## PROGRAMME OUTCOMES

| S. No. | Outcome | Description |
|---|---|---|
| 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** | Honor personal values and apply ethical principles in professional and social contexts. Demonstrate behavior that recognizes cultural and personal |



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| | | 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 dependent and life-long learning in the broadest context of technological change |

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**Course outcome of B. Pharmacy course**

**Semester-1**

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| **BP101T** | Human Anatomy and Physiology I– Theory | **CO1.To impart fundamental knowledge on human body**<br>**CO 2. Classify and identify principal hormones and their function.**<br>**CO 3.To know functions of the various systems**<br>**CO 4.To Physiology of the human body.**<br>**CO5. Apply concepts of nervous systems and its coordination.** |
| **BP102T** | Pharmaceutical Analysis I – Theory | **CO1.To Understand terms of pharmaceutical analysis**<br>**CO2.To know the principles of analysis**<br>**CO3. To perform volumetric analysis**<br>**CO4. To do electro chemical analysis.**<br>**CO5. Construct the fundamental methodology to prepare different s of solutions.** |
| **BP103T** | Pharmaceutics I – Theory | **CO1.To study Fundamentals of Pharmaceutics**<br>**CO2. Knowledge with arts of pharmaceutics.**<br>**CO3.Science of preparing dosage forms**<br>**CO4. Differentiation of dosage forms.**<br>**CO5. Explain where pharmaceutical additives are used and classify t** |
| **BP104T** | Pharmaceutical Inorganic Chemistry – Theory | **CO1.To know the sources of materials**<br>**CO2. Understand methods to determine the purity of drugs**<br>**CO3.Finding impurities in inorganic drugs**<br>**CO4. To know standards of pharmaceuticals**<br>**CO5. Evaluate activity and properties of radiopharmaceuticals** |
| **BP105T** | Communication skills – Theory * | **CO1.To prepare the young pharmacy student effectively**<br>**CO2.To interact effectively with doctors,**<br>**CO3.To interact nurses, dentists, physiotherapists and**<br>**CO4. To interact effectively other health workers** |
| **BP106T** | Remedial Biology/ Remedial Mathematics – Theory* | **CO1.To learn Biology/Maths**<br>**CO2.To understand the components of living world,**<br>**CO3. To know structure and functionalsystem of plant and**<br>**CO4. To learn animal kingdom.** |
| **BP107P** | Human Anatomy and Physiology – Practical | **CO1.To impart fundamental knowledge on human body**<br>**CO2. The human body structure**<br>**CO3. functions of the various systems**<br>**CO4.Physiology of the human body.** |



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| **BP108P** | Pharmaceutical Analysis I – Practical | **CO1.Understand terms of analysis**<br>**CO2.To know the principles of analysis**<br>**CO3. To perform volumetric analysis**<br>**CO4. Electro chemical analysis.** |
| **BP109P** | Pharmaceutics I – Practical | **CO 1.Fundamentals of Pharmaceutics**<br>**CO 2. Knowledge with arts of pharmaceutics.**<br>**CO 3.Science of preparing dosage forms**<br>**CO 4. Differentiation of dosage forms.** |
| **BP110P** | Pharmaceutical Inorganic Chemistry – Practical | **CO 1.To know the sources of materials**<br>**CO 2. Understand methods to determine them**<br>**CO 3.Finding impurities in inorganic drugs and**<br>**CO 4. To know standards of pharmaceuticals** |
| **BP111P** | Communication skills – Practical* | **CO 1.To prepare the young pharmacy student effectively**<br>**CO 2.To interact effectively with doctors,**<br>**CO 3.To interact nurses, dentists, physiotherapists and**<br>**CO 4. To interact effectively other health workers** |
| **BP112R BP** | **Remedial Biology – Practical*** | **CO 1.To learn Biology/Maths**<br>**CO 2.To understand the components of living world,**<br>**CO 3. To know structure and functionalsystem of plant and**<br>**CO 4. To learn animal kingdom.** |

**Semester 2**

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| **BP201T** | Human Anatomy and Physiology II – Theory | **CO 1.To impart fundamental knowledge on human body**<br>**CO 2.To know the the human body structure**<br>**CO 3.To study the functions of the various systems**<br>**CO 4.Physiology of the human body.**<br>**CO5. List the major components of blood plasma and describe functions of each** |
| **BP202T** | Pharmaceutical Organic Chemistry I – Theory | **CO 1.To know the Classification of materials**<br>**CO 2. Understand nomenclatures**<br>**CO 3.Finding simple organic compounds drugs and**<br>**CO 4. To know intermediates forming in reaction of pharmaceuticals**<br>**CO5. Discuss the orientation, reactivity and stability of organic compounds** |
| **BP203T** | Biochemistry – Theory | **CO 1. To find chemical facts**<br>**CO 2.To know principles to understand metabolism** |



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| | | **CO 3.To apply role of nutrient molecules in physiology**<br>**CO 4.To know different pathological conditions.**<br>**CO5:Determine the energetic of various metabolic pathways lik glycolysis, ETC, Krebs cycle, β-oxidation of fatty acids etc.** |
| **BP204T** | Pathophysiology – Theory | **CO1.To get knowledge required to practice medicine safel**<br>**CO2. To develop confidently on medicine use,**<br>**CO 3. To find medicine rationale**<br>**CO 4. To apply medicine effectively**<br>**CO5. To know the diseases related to cardiovascular, respirat and renal system.** |
| **BP205T** | Computer Applications in Pharmacy – Theory * | **CO 1. To know Introduction of Database,**<br>**CO 2. To manage Database system,**<br>**CO 3. To apply computer in clinical studies and**<br>**CO 4.To Use of databases** |
| **BP206T** | Environmental sciences – Theory * | **CO1. To study of physical characters**<br>**CO 2. To study biological of the environment**<br>**CO 3.To study the social and cultural factors and**<br>**CO 4. To understand the impact of man on environment.** |
| **BP207P** | Human Anatomy and Physiology II –Practical | **CO 1.To impart fundamental knowledge on human body**<br>**CO 2. The human body structure**<br>**CO 3.To know functions of the various systems**<br>**CO 4.Physiology of the human body.** |
| **BP208P** | Pharmaceutical Organic Chemistry I– Practical | **CO 1.To know the Classification of materials**<br>**CO 2. Understand nomenclatures to determine them**<br>**CO 3.Finding simple organic compounds drugs and**<br>**CO 4. To know intermediates forming in reactions, of pharmaceuticals** |
| **BP209P** | Biochemistry – Practical | **CO 1. To find chemical facts**<br>**CO 2.To know principles to understand metabolism**<br>**CO 3.To apply role of nutrient molecules in physiology**<br>**CO 4.To know the different pathological conditions.** |
| **BP210P** | **Computer Applications in Pharmacy – Practical*** | **CO 1. know Introduction of Database**<br>**CO 2. To manage Database system**<br>**CO3.To know the computer in clinical studies and**<br>**CO 4. Use of databases** |



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**Semester 3**

| Course Code | Name of the course | Out come |
|---|---|---|
| BP301T | Pharmaceutical Organic Chemistry II – Theory | CO 1.To know the and the type of isomerism of the organic compour<br>CO 2. Understand nomenclatures structure<br>CO 3. To know reactions and Chemistry of oils<br>CO 4. To know reactions and Chemistry of fats |
| BP302T | Physical Pharmaceutics I – Theory | CO 1.To know Various physical properties and<br>CO 2.To know physicochemical properties, and<br>CO 3. To understand principles,<br>CO 4.To apply various areas of formulation research and development. |
| BP303T | Pharmaceutical Microbiology – Theory | CO1. To classify microorganisms<br>CO2. To understand alcohol production<br>CO3. Evaluate microbial spoilage of pharmaceutical products and apply ce cultures in pharmaceutical Industry<br>CO4. To understand the production of vitamins and enzymes<br>CO5. To know about vaccines and antibiotics production |
| BP304T | Pharmaceutical Engineering – Theory | CO 1.The art of unit operations and<br>CO 2. scienceof various unit operations<br>CO 3. Applications in pharmaceutical industry,<br>CO 4.significance of plant lay out design for optimumuse of resources.<br>CO5. Demonstrate the principles and applications of unit operations like drying, mixing filtration and centrifugation. |
| BP305P | Pharmaceutical Organic Chemistry II – Practical | CO 1. General methods of preparation and reactions of some organic compounds reactivity/stability of compounds<br>CO 2. Understand nomenclatures structure<br>CO 3. To know reactions and Chemistry of oils<br>CO 4. To know reactions and Chemistry of fats |
| BP306P | Physical Pharmaceutics I – Practical | CO 1.To know Principles of chemical kinetics<br>CO 2. To use them for stability testing<br>CO 3.To know expiry date of formulations<br>CO 4.To find physico-chemical properties |
| BP307P | Pharmaceutical Microbiology – Practical | CO 1.Knowing the Staining methods- Simple, Grams staining and acid-fast staining<br>CO 2 . sterlization inpharmaceutical processing and industry,<br>To find with Microbiological assay of antibiotics by cup plate methoc<br>CO 3.Understand the cell culture technology<br>CO 4. applications in pharmaceuticalindustries |



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| BP 308P | Pharmaceutical Engineering –Practical | CO 1.The art of unit operations and<br>CO 2. science of various unit operations<br>CO 3. Applications in pharmaceutical industry,<br>CO 4.significance of plant lay out design for optimum use of resources. |

**Semester 4**

| Course Code | Name of the course | Out come |
|---|---|---|
| BP401T | Pharmaceutical Organic Chemistry III– Theory | CO 1.To imparts knowledge on stereo-chemical aspects of organic compounds and<br>CO 2.To find organic reactions,<br>CO 3. To learn important named reactions<br>CO 4. To know chemistry of important hetero cyclic compounds.<br>CO5. Compare the reactivity and properties of heterocyclic compounds with uses. |
| BP402T | Medicinal Chemistry I – Theory | CO 1.To learn medicines structure,<br>CO 2. To know medicines chemistry and<br>CO 3.To understand therapeutic value of drugs.<br>CO 4. To find QSAR<br>CO5. Explain the mechanism of action of various category of drugs |
| BP403T | Physical Pharmaceutics II – Theory | CO 1. To know the use of physicochemical properties<br>CO 2. To design the formulation<br>CO 3. To develop dosage forms<br>CO 4. To evaluate dosage forms<br>CO5. Determine the nature of flow of liquids and their measurement |
| BP404T | Pharmacology I – Theory | CO1.To know what drug do to the living organisms and<br>CO 2. To find how their effects can be applied to therapeutics.<br>CO 3. To understand pharmacological actions<br>CO 4. To differentiate various categories of drugs<br>CO5. Understands pharmacology of anti-psychotics, anti-depressants, anti-maniacs, hallucinogens, anti-epileptic and anti-parkinsonian drugs |
| BP405T | Pharmacognosy and Phytochemistry I– Theory | CO 1.To know pharmacognosy scope,<br>CO 2. To classify crude drugs,<br>CO3. To find phytochemicals present in them<br>CO 4. To understand their medicinal properties.<br>CO5. Study of primary metabolites from natural sources |



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| BP406P | Medicinal Chemistry I – Practical | CO 1.To learn medicines structure,<br>CO 2. To know medicines chemistry and<br>CO 3.To understand therapeutic value of drugs.<br>CO 4. To find QSAR. |
| BP407P | Physical Pharmaceutics II – Practical | CO 1To know the use of physicochemical properties<br>CO 2To design the formulation<br>CO 3. To develope of dosage forms<br>CO 4 To evaluate dosage forms |
| BP408P | Pharmacology I – Practical | CO1. To know what drugs will do to the living organisms and<br>CO 2.To find how their effects can be applied to therapeutics.<br>CO 3.To understand pharmacological actions<br>CO 4.To differentiate various categories of drugs. |
| BP409P | Pharmacognosy and Phytochemistry I – Practical | CO 1.To know pharmacognosy scope<br>CO 2. To classify crude drugs<br>CO 3. To find phytochemicals present in plants<br>CO 4. To understand their properties. |

**Semester 5**

| Course Code | Name of the course | Out come |
|---|---|---|
| BP501T | Medicinal Chemistry II – Theory | CO 1.To know Chemistry of drugs with respect<br>CO 2. To find their pharmacological activity<br>CO 3.To understand drug metabolic pathways, adverse effect<br>CO 4. To utilize therapeutic value of drugs<br>CO5. Examine the chemical synthesis of various drugs. |
| BP502T | Industrial PharmacyI– Theory | CO 1.To know various principle of manufacturing<br>CO 2.To understand the considerations of variables<br>CO 3.To develop of methods of preparations<br>CO 4.To manufacture pharmaceutical dosage forms<br>CO5. To evaluate dosage forms |
| BP503T | Pharmacology II – Theory | CO 1.To Classify drugs,<br>CO 2. To know mechanism of action, therapeutic effects<br>CO 3.To use medicines clinically,<br>CO 4.To learn side effects and contraindications of drugs acting on different systems of body<br>CO5. Outline Concept of Autacoids- various types of autacoids |
| BP504T | Pharmacognosy and Phytochemistry II– Theory | CO 1.To get Knowledge of secondary metabolites<br>CO 2.To learn how metabolites are produced in the crude drugs, |



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| | | CO 3. To understand how to isolate secondary metabolites and<br>CO 4. To identify them industrially.<br>CO5. Define Alkaloids and glycosides with extraction procedure |
| BP505T | Pharmaceutical Jurisprudence – Theory | CO 1.To Know Pharmaceutical Legislations<br>CO 2. Their Implications in The Development<br>CO3 Marketing Of Pharmaceuticals<br>CO 4. To learn the legal procedures |
| BP506P | Industrial Pharmacy I – Practical | CO 1.To know various principle of manufacturing<br>CO 2.To understand the considerations of variables<br>CO 3.To develop of methods<br>CO 4.To manufacture pharmaceutical dosage forms |
| BP507P | Pharmacology II – Practical | CO 1To isolate different organs/<br>CO 2To isolate tissues from the laboratory animals<br>CO3.various receptor actions on organs<br>CO4.To learn simulated experiments |
| BP508P | Pharmacognosy and Phytochemistry II – Practical | CO 1 To know the modern extraction techniques,<br>CO 2 To learn characterization of crude drugs<br>CO 3 To understand identification of the herbal drugs<br>CO 4 To determine phytochemicals. |



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**Semester 6**

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| BP601T | Medicinal Chemistry III – Theory | CO 1.To study Chemistry of drugs,<br>CO 2.To learn mechanism of action, metabolism, adverse effects, Structure Activity Relationships,<br>CO3. To understand Pro-drug concept, combinatorial chemistry a<br>CO 4. To apply Computer aided drug design<br>CO5. Apply the knowledge of chemistry for synthesis of new compounds |
| BP602T | Pharmacology III – Theory | CO 1.To learn Mechanism of drug action and<br>CO 2. To know its relevance in the treatment<br>CO 3. To undersand infectious diseases<br>CO 4.To apply clinically<br>CO5. |
| BP603T | Herbal Drug Technology – Theory | CO 1.To understand herbal drug industry<br>CO 2. To identify the quality of raw material<br>CO 3. To know guidelines for quality of herbal drugs,<br>CO 4. To apply herbal cosmetics, natural sweeteners, nutraceutical<br>CO5. Analysis of herbal drugs from recent Pharmacopoeias |
| BP604T | Bio-pharmaceutics and Pharmacokinetics – Theory | CO 1.To develop Skills of Bio-pharmaceutics<br>CO 2. To learn pharmacokinetics and their applications in pharmaceutical development<br>CO 3. To design of dose and dosage regimen<br>CO 4. To analyze in solving the problems arise.<br>CO5. Correlate *In-vitro – In-vivo* absorption studies of various dosage forms |
| BP605T | Pharmaceutical Biotechnology – Theory | CO 1. To learn the Use of microorganisms in fermentation technology<br>CO 2. To understand biological revolutions in diagnosis, |



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| | | CO3 . To know prevention adcure of diseases,<br>CO 4. To develop new and cheaper pharmaceutical drugs<br>CO5. Infer blood and related products and define surgical |
| BP606T | Quality Assurance – Theory | CO 1. To study cGMP aspects<br>CO 2 .To apply cGMP in a pharmaceutical industry<br>CO 3 .To learn responsibilities of QA &<br>CO 4. To know responsibilities QC departments |
| BP607P | Medicinal chemistry III – Practical | CO 1.To know the importance of drug design<br>CO 2.To understand and different techniques of drugdesign.<br>CO 3.To learn chemistry of drugs<br>CO 4.To analyze their biological activity |
| BP608P | Pharmacology III – Practical | CO 1To know the principles of toxicology and<br>CO 2. To learn treatment of various poisoning<br>CO 3.To appreciate correlation of pharmacology with<br>CO 4.To relate pharmacology with medical sciences |
| BP609P | Herbal Drug Technology – Practical | CO 1.To know Raw material as source of herbal drugs from<br>CO 2 . To study cultivation to herbal drug prdt<br>CO 3. To learn WHO ICH guidelines<br>CO 4. To analyze evaluation of herbal drugs |



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**Semester 7**

| Course Code | Name of the course | Out come |
|---|---|---|
| BP701T | Instrumental Methods of Analysis – Theory | CO 1. To learn the principles of analysis methods<br>CO 2. To understand instrumentation<br>CO 3. To practice spectroscopic technique<br>CO 4. To Utilize chromatographic technique<br>CO5. To analyze medicines quality |
| BP702T | Industrial Pharmacy-II Theory | CO 1.To develop pharmaceuticalproduct<br>CO 2.To Understand innovate translation from laboratory to market<br>CO 3. To know Laws and Acts of industries<br>CO 4.To learn the regulations of pharmaceutical industry<br>CO5.To understand MOU |
| BP703T | Pharmacy Practice – Theory | CO 1.To learn Drug distribution<br>CO 2. To know drug information<br>CO 3.To practice therapeutic drug monitoring<br>CO 4.To utilize for improved patient care<br>CO5.To practice patient counseling |
| BP704T | Novel Drug Delivery System – Theory | CO 1To understand Criteria for selection of drugs<br>CO 2. To get knowledge of polymers<br>CO 3. To developNovel drug delivery systems,<br>CO 4.To know formulation and evaluation<br>CO5. Apply the mechanisms in developing various alginate beads |
| BP705P | Instrumental Methods of Analysis – Practical | CO 1. To learn the principles of analysis methods<br>CO 2. To understand instrumentation of<br>CO 3. To practice spectroscopic technique<br>CO 4. To Utilize chromatographic technique |



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**Semester 8**

| Course Code | Name of the course | Out come |
|---|---|---|
| BP801T | Biostatistics and Research Methodology | CO 1.To learn Design of Experiments<br>CO 2.To study Phases of Clinical trials and Observational and Experimental studies,<br>CO 3.To understand SPSS, R and MINITAB statistical software's,<br>CO 4.To determine analyzing the statistical data using Excel<br>CO5. To interpret results |
| BP802T | Social and Preventive Pharmacy | CO 1.To Acquire high consciousness<br>CO 2. To understand real current issues related to health<br>CO 3. To know problems within the country<br>CO 4. To get aware of worldwide problems in pharma<br>CO5.Practice of quality health |
| BP803ET | Pharma Marketing Management | CO 1.To study WHO guidelines for<br>CO 2.To determine quality control of herbal drugs<br>CO 3.To understand the regulatory approval process and their registration in Indian and international markets.<br>CO 4. To find preclinical studies inexperimental animals including design, conduct and interpretations of results |
| BP804ET | Pharmaceutical Regulatory Science | |
| BP805ET | Pharmacovigilance | |
| BP806ET | **Quality Control and Standardization ofHerbals** | |
| **BP810ET** | **Experimental Pharmacology** | |



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## COURSE OUTCME OF PHARM. D

| No | Name of the Course | Course Outcome |
|---|---|---|
| 1. | 1.1 Human Anatomy and Physiology | CO1: Can describe the structure and functions of various organs of the human body.<br>CO2: Able to describe the homeostatic mechanisms and their imbalances of various systems.<br>CO3: Can identify tissues and organs of the different systems of the human body.<br>CO4: Acquired knowledge of anatomy and physiological role of various systems in human body.<br>CO5: Appreciate coordinated working pattern & interlinked mechanisms in the maintenance of normal functioning (homeostasis) of human body. |
| 2. | 1.1 Human Anatomy and Physiology (Practical) | CO1:Capable of carrying out haematological experiments.<br>CO2:Can determine blood pressure using sphygmomanometer.<br>CO3:Demonstrate practical knowledge of human gross and microscopic anatomy using prepared histological slides, organ models. |
| 3. | 1.2 Pharmaceutics | CO1: Have fundamental knowledge in preparing & dispensing various dosage forms.<br>CO2: Know the history of profession of pharmacy.<br>CO3: Know the professional way of handling the prescription.<br>CO4: aware of their professional role in the healthcare system.<br>CO5: Have the basics of pharmaceutical incompatibilities and calculations involved in prescribing dose. |
| 4. | 1.2 Pharmaceutics (Practical) | CO1:Able to prepare & dispense solid, liquid, semisolid dosage form.<br>CO2:Able to differentiate labelling and container requirements for pharmaceutical products.<br>CO3:Can analysis the incompatibility problems present in the prescription. |
| 5. | 1.3 Medicinal Biochemistry | CO 1: Know the basic concepts of cell and metabolic process in healthy and illness conditions<br>CO 2: Can describe activity of enzymes, isoenzymes and |

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| | | importance of enzyme inhibitors.<br>CO 3: Acquired knowledge of genetic organization of mammalian genome<br>CO 4: Know the biochemichemistry of specific organ function tests.<br>CO 5: Know the qualitative analysis and determination of biomolecules in the body fluids. |
| 6. | 1.3 Medicinal Biochemistry (Practical) | CO1: Able to perform qualitatively analyze normal and abnormal constituents of urine.<br>CO2: Able to estimate various biomolecules, SGOT and SGPT in serum.<br>CO3 Able to prepare different buffers and its pH measurement. |
| 7. | 1.4 Pharmaceutical Organic Chemistry | CO 1: Can give IUPAC names of simple hydrocarbons.<br>CO 2: Acquired understanding of the physical properties of organic compounds.<br>CO 3: Acquire the knowledge of preparation and reactions of various clauses of organis compound.<br>CO 4: Can explain important name reactions with mechanisms and applications.<br>CO 5: Know the methods of preparation, qualitative and quantitative analysis of medicinal organic compounds. |
| 8. | 1.4 Pharmaceutical Organic Chemistry (Practical) | CO1: Able to synthesize organic compounds by benzoylation, condensation, diazotization, nitration etc.<br>CO2: Able to identify organic compounds through systematic analysis<br>CO3 Able to make stereo models of simple organic compounds and evaluate stereochemical aspects. |
| 9. | 1.5 Pharmaceutical Inorganic Chemistry | CO1: Can explain the sources of impurities in inorganic pharmaceuticals.<br>CO2: Acquired knowledge on theoretical aspects of volumetric analysis.<br>CO3: Acquired knowledge of limit test<br>CO4: Explain the methods of preparation, assay, properties, medicinal uses of medicinal gases inorganic pharmaceuticals, pharmaceutical aids and |

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| | | miscellaneous compounds.<br>CO5: Describe the properties, storage condition and application of radiopharmaceuticals. |
| 10. | 1.5 Pharmaceutical Inorganic Chemistry (Practical) | CO1: Able to perform the identification tests and preparation of inorganic compounds.<br>CO2: Able to perform the limit tests and purity test for inorganic pharmaceuticals in a QC lab.<br>CO3 Able to perform estimations of inorganic compounds |
| 11. | 1.6 Remedial Mathematics | CO 1: Can apply mathematical concepts and principles to perform computations for Pharmaceutical Sciences.<br>CO 2: Able to create, use and analyze mathematical representations by applying mathematical theory<br>CO 3: Know trigonometry, analytical geometry, matrices, determinant, integration differential equation, Laplace transform & their applications.<br>CO 4: Perform abstract mathematical reasoning<br>CO 5: Obtained knowledge of mathematical relationships |
| | 1.6 Remedial biology | CO 1: Acquired basic knowledge of nature of Plant cell and Animal cell<br>CO 2: Able to Classify Plants & Animals<br>CO 3: Know the basic components of anatomy & physiology of plant and animals<br>CO 4: Obtained knowledge Various tissue and organ in plant and animals<br>CO 5: Aware of various naturally occurring drugs & its history |
| 12. | 1.6: Remedial biology (Practical) | CO1: Able to identify different plants using their morphological characteristics.<br>CO2: Can do evaluation of different plants using anatomical methods.<br>CO3: Able to prepare permanent slides for different samples of seeds, stems, roots and barks. |
| 13. | 2.1 Pathophysiology | CO1: Acquired thorough knowledge of pathology of various conditions with reference to its pharmacological applications.<br>CO2: Have understanding of basic Pathophysiological mechanisms. |

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| | | CO3: Able to describes the etiology and pathogenesis of the selected disease states<br>CO4: Can describe the signs and symptoms of the diseases<br>CO5: Aware of complications of the diseases. |
| 14. | 2.2 Pharmaceutical Microbiology | CO1: Able to explain the anatomy, identification, growth factors of microorganisms<br>CO2: Aware of different methods of sterilization process in pharmaceutical microbiology Lab<br>CO3: Obtained knowledge on diagnostic tests for Identification of infectious diseases<br>CO4: Possess the understanding of determining drug potency by microbiological assay method<br>CO5: Have knowledge on concepts of and types of immunity and antigen -antibody reactions. |
| 15. | 2.2 Pharmaceutical Microbiology (Practical) | CO 1: Able to identify different types of microorganisms by using staining techniques and biochemical test<br>CO 2: Able to prepare various culture medium for cultivation of microorganisms and to determine the drug potency by microbiological assay technique<br>CO 3: Able to perform sterilization, maintain the aseptic condition and able to do the sterility test for different pharmaceutical dosage forms |
| 16. | 2.3 Pharmacognosy & Phytopharmaceuticals | CO1: Able to classify crude drugs obtained from natural origin by various approches.<br>CO2: Obtained theoretical knowledge of cultivation, collection and processing techniques, factors affecting growth of plant drugs.<br>CO3: Possess awareness about adulterants used in herbal products and methods to determine adulterants.<br>CO4: Possess knowledge about different herbal remedies belonging to carbohydrates, lipids, proteins, volatile oil, alkaloids and glycosides.<br>CO5: Obtained knowledge about herbal source for pesticides and surgical dressings. |
| 17. | 2.3 Pharmacognosy & Phytopharmaceuticals (Practical) | CO 1: Able to perform crude dug evaluation through morphological and microscopical methods.<br>CO 2: Able to analyze of oils and fats available in the market and assess their quality.<br>CO 3: Able to identify plant products through chemical |

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| | | test. |
| 18. | 2.4 Pharmacology I | CO 1: Possess broad knowledge on classification, Pharmacological aspects, adverse effects, Therapeutic uses of different drug categories.<br>CO 2: Can apply the knowledge therapeutically in deciding dose, route of administration, precautions, and contraindications.<br>CO 3: Understood the pharmacological aspects of drugs used to treat ailment of different organ systems of the body.<br>CO 4: Konow the procedures to handle & carry out animal experiments.<br>CO5: Appreciate the importance of pharmacology subject as a basis of therapeutics. |
| 19. | 2.5 Community Pharmacy | C O 1: Able to provide pharmaceutical care services<br>C O 2: Know the business and professional practice management skills in community pharmacies<br>C O 3: Learnt to show empathy and provide patient counseling and health screening services to the community<br>C O 4: Able to manage to minor ailments and provide appropriate OTC medication<br>C O 5: Able to provide rational drug therapy to the patient |
| 20. | 2.6 Pharmacotherapeutics I | CO1: Able to identify the abnormal physiology and pathogenesis of diseases.<br>CO2: Able to interpret the data from diagnostic tools.<br>CO3: Able to diagnose the disease by monitoring the clinical manifestations of the patient and suggest individualized therapy.<br>CO4: Able to provide rational drug therapy to the patient<br>CO5: Capable to suggest the treatment options for special populations like pediatric, geriatric, breast feeding & pregnant. |
| 21. | 2.6 Pharmaco-therapeutics I (Practical) | CO 1: Can use therapeutic approach for the management of diseases<br>CO 2: Know the controversies in drug<br>CO 3: Able to identify the needed interventions from the prescription. |

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| 22. | 3.1 Pharmacology II | CO1: Possess in depth knowledge of pharmacological aspects of drugs.<br>CO2: Possess knowledge on the procedure to carry out animal experiments.<br>CO3: Able to correlate pharmacology and therapeutics to provide better pharmaceutical care.<br>CO4: Posses in depth knowledge on cell, macromolecules, cell signaling, DNA replication and cell cycle.<br>CO5: Appreciate the importance of gene and its structure, genome, gene expression, recombinant and DNA technology. |
| 23. | 3.1 Pharmacology II (Practical) | CO 1: Able to perform Pharmacological effect of drugs on tissue preparations.<br>CO 2: Able to perform the dosage calculations of drug.<br>CO 3: Able to perform animal experiments by using isolated organs. |
| 24. | 3.2 Pharmaceutical Analysis II | CO1: Aware of basic concepts of quality assurance<br>CO2: Obtained basic knowledge on spectroscopic, chromatographic and , electrometric methods of analysis.<br>CO3: Acquired knowledge on the basic concept, instrumentation and application of sensitive instrumental analysis<br>CO4: Perform quantitative & qualitative analysis of drugs using various analytical instruments<br>CO5: Can perform mathematical treatment of analytical data in quantitative analysis |
| 25. | 3.2 Pharmaceutical Analysis II (Practical) | CO 1: Able to perform quantitative & qualitative analysis of drugs using various analytical instruments.<br>CO 2: Able to operate different analytical equipments.<br>CO 3: Apply the concepts of quality assurance and evaluation of analytical standards. |
| 26. | 3.3 Pharmacotherapeutics II | CO1: Able to understand different causes of diseases.<br>CO2: Able to identify the abnormal physiology of individual with specific disease states.<br>CO3: Able to diagnose the disease by correlating clinical manifestations and laboratory indices.<br>CO4: Able to prepare individualized therapeutic plans |

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| | | based on diagnosis.<br>CO5: Able to suggest lifestyle modifications based on the disease states. |
| 27. | 3.3Pharmaco-therapeutics II (Practical) | CO 1: Able to perform patient counseling regarding specific disease states and drugs.<br>CO 2: Can identify relevant patient specific parameters in initiating drug therapy and monitoring therapy<br>CO 3: Can monitor controversies in drug therapy and suggest rationale for drug therapy of selected diseases. |
| 28. | 3.4 Pharmaceutical Jurisprudence | CO 1: Developed inclination to follow the Professional ethics<br>CO 2: Aware of various concepts of the pharmaceutical legislation in India<br>CO 3: Obtained in depth knowledge of various acts & rules governing pharmacy profession Know the various parameters in the Drug and Cosmetic Act and rules<br>CO 4: Know the Drug policy, DPCO, Patent and design act and understand the labeling requirements and packaging guidelines for drugs and cosmetics<br>CO 5: Obtained understanding of Pharmacy Act, Pharmacy Council of India and its functioning |
| 29. | 3.5 Medicinal Chemistry | CO 1: Obtained knowledge of the chemistry of drugs with respect to their biological activity.<br>CO 2: Can explain metabolism, therapeutic uses and adverse effects of drugs.<br>CO 3: Obtained basic knowledge on modern techniques of drug design.<br>CO 4: Appreciate the role SAR and QSAR in drug discovery.<br>CO 5: Possess knowledge of synthesis, and analysis of selected representative drugs. |
| 30. | 3.5 Medicinal Chemistry (Practical) | CO 1: Able to prepare different medicinally important compounds.<br>CO 2: Able to determine partition coefficient and Hansch analysis of different drugs.<br>CO 3: Able to perform standardization and assay of drugs. |

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| 31. | 3.6 Pharmaceutical Formulations | CO1: Acquired knowledge about the various non parenteral pharmaceutical dosage forms and their manufacturing techniques.<br>CO2: Learnt Pharmacopeial specifications, and quality control techniques used in different dosage forms.<br>CO3: Acquired knowledge on manufacturing, labeling, sterilization & sterility testing of SVPs, LVPs, and ophthalmic preparations.<br>CO4: Realized the concepts of controlled drug delivery system<br>CO5: Obtained basic knowledge on cosmetics technology |
| 32. | 3.6 Pharmaceutical Formulations (Practical) | CO 1: Able to formulate different dosage forms and carry out their in process control tests<br>CO 2: Able to formulate the cosmetic preparations and perform its evaluation tests.<br>CO 3: Can perform the quality control tests and to operate the equipments required for the tests |
| 33. | PD 4.1<br>Pharmacotherapeutics-III | CO1: Able to identify the abnormal physiology individuals with diseases.<br>CO2: Able to interpret the data from diagnostic tools.<br>CO3: Able to diagnose the disease by monitoring the clinical features of the patient and suggest the therapy.<br>CO4: Able to differentiate types of pain and can suggest the management strategies for each.<br>CO5: Capable to suggest the treatment options from the evidences. |
| 34. | PD 4.1<br>Pharmaco-therapeutics-III (Practical) | CO1:Able to systematically analyse a case<br>CO2:Able to diagnose as well as suggest the medicine<br>CO3:Can perform the patient counseling effectively |
| 35. | PD 4.2<br>Hospital Pharmacy | CO 1: Know various drug distribution methods.<br>CO 2: Know the professional practice management in hospital pharmacies<br>CO 3: Can provide unbiased drug information to the doctors.<br>CO 4: Aware of the manufacturing practices of various formulations in hospital set up.<br>CO 5: Appreciate importance of stores management and |

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| | | inventory control. |
| 36. | PD 4.3<br>Clinical Pharmacy | CO1: have good understanding of elements of comprehensive pharmaceutical care<br>CO2: Can Interpret laboratory results to aid the clinical diagnosis of various disorders<br>CO3: Can provide integrated medicine information<br>CO4: Can provide integrated poison information<br>CO5: Able to promote in the efficient patient management along with other health care professionals. |
| 37. | PD 4.3<br>Clinical Pharmacy (Practical) | CO1:Can analyse, interpret and formulate drug information<br>CO2Able to detect monitoring parameters in therapeutics for determination of liver and kidney abnormalities.<br>CO3:Can identify, detect, assess and monitor adverse drug reaction |
| 38. | PD 4.4<br>Biostatistics & Research Methodology | CO1: Have fundamental knowledge on selection of research topic.<br>CO2: Acquired basic understanding of different types of research data and documentation of data.<br>CO3: Have the preliminary knowledge on data collection in clinical research<br>CO4: Can design sampling protocol for research<br>CO5: Can use different statistical tool for the research data analysis using software |
| 39. | PD 4.5 Biopharmaceutics & Pharmacokinetics | CO1: Learnt the basic concepts in biopharmaceutics and pharmacokinetics.<br>CO2: Possess knowledge on the effect of Pharmacokinetic parameters on biological effects of the drug.<br>CO3: Capable of designing and evaluating dosage regimens of the drugs using pharmacokinetic and bio-pharmaceutic parameters.<br>CO4: Can calculate various pharmacokinetic parameters from plasma and urinary excretion data applying compartment modeling and model independent methods.<br>CO5: Can design Bioavailability and Bioequivalence studies of new drugs or dosage forms. |

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| 40. | PD 4.5 Biopharmaceutics & Pharmacokinetics (Practical) | CO1:Able to perform the Dissolution studies for different marketed products of the same drug .<br>CO2Able to compute various pharmacokinetic parameters from plasma and urinary excretion data applying compartment modeling and model independent methods.<br>CO3:Can perform Bioavailability and Bioequivalency studies of drugs on animal/human model . |
| 41. | PD 4.6<br>Clinical Toxicology | CO1: Student can support the medical professional in identifying the antidote for specified poisons.<br>CO2: Able to give poison information especially regarding clinical features and management of poisoning.<br>CO3: Can identify the venomous snakebite poison substance.<br>CO4: Able to differentiate different types of substance abuse and can suggest the clinical features and its management.<br>CO5: Able to give suggestions on the management of poisoning. |
| 42. | PD (PB)<br>1.1Pharmacotherapeutics-I & II | CO1: Able to understand different causes of diseases.<br>CO2: Able to identify the abnormal physiology of individual with specific disease states.<br>CO3: Able to diagnose the disease by correlating clinical manifestations and laboratory indices.<br>CO4: Able to prepare individualized therapeutic plans based on diagnosis.<br>CO5: Able to suggest lifestyle modifications based on the disease states. |
| 43. | PD (PB)<br>1.1Pharmacotherapeutics-I & II (Practical) | CO1:Able to systematically analyse a case<br>CO2: Able to diagnose as well as to prescribe the medicine<br>CO3:Can perform the patient counseling effectively |
| 44. | 5.1-Clinical Research | CO1: Able to take part in drug discovery and new drug development process at clinical trial stage<br>CO2: Acquired knowledge to conduct clinical trial<br>CO3: Capable of preparing various study documents used in clinical trials and able to carry out clinical trial start up activities<br>CO4: Possess knowledge about the procurement, storage, |

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| | | filing of investigational product and to conduct monitoring visit, close out visit and safety reporting<br>CO.5: Possess knowledge of data management and quality assurance in CDM. |
| 45. | 5.2 Pharmacoepidemiology and Pharmacoeconomics | CO1: Posses knowledge of pharmacoepidemiology and concept of risk in pharmacoepidemiology<br>CO2: Capable of measuring outcomes pharmacoepidemiology using various pharmacoepidemiological methods<br>CO3: Possess knowledge of Sources of data for pharmacoepidemiological studies and applications of pharmacoepidemiology<br>CO4:. Aware of concepts of pharmacoeconomics and its significance<br>CO5: Can perform pharmacoeconomic evaluation |
| 46. | 5.3 Clinical Pharmacokinetics and TDM | CO1: Able to design of dosage regimen<br>CO2: Able to give drug dosing information about elderly, pediatrics and obese patients.<br>CO3: Able to describe different types of conversion from IV to Oral therapy.<br>CO4: Able to give TDM information especially regards cardiac, seizure and psychiatric conditions<br>CO5: Can support the medical professional in dosage adjustment in Renal and Hepatic disease |
| 47. | 5.4 Clerkship | CO1: capable of delivering clinical pharmacy services efficiently,<br>CO2:Able to plan and execute pharmaceutical care<br>CO3: Possess sound knowledge of therapeutics s |
| 48. | 5.5 Project work | CO1: Able to identify, design and carry out research work scientifically following research ethics<br>CO2: Able to collect date, interpret them using appropriate statistical tools and arrive at conclusion scientifically<br>CO3: Able to document the research work in the form of thesis in an acceptable format |

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| 49. | Internship | CO1: Expert in providing patient care as well as manage and use resources efficiently as a member of healthcare team<br>CO2: Capable of promoting health improvement, wellness, and disease prevention in cooperation with other related professionals and community<br>CO3; Developed skills in monitoring of the National Health Programmes and schemes with effective communication skill |

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**M. Pharmacy Pharmaceutics Course outcomes**

| S.No. | Subject Code and name | Out come |
|---|---|---|
| 1 | 1. Bio Pharmaceutics & Pharmacokinetics | CO1. understand the basic concepts of bio-pharmaceutics, pharmacokinetics & pharmacokinetic models<br>CO2.Identify the physiological, physicochemical and dosage form-related factors that affects drug absorption from different dosage forms<br>CO3. Outline and recognize various drug disposition process that can cause pharmacokinetic and pharmacodynamic variability<br>CO4. Identify and understand different study designs and various statistical tests applied in bioequivalence studies.<br>CO5. Evaluate the PK parameters and examine absolute, relative bioavailability of drugs from different dosage forms using either plasma or urine data along with *In vitro-in vivo correlation* |
| 2 | 2. Pharmaceutical Formulation Technology | CO1. Explain how solubility, particle size, particle shape, crystallinity, amorphous structure of pure drug as pre-formulation parameters plays a major role in the<br>CO2. Determine the formulation and manufacturing procedures of different types of tablet dosage forms and capsule dosage forms.<br>CO3. Develop different coating procedures to tablets and evaluate prepared coated tablets.<br>CO4. Evaluate materials used for packaging such as glass, plastic and rubber containers. |
| 3 | 3. Physical Pharmaceutics | CO1. Explain and determine interfacial properties of liquids. Explain types and properties of colloidal systems.<br>CO2. Estimate the size, shape and surface area of powder |

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| | | CO3. Determine the nature of flow of liquids and their measurement<br>CO4. Formulate and evaluate suspensions and emulsions.<br>CO5. Apply mathematical models to determine the rate and order of reaction, shelf life and explain various factors influencing reaction rates |
| 4 | 4. Quality Assurance | CO1. Understand the c GMP aspects in a pharmaceutical industry.<br>CO2. Appreciate the importance and Construct the documentation.<br>CO3. Develop Knowledge and understand the scope of quality certifications applicable to Pharmaceutical industry<br>CO4. Develop basic knowledge and understand the responsibilities of QA & QC departments.<br>CO5. Develop basic knowledge Manufacturing operations and controls. |
| 5 | 1P. Bio Pharmaceutics & Pharmacokinetics(Practical) | CO1. Compare the influence of dosage forms on dissolution behaviour of same API<br>CO2. Connect various physicochemical properties of drug affect on dissolution rate of drug substance<br>CO3. Design various techniques that enhance the dissolution rate of drugs<br>CO4. Correlate *In-vitro – In-vivo* absorption studies of various dosage forms<br>CO5. Solve and interpret various pharmacokinetic parameters by applying statistical treatment to pharmacokinetic data |

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| 6 | 2P . Pharmaceutical Formulation Technology & Physical Pharmaceutics(Practical) | CO1. Determine the formulation and manufacturing procedures of different types of tablet dosage forms and capsule dosage forms.<br>CO2. Develop different coating procedures to tablets and evaluate prepared coated tablets.<br>CO3. Estimate the size, shape and surface area of powder<br>CO4. Determine the nature of flow of liquids and their measurement<br>CO5. Formulate and evaluate suspensions and emulsions. |
| 8 | 5. Novel Drug Delivery Systems-I | CO1. Develop various vesicles and devices related to drug delivery systems<br>CO2. Define various types of drug delivery systems<br>CO3. Compare the different types of delivery systems based on their formulation and Usage<br>CO4. Evaluate drug delivery systems for their quality<br>CO5. Apply the mechanisms in developing various drug delivery systems |
| 9 | 6. Novel Drug Delivery Systems-II | CO1.Define basic concepts of enzymes, transporters and protein engineering.<br>CO2. Outline about recombinant DNA technology and Immunity<br>CO3. Utilize the knowledge of hybridoma technology and vaccines<br>CO4. Examine immunization techniques and genetic organization<br>CO5. Explain about mutants, use of microorganisms in fermentation technology |
| 10 | 7. Pharmaceutical Equipment validation | CO1. Determine Construction, operation , Working Application and validation Of Pharmaceutical Machinery<br>CO2. Understand validation Of Steam Distillation |

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| | | And Uniformity Index For Given Sample<br>CO3. Validation of Mixing, Drying, Filtration, Centrifugation<br>CO4. Demonstration Of Colloid Mill, Planetary Mixer, Fluidized Bed Dryer, Freeze Dryer And Such Other Major Equipment and their validation.<br>CO5. To study about various sterilization equipements validation |
| 11 | 8. Regulatory affairs | CO1.To understand about New Drug Application<br>CO2. To study about Documentation<br>CO3. To know the Importance of documentation,<br>CO4. To learn Current good manufacturing practices (CGMP) as per WHO. |
| 12 | 5P. Novel Drug Delivery Systems-I | CO1. To prepare Microparticles, liposomes and nanoparticles<br>CO2. To prepare and evaluate bioadhesive, transdermal and buccal drug delivery systems<br>CO3. Compare the different types of delivery systems based on their formulation and Usage<br>CO4. Evaluate drug delivery systems for their quality<br>CO5. Apply the mechanisms in developing various drug delivery systems |
| 13. | 6.P. Novel Drug Delivery Systems-II and Pharmaceutical Equipment validation | CO1.Define basic concepts of enzymes, transporters and protein engineering.<br>CO4. Examine immunization techniques and genetic organization<br>CO3. Validation of Mixing, Drying, Filtration, Centrifugation<br>CO4. Demonstration Of Colloid Mill, Planetary Mixer, Fluidized Bed Dryer, Freeze Dryer And Such Other Major Equipment and their validation.<br>CO5. To study about various sterilization equipment validation |

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Ramnagar Dist. Hanumakonda- 506001, (T.S)

## Course out comes for M. Pharm. Pharmaceutical analysis

| S.no. | Subject name | Outcomes |
|---|---|---|
| 1.1.T | Advanced Pharmaceutical analytical techniques | CO1. Theoretical aspects of the HPLC and GCtechniques<br>CO2. To get knowledge and skills in advanced instrumentation techniques for drug analysis<br>CO3. To learn hyphenated analytical techniques Critical analysis of analytical problem<br>CO4. Selection of appropriate analytical tool for the quantification of chemicals and excepients. |
| 1.2.T | Pharmaceutical Analysis- I | CO1. To study of the principles and procedures involved in Non - aqueous, Complex metric, Oxidation - reduction and Diazotization methods,<br>CO2. To study the principles and procedures involved in the electrometric methods: Conductometry, Potentiometry, Polarography and Amperometry<br>CO3. To learn Principles and procedures involved in using the following reagents in pharmaceutical analysis with suitable examples MBTH(3-methyl - 2- benzothiazolone hydrazone)<br>F.C. Reagent (Folin - Ciocalteau), PDAB (Para Dimethyl Amnio Benzaldehyde)etc..,<br>CO4. To practice Principles and Procedures involved in quantitative determination of various pharmaceutical preparations and dosage forms of the Alkaloids (Pilocarpine and quinine sulphate) |
| 1.3.T | Quality control of Pharmaceutical dosage forms | CO1. To study Quality control of Solid dosage Forms<br>CO2 To evaluate Ointments, Creams<br>CO3. To learn quality control tests Liquid oral preparations,,<br>CO4. To evaluate and study about Parenterals, |
| 1.4. T | Biological standardization | CO1. To study principles & procedures involved in bio assay of. Heparin, Insulin, Posterior Pituitary<br>CO2. To study principles & procedures involved in bio assay of. Diphtheria, Typhoid Principles and Procedures involved in Biological tests of the following.<br>CO3. To study principles & procedures involved in bio assay of Living contaminants in vaccines. Endotoxins Microbiological assay of Vitamins<br>CO4.To study principles & procedures involved in bio assay of. Antibiotics such as Neomycin sulphate. |
| 1.1.P | Advanced Pharmaceutical analytical techniques | CO1. To learn assay of paracetamol tablet By UV –spectroscopy, and Assay of paracetamol Tablets By colorimetry Method,<br>CO2. To perform Assay of Ibuprofen Tablets by UV -visible spectroscopy,<br>CO3. To learn Assay of Diclotenac Potassium Tablets By Uv-spectroscopy.<br>CO 4. To perform Assay of Furosemide Tablets by UV - spectroropy Assay of Riboflavin By Ur – spectroscopy& colorimetrys |
| 1.2.P | Pharmaceutical Analysis-I | CO1.To study Non aqueous titrations<br>CO2. To leran oxidation reduction titration |

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| | | CO3. To know quantitative determination of Alkaloids,Griseofulvin |
| 2.1T | Quality assurance | CO1. To understand New Drug Application<br>CO2. To learn Documentation and its Importance<br>CO3. To study the Current good manufacturing practices (CGMP) as per WHO.<br>CO4. To know about principles of quality assurance. |
| 2.2.T | Pharmaceutical Analysis-II | CO1. To know the advanced study of medicines (GLC, GC-MS<br>CO2. To know the principles and procedures of LC-MS, MS-MS<br>CO3. To learn instrumental methods in the development of medicines HPLC, HPTLC<br>CO4. To develop medicines Flame Photometry, Fluorimetry,<br>CO5. To know the advanced study of the principles and procedures and applications of instrumental methods in the development of medicines |
| 2.3.T | Analytical method development and validation | CO1. To learn on the importance of patent and intellectual property rights& trained on thequalification aspects of instruments.<br>CO2. To understand the importance of calibration to be performed for the instruments.<br>CO3. To know the various validation aspects to be carried out in the industry.<br>CO4. To gain knowledge on how validation are carried for various components such as instrument, cleaning, process validation. |
| 2.4.T | Regulatory Affairs | CO1.To understand about New Drug Application<br>CO2. To study about Documentation<br>CO3. To know the Importance of documentation<br>CO4. To learn Current good manufacturing practices (CGMP) as per WHO. |
| 2.1. P | Analytical method development and validation 9 | CO1. To isolation and quantstative determination of casein, Lactose from Milk<br>CO2. Simultaneous estimation of paracetamol and Ibuprofen taldets,<br>CO3. Assay of Glibendlamide by Uv-spectroscopy. nterpretation of IR Spectumand mass spectrum |
| 2.2.P. | Pharmaceutical Analysis-II | CO1. To Isolate and quantitative determination of casein, Lactose from Milk<br>CO2. Simultaneous estimation of paracetamol and Ibuprofen taldets<br>CO3. Assay of Glibendlamide by Uv-spectroscopy. nterpretation of IR Spectumand mass spectrum. |

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## Course outcome of M. Pharmacy Pharmaceutical Chemistry

| Course Code | Name of the Course | Out come |
|---|---|---|
| M. Pharm | Advanced Organic Chemistry - I | **$CO_1$:** Nucleophilic & Electrophilic substitution.<br>**$CO_2$:** Heterocylic chemistry, reactivity of aromatic heterocycles.<br>**$CO_3$:** Electrophilic addition at nitrogen, electrophilic, nucleophilic and radical substitution.<br>**$CO_4$:** Five-membered ring compounds with one heteroatom: Pyrroles, Furans and Thiophenes.<br>**$CO_5$:** Elimination reactions. |
| | Advanced Medicinal Chemistry - I | **$CO_1$:** Genesis of new drugs-sources of new drugs; leads from natural products.<br>**$CO_2$:** Molecular modifications, Drug Design-QSAR in drug design.<br>**$CO_3$:** A study includes an account of their origin and development, classification, structures, mechanism of action, SAR, uses and toxicity some important class of drugs-Beta blockers, ACE Inhibitors.<br>**$CO_4$:** H1 and H2 antagonist, Protan pump inhibitors.<br>**$CO_5$:** NSAIDS, Anticancers some important drugs synthesis. |
| | Spectroscopic Identification of Organic Compounds | **$CO_1$:** To understand the basic principles involved & instrumentation, and a detailed study of applications of the following spectroscopic techniques in the determination of structure of the following classes of compounds with the help of simple examples:<br>¡i) Alkanes il) Cycloalkanes ili) Alkenes iv) Aldehydes and ketones v) Alcohols vi)<br>Carboxylic acids vi) Phenols viti) Amines ix) Simple Heterocyclic Compounds<br>**$CO_2$:** UV & IR spectroscopy.<br>**$CO_3$:** $^1$H NMR, $^{13}$C NMR<br>**$CO_4$:** Mass spectrometry<br>**$CO_5$:** To know the knowledge two dimensional NMR techniques, COSY, HETCOR,HMBC,TOCY. |

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| | Screening Methods In Pharmacology | **$CO_1$:** To study the Principles and techniques involved in the Pharmacological screening of various diseases, Enzyme inhibition studies - Inhibition of COX-1, COX-2 and 5-LOX, Screening of cytotoxicity.<br>**$CO_2$:** Statistical analysis of data, methods of precision, accuracy, fiducial limits.<br>**$CO_3$:** Regression analysis, standard error, tests for significance - chisquare test, students T test, ANOVA.<br>**$CO_4$:** Important of tests in pharmaceutical/biological experiments. |
| | Advanced Organic Chemistry–I(Pr) | **$CO_1$:** To gain the knowledge Calibration of thermometer and finding melting point, boiling point.Crystallization, Distillation.<br>**$CO_2$:** Separation and identification of organic compounds from binary mixtures.<br>**$CO_3$:** Synthesis of some of the heterocyclic compounds. |
| | Advanced Medicinal Chemistry -I(Pr) | **$CO_1$:** Synthesis, purification and identification some of the drugs. |

| Course Code | Name of the Course | Out come |
|---|---|---|
| M. Pharm | Advanced Organic Chemistry - II | **$CO_1$:** To understand the Strategies in organic synthesis, **$CO_2$:** disconnection approach, functional group intervoncersions. Synthons & Retrosyntheis.<br>**$CO_3$:**Chiral drug synthesis: Modern synthetic methods:<br>**$CO_4$:** Green Synthesis<br>**$CO_5$:** Microwave assisted synthesis Six-membered heterocyclic ring compounds with one heteroatom. |
| | Advanced Medicinal Chemistry - II | **$CO_1$:** Psychopharmacological agents.<br>**$CO_2$:** Anxiolytics, sedatives and hypnotics: Benzodiazepines and related compounds.<br>**$CO_3$:** Antidepressants: MAO inhibitors.<br>**$CO_4$:** Antiepileptics & CNS stimulants.<br>**$CO_5$:** Diuretics, Antihyperlipidemic agents,Quinolones. |
| | Chemistry of Natural Products | **$CO_1$:** To know Alkaloids-opium, ergot. Structure of morphine- peripheral groups; SAR. Anticancer agents of natural origin, Vinca rosea,Anticancer antibiotics-dactinomycin etc..,<br>**$CO_2$:** Sources and structures of cholesterol, ergosterol, stigmasterol and diosgenin.<br>**$CO_3$:** Development of new cephalosporins - recent advances.<br>**$CO_4$:** Steroidal Hormonal Drugs.<br>**$CO_5$:** Structural Elucidation. |

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| | Chromatographic Separation Technology | **$CO_1$:** To study the Theory and instrumentation of thefollowing techniques for the separation of organic compounds.<br>TLC &HPTLC, Coloumns chromatography, Electrophoresis<br>**$CO_2$:** Chiral Separations, Circular counter current chromatography (CCCC), Ion Exchange methods.<br>**$CO_3$:** Electrophoresis.<br>**$CO_4$:** HPLC<br>**$CO_5$:** GLC |
| | Advanced Medicinal Chemistry – II (Pr) | **$CO_1$:** To gain the Synthetic procedures, purification and identification of some of the drugs.**$CO_2$:** Spectra to be recorded for some compounds and analyzed. |
| | Chemisty of Natural Products (Pr) | **$CO_1$:**Isolation and purification of the<br>a)Piperine from black pepper<br>b) Strychnine and Brucine from Strychnin nuxvomica seeds<br>c) Caffeine from Tea Powder<br>d) Curcumin from Turmeric etc. Identification of alkaloids in mixture by TLC.<br>**$CO_2$:** Preparation of TLC for separation and isolation. |

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## Course outcome of M. Pharmacy Pharmacology

| Course Code | Name of the Course | Out come |
|---|---|---|
| M. .Pharm | Clinical Pharmacology& Toxicology | **$CO_1$:** To understand the Adverse Drug Reactions.<br>**$CO_2$:** Pathophysiology of some disease.<br>**$CO_3$:** drug therapy of some disease.<br>**$CO_4$:** Pharmacogenomics.<br>**$CO_5$:** Principles of Toxicology |
| | Advances In Preclinical Evaluation - II | **$CO_1$:** To Know the basic principles of bioassays Experimental models and Statistical designs employed in biological Standardization.<br>**$CO_2$:** Preclinical evaluation of some drugs like sedatives etc.<br>**$CO_3$:** Cell culture technology.<br>**CO4:** Animal Screening Procedures.<br>**$CO_5$:** Concept of transgenic animals, principle of immunoassay. |
| | Clinical Research | **$CO_1$:** Know the Introduction to Clinical Research<br>**$CO_2$:**Research Design Methods, Planning and execution of Clinical trials.<br>**$CO_3$:** Bioavailability and Bioequivalence studies, Ethics and Guidelines in Biomedical Research.<br>**$CO_4$:** Clinical research, Designing of clinical trial documents, Data management. |
| | Molecular And Biochemical Pharmacology Basis Of Drug Discovery & Development | **$CO_1$:** This course primarily focuses on study of the following from molecular and biochemical perspective.<br>**$CO_2$:** The purpose is to enable the student to understand the trends in modern drug discovery.<br>**$CO_3$:** Drug Receptor theory.<br>**$CO_4$:** Quantitative analysis of Structure activity relation ship.<br>**$CO_5$:** Principle of computered aided drug design. |
| | Advances In Preclinical Evaluation – II(Pr) | **$CO_1$:** Preparation of various physiological salutations.<br>**$CO_2$:** Bio assays of Ach by three point& four point methods.<br>**$CO_3$:** Anticonvelsentactivity, CNS depressant activity. |
| | Clinical Pharmacology &Toxicology(Pr) | **$CO_1$:** Liver function test, Determination of lipid profile, Renal function test.<br>**$CO_2$:**GOD-POD methods.<br>**$CO_3$:**Bio markers test. |

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| Course Code | Name of the Course | Out come |
|---|---|---|
| M.Pharm | Advanced pharmacology-I | **$CO_1$:** The basic Pharmacological knowledge in the preventation and treatment of various disease.<br>**$CO_2$:** Drugs acting on synoptic & neuro effect junctional sites.<br>**$CO_3$:** Drug acting on ANS & CNS(agonist & antagonist), blood forming Organs<br>**$CO_4$:**.Muscarinic receptor agonists & antagonist.<br>**$CO_5$:** Drugs affected renal and cardiovascular function. |
| | Advanced pharmacology-II | **$CO_1$:** To gain the knowledge about Autacoids, Drug therapy of inflammation.<br>**$CO_2$:** Drugs affecting gastro intestinal function.<br>**$CO_3$:** Chemotherapy of Malaria, microbial infection, Neoplastic diseases.<br>**$CO_4$:** Oral hypoglycemic agents.<br>**$CO_5$:** Thyroid and Steroidal hormones. |
| | Advances in preclinical Evaluation-I | **$CO_1$:** To understand about the handling & breeding techniques.<br>**$CO_2$:** Regulations of laboratory animals,Ethical requirement.<br>**$CO_3$:** Drug discovery process principles, techniques and strategies used in drug discovery.<br>**$CO_4$:** To understand the preclinical and clinical models employed in the screening of new drugs.<br>**$CO_5$:** Principals of Toxicological evaluations, parametric and non para metric tests. |
| | Pharmacokinetics, Pharmacodynamics & Drug Metabolism (PPDM) | **$CO_1$:** To understand about the ADME.<br>**$CO_2$:** Bioavailability and Bioequivalence of drug products.<br>**$CO_3$:** Biotransformation reactions.<br>**$CO_4$:** Protein binding.<br>**$CO_5$:** Excretion of drugs ,routes of excretion of drugs. |
| | Advanced pharmacology-I(pr) | **$CO_1$:** Preparation of physiological salt solutions.<br>**$CO_2$:**DRC of Ach on frog rectus abdomen muscle. |
| | Pharmacokinetics, Pharmacodynamics & Drug Metabolism (PPDM)(pr) | **$CO_1$:** Preparation of standard graph of caffeine, calculate the linearity,correlations.<br>**$CO_2$:**Determination of apparent permeability. |

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