	6	PO1, PO2, PO3, PO4, PO6, PO8,PO11
b	Discuss methods used for conformational search used in Pharmacophore mapping	2	6	PO1, PO2, PO3, PO4, PO6, PO8,PO11
c	Explain in detail Fragment based drug design	1	6	PO1, PO2, PO3, PO4, PO6, PO8,PO11
Q.3 Write short note on (Any two) (10)				
a	Discuss importance of ADMET study in drug design.	1	6	PO1, PO2, PO3, PO4, PO6, PO8,PO11
b	Differentiate between LUDI and SPROUT technique.	2	4	PO1, PO2, PO3, PO4, PO6, PO8,PO11
c	Elaborate on Homology modelling	1	6	PO1, PO2, PO3, PO4, PO6, PO8,PO11

SESSIONAL II

Q. NO.	Question	CO Mapped	BT level	PO Mapped
Q.1Answer the following (Any one) (10)				
a	Elaborate on QSAR. Explain Hansch analysis and its applications in drug design.	6	6	PO1, PO2, PO3, PO4, PO6, PO7, PO8,PO11
b	Explain the methodology and applications of molecular docking in drug design.	3	6	PO1, PO2, PO3, PO4, PO6, PO8,PO11
Q.2 Answer the followings (Any two) (10)				
a	Discuss various methods of energy minimization.	3	6	PO1, PO2, PO3, PO4, PO6, PO8,PO11
b	Estimate the role of Quantum mechanics in drug design.	3	6	PO1, PO2, PO3, PO4, PO6, PO8,PO11
c	Argue on steric features of the drug molecule are important in QSAR study.	5	6	PO1, PO2, PO3, PO4, PO6, PO8,PO11
Q.3 Write short note on (Any two) (10)				

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a	Explain in detail about drugs acting on HMG CoA reductase with suitable example.	2	6	PO1, PO2, PO3, PO4, PO6, PO8,PO11
b	Elaborate on Free Wilson Analysis	6	6	PO1, PO2, PO3, PO4, PO6, PO7, PO8,PO11
c	Discuss in detail about various parameters used in QSAR	5	6	PO1, PO2, PO3, PO4, PO6, PO8,PO11

ASSIGNMENT MAPPING

PRESENTATION

Q. NO.	Question	CO Mapped	BT level	PO Mapped
1	Agents acting on enzymes such as DHFR	2	6	PO1, PO2, PO3, PO4, PO6, PO8,PO11
2	Agents acting on enzymes such as HMG–CoA reductase	3	6	PO1, PO2, PO3, PO4, PO6, PO8,PO11
3	Agents acting on enzymes such as HIV protease	2	6	PO1, PO2, PO3, PO4, PO6, PO8,PO11
4	Agents acting on enzymes such as choline esterase (AchE)	2	6	PO1, PO2, PO3, PO4, PO6, PO8,PO11
5	Agents acting on enzymes such as choline esterase (BchE)	2	6	PO1, PO2, PO3, PO4, PO6, PO8,PO11

CASE STUDY

Q. NO.	Question	CO Mapped	BT level	PO Mapped
1	Assess the role of computer aided drug design in drug discovery	4	6	PO1, PO2, PO3, PO4, PO6, PO8,PO11

Dr. S. C. Daswadkar
Subject Teacher

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