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| **PO and CO Report for AY 2019\_20** |
| **Curriculum:**  B. in Pharm 2019-2023 (SEM-1 & SEM II) |

**Program Level Course - PO Matrix Report**

**Program Outcomes (POs):**

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| 01 . 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. |
| 02 . 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. |
| 03 . Problem analysis: Utilize the principles of scientific inquiry, 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. |
| 04 . Modern tool usage: Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations. |
| 05 . Leadership skills: Understand and consider the human reaction to change, motivation issues, leadership and team-building when planning changes required for fulfillment of practice, professional and societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and wellbeing. |
| 06 . 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). |
| 07 . 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. |
| 08 . 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 |
| 09 . 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. |

**Course Outcomes (COs) - Program Outcomes (POs) matrices:-**

**Course Outcomes (COs):**

|  |  |  |  |  |  |  |  |  |  |  |  |
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| **Course: Human Anatomy and Physiology I - [BP101T]**  **Term: 1 - Semester** | | | | | | | | | | | |
| **CO** | **01** | **02** | **03** | **04** | **05** | **06** | **07** | **08** | **09** | **10** | **11** |
| CO1 | 2 |  |  |  |  |  |  |  |  |  |  |
| CO2 | 2 |  |  |  |  |  |  |  |  |  |  |
| CO3 | 2 |  | 1 |  |  |  |  |  |  |  |  |
| CO4 | 2 |  | 1 |  |  |  |  |  |  |  |  |
| CO5 | 2 |  |  |  |  |  |  |  |  |  |  |

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| --- |
| CO1: Explain the gross morphology, structure and functions of various organs of the human body. |
| CO2: Describe the various homeostatic mechanisms and their imbalances. |
| CO3: Identify the various tissues and organs of different systems of human body. |
| CO4: Perform the various experiments related to special senses and nervous system. |
| CO5: Appreciate coordinated working pattern of different organs of each system |

**Course Outcomes (COs):**

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Course: Pharmaceutical Analysis I - [BP102T]**  **Term: 1 - Semester** | | | | | | | | | | | |
| **CO** | **01** | **02** | **03** | **04** | **05** | **06** | **07** | **08** | **09** | **10** | **11** |
| CO1 | 2 |  |  |  |  |  |  |  |  |  |  |
| CO2 | 2 |  |  |  |  |  |  |  |  |  |  |
| CO3 | 2 |  |  |  |  |  |  |  |  |  |  |
| CO4 | 2 |  |  |  |  |  |  |  |  |  |  |
| CO5 | 2 |  |  |  |  |  |  |  |  |  |  |

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| --- |
| CO1: Explain the role of pharmaceutical analysis in the field of pharmacy and industry and explain methods of expressing concentration and minimizing errors |
| CO2: Describe volumetric,acid base and non aqueous titration |
| CO3: Explain gravimetric,complexometric and precipitation titration and apply simple statistics to numerical data. |
| CO4: analyse different methods of redox titration |
| CO5: Understand principle and concept of potentiometry ,polarography and conductometry |

**Course Outcomes (COs):**

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| **Course: Pharmaceutical Inorganic Chemistry Lab - [BP110P]**  **Term: 1 - Semester** | | | | | | | | | | | |
| **CO** | **01** | **02** | **03** | **04** | **05** | **06** | **07** | **08** | **09** | **10** | **11** |
| CO1 |  |  |  |  |  |  |  |  |  |  |  |
| CO2 |  |  |  |  |  |  |  |  |  |  |  |
| CO3 |  |  |  |  |  |  |  |  |  |  |  |
| CO4 |  |  |  |  |  |  |  |  |  |  |  |

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| CO1: Identify different inorganic impurities in inorganic medicinal agents by performing pharmacopoeia limit test. |
| CO2: Perform identification test on inorganic pharmaceuticals. |
| CO3: Perform purity test on inorganic pharmaceuticals. |
| CO4: Prepare and purify inorganic pharmaceuticals. |

**Course Outcomes (COs):**

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Course: Human Anatomy and Physiology II - [BP201T]**  **Term: 2 - Semester** | | | | | | | | | | | |
| **CO** | **01** | **02** | **03** | **04** | **05** | **06** | **07** | **08** | **09** | **10** | **11** |
| CO1 | 2 |  |  |  |  |  |  |  |  |  |  |
| CO2 | 2 |  |  |  |  |  |  |  |  |  |  |
| CO3 | 2 |  |  |  |  |  |  |  |  |  |  |
| CO4 | 2 |  |  |  |  |  |  |  |  |  |  |
| CO5 | 2 |  |  |  |  |  |  |  |  |  |  |

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| --- |
| CO1: Explain the gross morphology, structure and functions of various organs belongs to nervous system, endocrine system, digestive system, urinary system, respiratory system, reproductive system of the human body. |
| CO2: Describe the various homeostatic mechanisms and their imbalances. |
| CO3: Explain the coordinated working pattern of different organs of each system |
| CO4: Discuss the interlinked mechanisms in the maintenance of normal functioning (homeostasis) of human body. |
| CO5: Discuss the concept of energetic and genetics of human body. |

**Course Outcomes (COs):**

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| **Course: Pharmaceutical Organic Chemistry I - [BP202T]**  **Term: 2 - Semester** | | | | | | | | | | | |
| **CO** | **01** | **02** | **03** | **04** | **05** | **06** | **07** | **08** | **09** | **10** | **11** |
| CO1 | 1 |  |  |  |  |  |  |  |  |  |  |
| CO2 | 1 |  |  |  |  |  |  |  |  |  |  |
| CO3 | 1 |  |  |  |  |  |  |  |  |  |  |
| CO4 | 1 |  |  |  |  |  |  |  |  |  |  |

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| --- |
| CO1: Write the structure, name and the type of isomerism of the organic compound |
| CO2: write the reaction, name the reaction and orientation of reactions |
| CO3: Understand the reactivity/stability of compounds |
| CO4: Identify/confirm the identification of organic compound |

**Course Outcomes (COs):**

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| **Course: Biochemistry - [BP203T]**  **Term: 2 - Semester** | | | | | | | | | | | |
| **CO** | **01** | **02** | **03** | **04** | **05** | **06** | **07** | **08** | **09** | **10** | **11** |
| CO1 | 2 |  |  |  |  |  |  |  |  |  |  |
| CO2 | 2 |  |  |  |  |  |  |  |  |  |  |
| CO3 | 2 |  |  |  |  |  |  |  |  |  |  |

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| CO1: Understand the catalytic role of enzymes, importance of enzyme inhibitors in design of new drugs, therapeutic and diagnostic applications of enzymes |
| CO2: Understand the metabolism of nutrient molecules in physiological and pathological conditions |
| CO3: Understand the genetic organization of mammalian genome and functions of dna in the synthesis of rnas and proteins. |

**Course Outcomes (COs):**

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| **Course: Computer Applications in Pharmacy - [BP205T]**  **Term: 2 - Semester** | | | | | | | | | | | |
| **CO** | **01** | **02** | **03** | **04** | **05** | **06** | **07** | **08** | **09** | **10** | **11** |
| CO1 | 1 |  |  |  |  |  |  |  |  |  |  |
| CO2 | 2 |  |  |  |  |  |  |  |  |  |  |
| CO3 |  | 1 |  |  |  |  |  |  |  |  |  |

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| CO1: Students shall be able to know the various types of application of computers in pharmacy |
| CO2: Student shall be able to know the various types of data bases |
| CO3: Students shall be able to know the various applications of databases in pharmacy |

**Course Outcomes (COs):**

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| **Course: Environmental sciences - [BP206T]**  **Term: 2 - Semester** | | | | | | | | | | | |
| **CO** | **01** | **02** | **03** | **04** | **05** | **06** | **07** | **08** | **09** | **10** | **11** |
| CO1 |  |  |  |  |  |  |  |  |  | 2 | 2 |
| CO2 |  |  |  |  |  |  |  |  |  | 2 | 2 |
| CO3 |  |  |  |  |  |  |  |  |  | 2 | 2 |
| CO4 |  |  |  |  |  |  |  |  |  | 2 | 2 |
| CO5 |  |  |  |  |  |  |  |  |  | 2 | 2 |
| CO6 |  |  |  |  |  |  |  |  |  | 2 | 2 |

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| CO1: Upon completion of the course the student shall be able to create the awareness about environmental problems among learners. |
| CO2: Impart basic knowledge about the environment and its allied problems |
| CO3: Develop an attitude of concern for the environment |
| CO4: Motivate learner to participate in environment protection and environment improvement. |
| CO5: Acquire skills to help the concerned individuals in identifying and solving environmental problems. |
| CO6: Strive to attain harmony with nature |

**Course Outcomes (COs):**

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| **Course: Human Anatomy and Physiology II Lab - [BP207P]**  **Term: 2 - Semester** | | | | | | | | | | | |
| **CO** | **01** | **02** | **03** | **04** | **05** | **06** | **07** | **08** | **09** | **10** | **11** |
| CO1 | 2 |  | 1 |  |  |  |  |  |  |  |  |
| CO2 | 2 |  |  |  |  |  |  |  |  |  |  |
| CO3 | 2 |  |  |  |  |  |  |  |  |  |  |
| CO4 | 2 |  |  |  |  |  |  |  |  |  |  |

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| CO1: Perform to determine tidal volume, vital capacity , body temperature, basal mass index and different types of taste. |
| CO2: Describe the different systems of human body, family planning devices, pregnancy diagnosis test. |
| CO3: Identify vital organs and gonads by observing permanent slides. |
| CO4: Demonstrate the general neurological examination, visual acuity, reflex activity, total blood count by cell analyser and positive - negative feedback mechanism. |

**Course Outcomes (COs):**

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| **Course: Pharmaceutical Organic Chemistry\_I Lab - [BP208P]**  **Term: 2 - Semester** | | | | | | | | | | | |
| **CO** | **01** | **02** | **03** | **04** | **05** | **06** | **07** | **08** | **09** | **10** | **11** |
| CO1 | 1 |  |  |  |  |  |  |  |  |  |  |
| CO2 | 1 |  |  |  |  |  |  |  |  |  |  |
| CO3 | 1 |  |  |  |  |  |  |  |  |  |  |
| CO4 | 1 |  |  |  |  |  |  |  |  |  |  |

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| --- |
| CO1: Practice and follow safety rules and precautionary measures in laboratory and preparation of molecular models |
| CO2: Understand theoretical aspects of physical constant determination, detection of functional groups |
| CO3: characterize/ identify/spot monofunctional unknown organic compounds by physical constant, elemental analysis and functional group analysis |
| CO4: Prepare derivatives of organic compounds. |

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| **Course: Biochemistry Lab - [BP209P]**  **Term: 2 - Semester** | | | | | | | | | | | |
| **CO** | **01** | **02** | **03** | **04** | **05** | **06** | **07** | **08** | **09** | **10** | **11** |
| CO1 | 2 |  |  |  |  |  |  |  |  |  |  |
| CO2 | 2 |  |  | 1 |  |  |  |  |  |  |  |
| CO3 | 2 |  |  |  |  |  |  |  |  |  |  |

**Course Outcomes (COs):**

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| CO1: Students understand the importance of metabolism of substrates |
| CO2: Students will acquire knowledge in qualitative and quantitative estimation of biological macromolecules |
| CO3: Students will learn how to interpret data emnating from biochemical tests |

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| **Course Outcomes (COs) - Program Specific Outcomes (PSOs) matrices:-** |

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| **Curriculum:**  B. in Pharm 2018-2022; (SEM III & IV) |

**Program Level Course - PO Matrix Report**

**Program Outcomes (POs):**

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| --- |
| 1 . Pharmacy Knowledge: Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices. |
| 2 . Planning Abilities: Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines. |
| 3 . Problem analysis: Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate and apply information systematically and shall make defensible decisions. |
| 4 . Modern tool usage: Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations. |
| 5 . Leadership skills: Understand and consider the human reaction to change, motivation issues, leadership and team-building when planning changes required for fulfillment of practice, professional and societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and wellbeing. |
| 6 . Professional Identity: Understand, analyze and communicate the value of their professional roles in society (e.g. health care professionals, promoters of health, educators, managers, employers, employees). |
| 7 . Pharmaceutical Ethics: 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. Selfassess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis. |

**Course Outcomes (COs) - Program Outcomes (POs) matrices:-**

**Course Outcomes (COs):**

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| **Course: Physical Pharmacy I - [BPH\_C\_302\_T]**  **Term: 3 - Semester** | | | | | | | | | | | |
| **CO** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** |
| CO1 | 2 |  |  |  |  |  |  |  |  |  |  |
| CO2 | 2 |  |  |  |  |  |  |  |  |  |  |
| CO3 | 2 |  | 1 |  |  |  |  |  |  |  |  |
| CO4 | 2 |  |  |  |  |  |  |  |  |  |  |

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| CO1: Understand the various physical phenomena involved in designing of various formulations. |
| CO2: Determine the various physical parameters of drugs and formulations. |
| CO3: Predict and anticipate in process problems based on raw materials and manufacturing methods. |
| CO4: Apply the knoledge of physical phenomena in selecting raw materials, including drug iactive ingredients of appropriate quality leading to stable formulations. |

**Course Outcomes (COs):**

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| **Course: Anatomy Physiology and Pathophysiology III - [BPH\_C\_303\_T]**  **Term: 3 - Semester** | | | | | | | | | | | |
| **CO** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** |
| CO1 | 2 |  |  |  |  |  |  |  |  |  |  |
| CO2 | 2 |  |  |  |  |  |  |  |  |  |  |
| CO3 | 2 |  |  |  |  |  |  |  |  |  |  |
| CO4 | 2 |  |  |  |  |  |  |  |  |  |  |
| CO5 | 2 |  | 1 |  |  |  |  |  |  |  |  |

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| CO1: Explain the anatomy, and physiology of the reproductive system, cardiovascular system, urinary system and digestive system |
| CO2: Comprehend the etiology, pathogenesis, signs and symptoms of common diseases of the reproductive system, cardiovascular system, urinary system and digestive system |
| CO3: State the relevance of various body fluid compartments, electrolyte distribution and acid-base balance. |
| CO4: Know the concept, significance and application of ecg |
| CO5: Correlate sign and symptoms with diseases of the reproductive system, cardiovascular system, urinary system and digestive system |

**Course Outcomes (COs):**

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| **Course: Pharmaceutical Analysis I - [BPH\_C\_304\_T]**  **Term: 3 - Semester** | | | | | | | | | | | |
| **CO** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** |
| CO1 | 1 | 1 | 2 | 2 |  |  | 2 |  | 2 |  |  |
| CO2 | 2 |  | 2 | 2 |  |  |  |  |  |  |  |
| CO3 | 2 | 2 | 2 | 2 |  |  |  |  |  |  |  |

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| CO1: Explain the role of pharmaceutical analysis in the field of pharmacy and industry and delineate between qualitative quantitative, manual, automatic and electrochemical methods of analysis. |
| CO2: Describe volumetric, gravimetric, electrochemical and solvent extraction methods of analysis |
| CO3: Solve numerical problems related to volumetric, gravimetric and solvent extraction methods of analysis and apply simple statistics to numerical data. |

**Course Outcomes (COs):**

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| **Course: Pharmaceutical Engineering - [BPH\_C\_305\_T]**  **Term: 3 - Semester** | | | | | | | | | | | |
| **CO** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** |
| CO1 | 2 |  |  |  |  |  |  |  |  |  |  |
| CO2 | 2 |  |  |  |  |  |  |  |  |  |  |
| CO3 | 2 |  |  |  |  |  |  |  |  |  |  |
| CO4 | 2 |  |  |  |  |  |  |  |  |  |  |
| CO5 | 2 |  |  |  |  |  |  |  |  |  |  |

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| --- |
| CO1: Understand mechanics of fluid, fluid flow, and its measurements |
| CO2: Classify and describe pumps, heat measuring devices and conveyors |
| CO3: Understand basic principles involved in unit operations such as crystallization, evaporation, distillation and refrigeration and will able to describe the equipment and accessories involved therein. |
| CO4: Summarize construction material, discuss corrosion of equipment from pharmaceutical industry point. |
| CO5: Define and categorize the different industrial hazards. |

**Course Outcomes (COs):**

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| **Course: Physical Pharmacy-I Lab - [BPH\_C\_307\_T]**  **Term: 3 - Semester** | | | | | | | | | | | |
| **CO** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** |
| CO1 | 2 |  |  |  |  |  |  |  |  |  |  |
| CO2 | 2 |  | 1 |  |  |  |  |  |  |  |  |
| CO3 | 2 |  |  |  |  |  |  |  |  |  |  |

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| CO1: To determine the principle and methods for the determination of various physical parameters of drugs and formulations. |
| CO2: To carry out various physical tests involved in characterization of drugs. |
| CO3: To demonstrate testing of various physical parameters involved in pre-formulation and formulation evaluation. |

**Course Outcomes (COs):**

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| **Course: Pharmaceutical Analysis Lab-I - [BPH\_C\_308\_T]**  **Term: 3 - Semester** | | | | | | | | | | | |
| **CO** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** |
| CO1 | 1 | 2 |  |  |  |  |  |  |  |  |  |
| CO2 | 1 | 1 | 1 | 2 |  |  |  |  |  |  |  |
| CO3 |  | 2 | 2 | 2 |  |  |  |  |  |  |  |
| CO4 | 2 | 2 | 2 | 2 |  |  |  |  |  |  |  |

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| CO1: Employ practice of calibration and proper handling of volumetric apparatus, electronic analytical balance and safety measures in the laboratory. |
| CO2: Demonstrate eye-hand co-ordination required for titrimetric analysis |
| CO3: Perform and record, calculate and interpret data obtained for experiments related to volumetric, gravimetric and solvent extraction methods of analysis. |
| CO4: Conduct and evaluate various tests mentioned in a pharmacopoeial monograph |

**Course Outcomes (COs):**

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| **Course: Organic Chemistry-II - [BPH\_C\_401\_T]**  **Term: 4 - Semester** | | | | | | | | | | | |
| **CO** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** |
| CO1 | 1 |  | 1 |  |  |  |  |  |  |  |  |
| CO2 | 1 |  | 1 |  |  |  |  |  |  |  |  |
| CO3 | 1 |  | 1 |  |  |  |  |  |  |  |  |
| CO4 | 1 |  | 1 |  |  |  |  |  |  |  |  |

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| --- |
| CO1: Outline few methods of preparation for various functional group. |
| CO2: Understand how and why c=o group reacts with nucleophiles (using molecular orbitals and curly arrows) to give varied products |
| CO3: Predict the molecules that can be synthesized by reaction of c=c groups with electrophiles |
| CO4: Understand reactivity aromatic system towards electrophiles and nucleophiles. |

**Course Outcomes (COs):**

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Course: Physical Pharmacy-II - [BPH\_C\_402\_T]**  **Term: 4 - Semester** | | | | | | | | | | | |
| **CO** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** |
| CO1 | 2 |  | 1 |  |  |  |  |  |  |  |  |
| CO2 | 2 |  |  |  |  |  |  |  |  |  |  |
| CO3 | 2 |  |  |  |  |  |  |  |  |  |  |
| CO4 | 2 |  |  |  |  |  |  |  |  |  |  |
| CO5 | 2 |  | 2 |  |  |  |  |  |  |  |  |

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| --- |
| CO1: Identify order of reactions, pathways of drug degradation and types of drug complexes. |
| CO2: Describe fick’s laws of diffusion, mechanism of drug dissolution and absorption |
| CO3: Acquire understanding of drug complexes, protein binding and their applications |
| CO4: Gain knowledge of the basic principles of coarse and colloidal dispersions |
| CO5: Apply basic principles of drug characterization to biopharmaceutical aspects of drug delivery |

**Course Outcomes (COs):**

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| **Course: Pharmaceutics-I - [BPH\_C\_403\_T]**  **Term: 4 - Semester** | | | | | | | | | | | |
| **CO** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** |
| CO1 | 1 |  |  |  |  |  |  |  |  |  |  |
| CO2 | 1 |  |  |  |  |  |  |  |  |  |  |
| CO3 | 1 |  |  |  |  |  |  |  |  |  |  |
| CO4 | 1 |  |  |  |  |  |  |  |  |  |  |
| CO5 | 1 |  |  |  |  |  |  |  |  |  |  |

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| --- |
| CO1: Describe the status of pharma industry in india and elaborate on the different official compendia, recall the various types of dosage forms, routes of administration and describe the alternate systems of medicine |
| CO2: Explain the concepts and need for gmp & qa and preformulation. |
| CO3: Summarize the packaging of pharmaceuticals |
| CO4: Explain the formulation considerations, unit operations, q.a. aspects of monophasic systems, and powders |
| CO5: Classify, describe the various biological products, viz. sutures & ligatures, blood products and plasma volume expanders |

**Course Outcomes (COs):**

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| **Course: Pharmacology-I - [BPH\_C\_404\_T]**  **Term: 4 - Semester** | | | | | | | | | | | |
| **CO** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** |
| CO1 | 3 |  |  |  |  |  |  |  |  |  |  |
| CO2 | 3 |  |  |  |  |  |  |  |  |  |  |
| CO3 | 3 |  |  |  |  |  |  |  |  |  |  |
| CO4 | 3 |  |  |  |  |  |  |  |  |  |  |
| CO5 | 3 |  |  |  |  |  |  |  |  |  |  |
| CO6 | 3 |  |  |  |  |  |  |  |  |  |  |

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| --- |
| CO1: Define the scope, general principles and applications of pharmacology. |
| CO2: Understand the factors modifying drug action. |
| CO3: Comprehend pharmacokinetic and pharmacodynamic principles along with ability to compare and contrast various routes of administration with advantages and disadvantages |
| CO4: Classify receptors and elucidate their role in drug/neurotransmitter/hormone action. understand the mechanisms of drug action. |
| CO5: Explain autonomic transmission and discuss the pharmacology of drugs acting on ans and rationalize their therapeutic applications. |
| CO6: Explain the pharmacology of drugs acting on cardiovascular system and as diuretics and discuss their use in associated diseases |

**Course Outcomes (COs):**

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| **Course: Physical Pharmacy\_2 Lab - [BPH\_C\_407\_L]**  **Term: 4 - Semester** | | | | | | | | | | | |
| **CO** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** |
| CO1 | 2 |  | 1 |  |  |  |  |  |  |  |  |
| CO2 | 2 |  | 1 |  |  |  |  |  |  |  |  |
| CO3 | 2 |  | 1 |  |  |  |  |  |  |  |  |

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| --- |
| CO1: Determine reaction rate constant, order of a reaction for different reactions |
| CO2: Predict shelf life by carrying out accelerated stability studies |
| CO3: Calculate physical parameters such as stability constants, molecular weight, and critical micellar concentration |

**Course Outcomes (COs):**

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| **Course: Pharmaceutics\_1 Lab - [BPH\_C\_408\_L]**  **Term: 4 - Semester** | | | | | | | | | | | |
| **CO** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** |
| CO1 | 1 |  |  |  |  |  |  |  |  |  |  |
| CO2 | 1 |  |  |  |  |  |  |  |  |  |  |
| CO3 | 1 |  |  |  |  |  |  |  |  |  |  |

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| CO1: Prepare monophasic liquid systems and powder systems, justify the components and method of preparation. |
| CO2: Demonstrate the properties of the developed dosage forms and biological products, comment on the quality. |
| CO3: Perform experiments as per glp and record in the journals |

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| **Course: Pharmacology\_Lab-I - [BPH\_C\_409\_L]**  **Term: 4 - Semester** | | | | | | | | | | | |
| **CO** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** |
| CO1 | 3 | 1 |  |  |  |  |  |  |  |  |  |
| CO2 | 3 |  |  |  |  |  |  |  |  |  |  |
| CO3 | 3 |  |  |  |  |  |  |  |  |  |  |
| CO4 | 3 |  |  |  |  |  |  |  |  |  |  |
| CO5 | 3 |  | 1 |  |  |  |  |  |  |  |  |
| CO6 | 3 |  |  |  |  |  | 1 |  |  |  |  |

**Course Outcomes (COs):**

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| --- |
| CO1: Perform in vitro experiment on cock ileum (tissue) to evaluate effect of drug (ach) and its dose on response (contraction) to comprehend and infer drug effects on receptors and its outcomes. |
| CO2: State the principles behind plotting dose-response of drugs/agonist/antagonist and its applications |
| CO3: Define pa2 value and calculate pa2 value of antagonist |
| CO4: Summarize the impact of drugs on eye and gi and discuss their potential therapeutic utility. |
| CO5: Observe and explain the mechanisms of action of neurotransmitters, drugs and ions on isolated frog heart. |
| CO6: Knowledge of animal handling techniques and understanding of ethical guidelines governing animal experimentation. |

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| **Course Outcomes (COs) - Program Specific Outcomes (PSOs) matrices:-** |

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| **Curriculum:**  B. in Pharm 2017-2021 (SEM V & VI) |

**Program Level Course - PO Matrix Report**

**Program Outcomes (POs):**

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| 1 . Pharmacy Knowledge: Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices. |
| 2 . Planning Abilities: Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines. |
| 3 . Problem analysis: Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate and apply information systematically and shall make defensible decisions. |
| 4 . Modern tool usage: Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations. |
| 5 . Leadership skills: Understand and consider the human reaction to change, motivation issues, leadership and team-building when planning changes required for fulfillment of practice, professional and societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and wellbeing. |
| 6 . Professional Identity: Understand, analyze and communicate the value of their professional roles in society (e.g. health care professionals, promoters of health, educators, managers, employers, employees). |
| 7 . Pharmaceutical Ethics: 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. Selfassess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis. |

**Course Outcomes (COs) - Program Outcomes (POs) matrices:-**

**Course Outcomes (COs):**

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Course: Pharmacognosy and Phytochemistry-II - [614BPH\_C\_604\_T]**  **Term: 6 - Semester** | | | | | | | | | | | |
| **CO** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** |
| CO1 | 2 |  |  |  |  |  |  |  |  |  |  |
| CO2 | 2 |  |  |  |  |  |  |  |  |  |  |
| CO3 | 2 |  |  |  |  |  |  |  |  |  |  |
| CO4 | 2 |  |  |  |  |  |  |  |  |  |  |
| CO5 | 2 |  |  |  |  |  |  |  |  |  |  |
| CO6 | 2 |  |  |  |  |  |  |  |  |  |  |

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| --- |
| CO1: Explain the concept of adulteration and substitution in crude drugs, extraction process for phyto-constituents using different methods and principles. |
| CO2: Write the source, composition, general methods of extraction, evaluation, chemical tests, therapeutic uses of crude drugs containing volatile oils, resins and tannins |
| CO3: Write the biosynthesis of monoterpenoids and phenypropanoid constituents of volatiles |
| CO4: Understand the chemistry of phytoconstituents belonging to the classes of terpenoids, sulfur containing constituents and quinones and write source composition and structures of phytoconstituents of crude drugs belonging to these classes |
| CO5: Write the significance of excipients of natural origin, used in pharmaceutical formulations and describe various classes of excipients like binders, colours, sweetners and flavorants along with the examples of their utility. |
| CO6: Describe the applications of plant tissue culture techniques with respect to production of secondary metabolites and edible vaccines. |

**Course Outcomes (COs):**

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| **Course: Organic Chemistry-III - [BPH\_C\_501\_T]**  **Term: 5 - Semester** | | | | | | | | | | | |
| **CO** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** |
| CO1 | 2 | 1 | 1 |  |  |  |  |  |  |  |  |
| CO2 | 2 | 1 | 1 |  |  |  |  |  |  |  |  |
| CO3 | 2 | 1 | 1 |  |  |  |  |  |  |  |  |
| CO4 | 2 | 1 | 1 |  |  |  |  |  |  |  |  |
| CO5 | 2 | 1 | 1 |  |  |  |  |  |  |  |  |

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| --- |
| CO1: Upon successful completion of this course, a learner will be able to identify, nomenclature, and to employ fundamental heterocyclic organic reactions in the synthetic design of biologically active molecules containing heterocyclic nucleus |
| CO2: Recognize the steroid molecules, synthetic methods, nature and their role in our body. |
| CO3: Outline the synthesis, chemical reactions of steroids, conversion of cholesterol to progesterone, estrone and testosterone and elucidation of structure of cholesterol. |
| CO4: State basic terminologies in polymers, different mechanisms involved in the polymer preparation, different polymerization techniques, details about the glass transition temperature and the factors affecting it and the types of polymers with some specific examples of each |
| CO5: Students will able to learn assigned synthetic and chemical reactions related to few member and bridge hetero cyclic system. |

**Course Outcomes (COs):**

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| **Course: Pharmaceutics-II - [BPH\_C\_502\_T]**  **Term: 5 - Semester** | | | | | | | | | | | |
| **CO** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** |
| CO1 | 2 |  |  |  |  |  |  |  |  |  |  |
| CO2 | 2 |  |  |  |  |  |  |  |  |  |  |
| CO3 | 2 |  |  |  |  |  |  |  |  |  |  |
| CO4 | 2 |  |  |  |  |  |  |  |  |  |  |

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| --- |
| CO1: Understand the formulation of liquid biphasic, semisolid, suppository and aerosol dosage forms |
| CO2: Describe the evaluation of such dosage forms |
| CO3: Summarize the packaging of liquid biphasic, semisolid, suppository and aerosol dosage forms |
| CO4: Explain the basic concepts of cosmetic science |

**Course Outcomes (COs):**

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| **Course: Pharmaceutical Biotechnology - [BPH\_C\_503\_T]**  **Term: 5 - Semester** | | | | | | | | | | | |
| **CO** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** |
| CO1 | 2 |  |  |  |  |  |  |  |  |  |  |
| CO2 | 2 |  |  |  |  |  |  |  |  |  |  |
| CO3 | 2 |  |  |  |  |  |  |  |  |  |  |
| CO4 | 2 |  |  |  |  |  |  |  |  |  |  |

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| --- |
| CO1: Discuss the tools, techniques, ethics and environmental safety involved in gene cloning, and the applications of recombinant dna technology & also the concept of bioinformatics, its history & applications relevant to pharma industry |
| CO2: Discuss basics of immunology and explain the antigen-antibody interactions and defense mechanism and explain technique of monoclonal antibodies production for treating the human diseases |
| CO3: To study fermentation technology and understanding the basic concepts for production of safer vaccines and antibiotics |
| CO4: To study different techniques and applications of microbiological assay, enzyme immobilization and cell culture |

**Course Outcomes (COs):**

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| **Course: Organic Chemistry\_II Lab - [BPH\_C\_505\_L]**  **Term: 5 - Semester** | | | | | | | | | | | |
| **CO** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** |
| CO1 | 2 | 2 | 1 |  |  |  |  |  |  |  |  |
| CO2 | 2 | 2 | 1 |  |  |  |  |  |  |  |  |

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| --- |
| CO1: Develop the practical knowledge to purify the organic compounds and basic solvent selection strategy for re-crystallization |
| CO2: Students learned the experimental skills to separate the binary mixtures of organic compounds, and identifying the individual component after separation and preparing the respected derivatives by followin qualitative analytical skills , |

**Course Outcomes (COs):**

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| **Course: Pharmaceutics-Lab II - [BPH\_C\_506\_L]**  **Term: 5 - Semester** | | | | | | | | | | | |
| **CO** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** |
| CO1 | 2 |  |  |  |  |  |  |  |  |  |  |
| CO2 | 2 |  |  |  |  |  |  |  |  |  |  |
| CO3 | 2 |  |  |  |  |  |  |  |  |  |  |

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| --- |
| CO1: Understand the formulation aspects of biphasic and semisolid dosage forms |
| CO2: Explain calculations involved in formulations |
| CO3: Describe the importance of quality evaluation of biphasics, semisolids, suppositories, aerosols |

**Course Outcomes (COs):**

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| **Course: Pharmaceutical Biotechnology Lab - [BPH\_C\_507\_L]**  **Term: 5 - Semester** | | | | | | | | | | | |
| **CO** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** |
| CO1 | 2 |  | 1 |  |  |  |  |  |  |  |  |
| CO2 | 2 |  | 1 |  |  |  |  |  |  |  |  |
| CO3 | 2 |  | 1 |  |  |  |  |  |  |  |  |

|  |
| --- |
| CO1: Characterization and identification of bacteria using various staining techniques (morphological study), colony characterization, serological and biochemical characteristics |
| CO2: Analyze quality of raw material, food and water and assessment of extent of microbial contamination using counting technique and evaluate sterility of products |
| CO3: The knowledge of bioassay of antibiotic and test antibiotic sensitivity of few antibiotics |

**Course Outcomes (COs):**

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| **Course: Pharmaceutical Chemistry-I - [BPH\_C\_601\_T]**  **Term: 6 - Semester** | | | | | | | | | | | |
| **CO** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** |
| CO1 | 3 |  |  |  |  |  |  |  |  |  |  |
| CO2 | 3 |  |  |  |  |  |  |  |  |  |  |
| CO3 | 3 |  |  |  |  |  |  |  |  |  |  |
| CO4 | 3 |  |  |  |  |  |  |  |  |  |  |

|  |
| --- |
| CO1: Understand:- identify and study the suitable drug targets for treatment of disorders |
| CO2: Understand:- identify the relationship between the physicochemical properties of the chemical entity and biological response |
| CO3: Understand:- identify the sar of all the classes of anti-malarial, anti-tubercular, anti-infective, antibiotic, anti-parasitic disorders |
| CO4: Analyze:- draw a schematic metabolic pathway for any given drug. |

**Course Outcomes (COs):**

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| **Course: Pharmaceutics-III - [BPH\_C\_602\_T]**  **Term: 6 - Semester** | | | | | | | | | | | |
| **CO** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** |
| CO1 | 3 |  |  |  |  |  |  |  |  |  |  |
| CO2 | 3 |  |  |  |  |  |  |  |  |  |  |
| CO3 | 2 |  |  |  |  |  |  |  |  |  |  |
| CO4 | 2 |  |  |  |  |  |  |  |  |  |  |
| CO5 | 2 |  |  |  |  |  |  |  |  |  |  |

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| --- |
| CO1: Know the various solid oral dosage forms and their manufacturing techniques |
| CO2: Know various considerations in development of pharmaceutical dosage forms including stability. |
| CO3: Formulate solid dosage forms and evaluate them for their quality |
| CO4: Understand the responsibilities of quality assurance & quality control departments |
| CO5: Appreciate the importance of documentation |

**Course Outcomes (COs):**

|  |  |  |  |  |  |  |  |  |  |  |  |
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| **Course: Pharmaceutical Analysis-II - [BPH\_C\_603\_T]**  **Term: 6 - Semester** | | | | | | | | | | | |
| **CO** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** |
| CO1 | 1 |  |  | 2 |  |  |  | 1 |  |  | 1 |
| CO2 | 2 |  |  | 2 |  |  |  |  |  |  | 2 |
| CO3 | 1 |  |  |  |  |  |  |  |  |  |  |
| CO4 |  |  | 2 | 2 |  |  |  | 1 |  |  |  |

|  |
| --- |
| CO1: Comprehend underlying principle, instrumentation, application and limitations in instrumental techniques involving molecular as well as atomic absorption and emission techniques such as uv-visible, fluorescence, infra-red, raman, atomic absorption spectroscopy and atomic emission spectroscopy. |
| CO2: Explain fundamentals, working principle and applications of x-ray diffraction technique, potentiometric titrations and thermal methods of analysis like tg, dsc and dta. |
| CO3: Generalize the concepts and quality control aspects related to radiopharmaceuticals. |
| CO4: Calculate and interpret the results for spectral analysis and statistical data analysis. |

**Course Outcomes (COs):**

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| **Course: Pharmaceutical Chemistry Lab-I - [BPH\_C\_605\_L]**  **Term: 6 - Semester** | | | | | | | | | | | |
| **CO** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** |
| CO1 | 3 |  |  |  |  |  |  |  |  |  |  |
| CO2 | 3 |  |  |  |  |  |  |  |  |  |  |
| CO3 | 3 |  |  |  |  |  |  |  |  |  |  |
| CO4 | 3 |  |  |  |  |  |  |  |  |  |  |
| CO5 | 3 |  |  |  |  |  |  |  |  |  |  |
| CO6 | 3 |  |  |  |  |  |  |  |  |  |  |

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| --- |
| CO1: To synthesize the drug molecules |
| CO2: To identify the reaction type with the help of different catalyst used. |
| CO3: To demonstrate the reaction mechanism of particular reactions during practical |
| CO4: To explain and perform the reaction procedure |
| CO5: Demonstrate the use of apparatus used for the synthesizing the compounds |
| CO6: Demonstrate the analysis of the compound and calculations |

**Course Outcomes (COs):**

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Course: Pharmaceutics Lab-III - [BPH\_C\_606\_L]**  **Term: 6 - Semester** | | | | | | | | | | | |
| **CO** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** |
| CO1 | 2 |  |  |  |  |  |  |  |  |  |  |
| CO2 | 2 |  |  |  |  |  |  |  |  |  |  |
| CO3 | 2 |  |  |  |  |  |  |  |  |  |  |

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| --- |
| CO1: Formulate solid dosage forms like tablets and capsules and evaluate them for their quality |
| CO2: Understand the tablet coating process. |
| CO3: Learn the concepts of accelerated stability testing and shelf life calculations |

**Course Outcomes (COs):**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Course: Pharmaceutical Analysis Lab-II - [BPH\_C\_607\_L]**  **Term: 6 - Semester** | | | | | | | | | | | |
| **CO** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** |
| CO1 |  |  | 1 | 2 |  |  |  | 1 |  |  | 1 |
| CO2 |  |  | 1 | 2 |  |  |  | 1 |  |  |  |
| CO3 |  |  | 2 | 2 |  |  |  | 1 |  |  |  |
| CO4 | 2 |  | 2 |  |  |  |  |  |  |  |  |
| CO5 |  |  | 2 |  |  |  |  |  |  |  | 1 |

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| --- |
| CO1: Record the absorbance and calculate concentration of analyte in formulation or as an api by use of a(1%, 1cm), single point and double point standardisation by uv spectrophotometer. |
| CO2: Relate and construct linear regression analysis data for colorimetric assays and operate a colorimeter instrument. |
| CO3: Record and calculate the concentration of an analyte by measure of fluorescence of an analyte in absence and presence of quenching agent. |
| CO4: Operate a ph meter, measure equivalence point by potentiometric titration, calculate pka and normality for a given acid or mixture of acids. |
| CO5: Understand the sample preparation technique for ftir spectroscopy, interpret the ir spectra to identify the functional groups of an analyte, and understand the working of a flame photometer. |

**Course Outcomes (COs):**

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| **Course: Nutraceuticals and Dietary Supplements - [BPH\_E\_508\_T]**  **Term: 5 - Semester** | | | | | | | | | | | |
| **CO** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** |
| CO1 |  | 2 |  |  |  |  |  |  |  |  |  |
| CO2 |  | 2 |  |  |  |  |  |  |  |  | 2 |
| CO3 |  | 2 |  |  |  |  |  |  |  |  |  |
| CO4 |  | 2 |  |  |  |  |  |  |  |  |  |
| CO5 |  | 2 |  |  |  |  |  |  |  |  |  |

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| --- |
| CO1: Explain concept of nutraceuticals and dietary supplements, classify these based on chemical nature, health benefits and mechanism of action |
| CO2: Discuss the chemistry of phytochemicals, their health benefits, pharmacokinetics, interactions with food and recommended doses along with the marketed preparations |
| CO3: Explain the challenges in formulating nutraceuticals |
| CO4: Understand the significance of safety and stability studies of nutraceuticals |
| CO5: Describe the labeling and regulatory aspects for manufacture and sale of nutraceutical products. |

**Course Outcomes (COs):**

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| **Course: Cosmeticology - [BPH\_E\_512\_T]**  **Term: 5 - Semester** | | | | | | | | | | | |
| **CO** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** |
| CO1 | 2 |  |  |  |  |  |  |  |  |  |  |
| CO2 | 2 |  |  |  |  |  |  |  |  |  |  |
| CO3 | 2 |  |  |  |  |  |  |  |  |  |  |
| CO4 | 2 |  |  |  |  |  |  |  |  |  |  |

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| --- |
| CO1: Discuss the various raw materials for cosmetics |
| CO2: Understand the toxicological aspects and toxicity testing for cosmetics. |
| CO3: Discuss the various cosmetics products w.r.t. raw materials, large scale manufacturing and functional and physicochemical evaluation |
| CO4: Know the regulatory guidelines and sensorial assessment for cosmetics |

**Course Outcomes (COs):**

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| **Course: Biopharmaceutics & Pharmacokinetics - [BPH\_E\_609\_T]**  **Term: 6 - Semester** | | | | | | | | | | | |
| **CO** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** |
| CO1 | 2 |  |  |  |  |  |  |  |  |  |  |
| CO2 | 2 |  |  |  |  |  |  |  |  |  |  |
| CO3 | 2 |  |  |  |  |  |  |  |  |  |  |
| CO4 | 2 |  |  |  |  |  |  |  |  |  |  |
| CO5 | 2 |  |  |  |  |  |  |  |  |  |  |

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| CO1: Explain the basic terms used in biopharmaceutics and pharmacokinetics |
| CO2: Understand the concept of pharmacokinetics models and significance of various pharmacokinetic parameters |
| CO3: Understand bcs classification, theories of dissolution and methods of dissolution testing |
| CO4: Explain the concepts of bioavailability and bioequivalence and ivivc |
| CO5: Solve problems based on principles of pharmacokinetics |

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| **Course: Pharmaceutical Excipients - [BPH\_E\_613\_T]**  **Term: 6 - Semester** | | | | | | | | | | | |
| **CO** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** |
| CO1 | 2 |  |  |  |  |  |  |  |  |  |  |
| CO2 | 2 |  |  |  |  |  |  |  |  |  |  |
| CO3 | 2 |  |  |  |  |  |  |  |  |  |  |
| CO4 | 2 |  |  |  |  |  |  |  |  |  |  |

**Course Outcomes (COs):**

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| --- |
| CO1: Define, classify and elaborate on regulatory aspects of pharmaceutical excipients. |
| CO2: Understand the characterization and interactions of excipients with apis and packaging materials |
| CO3: Elaborate on common and novel excipients in pharmaceuticals |
| CO4: Explain the role of polymers as excipients. |

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| **Course Outcomes (COs) - Program Specific Outcomes (PSOs) matrices:-** |

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| **Curriculum:**  B. in Pharm 2016-2020; (SEM VII & VIII) |

**Program Level Course - PO Matrix Report**

**Program Outcomes (POs):**

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| --- |
| 1 . Pharmacy Knowledge: Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices. |
| 2 . Planning Abilities: Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines. |
| 3 . Problem analysis: Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate and apply information systematically and shall make defensible decisions. |
| 4 . Modern tool usage: Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations. |
| 5 . Leadership skills: Understand and consider the human reaction to change, motivation issues, leadership and team-building when planning changes required for fulfillment of practice, professional and societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and wellbeing. |
| 6 . Professional Identity: Understand, analyze and communicate the value of their professional roles in society (e.g. health care professionals, promoters of health, educators, managers, employers, employees). |
| 7 . Pharmaceutical Ethics: 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. Selfassess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis. |

**Course Outcomes (COs) - Program Outcomes (POs) matrices:-**

**Course Outcomes (COs):**

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| **Course: Pharmaceutical Chemistry II - [BPH\_C\_701\_T]**  **Term: 7 - Semester** | | | | | | | | | | | |
| **CO** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** |
| CO1 | 3 |  |  |  |  |  |  |  |  |  |  |
| CO2 | 3 |  |  | 1 |  |  |  |  |  |  |  |
| CO3 | 3 |  |  |  |  |  |  |  |  |  |  |
| CO4 | 3 |  |  |  |  |  |  |  |  |  |  |
| CO5 | 3 |  |  |  |  |  |  |  |  |  |  |

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| --- |
| CO1: Students will gain knowledge in the areas chemotherapy for cancer, antiviral diseases, cardiovascular drugs, antihistaminincs and hypoglycemic agents. |
| CO2: Learn structure including stereochemistry, chemical name and selected synthesis of different drugs. |
| CO3: Explain the effects of structural modifications on different drugs activity. (sar). |
| CO4: Explain mechanism of action in relation to molecular targets (eg. receptors, neurotransmitters etc.). |
| CO5: Identify metabolites of the drugs and predict whether they are active / inactive metabolites. |

**Course Outcomes (COs):**

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| **Course: Pharmacognosy-III - [BPH\_C\_702\_T]**  **Term: 7 - Semester** | | | | | | | | | | | |
| **CO** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** |
| CO1 | 2 |  |  |  |  |  |  |  |  |  |  |
| CO2 | 2 |  |  |  |  |  |  |  |  |  |  |
| CO3 | 2 |  |  |  |  |  |  |  |  |  |  |
| CO4 | 2 |  |  |  |  |  |  |  |  |  |  |
| CO5 | 2 |  |  |  |  |  |  |  |  |  |  |
| CO6 | 2 |  |  |  |  |  |  |  |  |  |  |
| CO7 | 2 |  |  |  |  |  |  |  |  |  |  |

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| --- |
| CO1: Write the source, composition, general methods of extraction, evaluation, chemical tests, therapeutic uses of crude drugs containing phytoconstituents like steroidal, triterpenoidal, anthraquinone, flavonoidal glycosides, alkaloids glycoproteins |
| CO2: Write the biosynthesis of biosynthesis of alkaloids obtained from different amino acids |
| CO3: Understand regulatory requirements for manufacture and sale of ayurvedic, siddha and unani (asu) medicines and phytopharmaceuticals, monographs of herbal drugs |
| CO4: Apply the knowledge of excipients from natural origin and pharmaceutical technology to herbal formulation and understand the challenges in herbal formulation |
| CO5: Understand the concept of herbal drug standardization and its application to herbal formulation. |
| CO6: Apply the knowledge of pharmacology to understand pharmacodynamic and pharmacokinetic interactions of herbal drugs with food. |
| CO7: Apply spectroscopic techniques to characterize small molecules both from the categories of aromatic and aliphatic nature. |

**Course Outcomes (COs):**

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| **Course: Pharmaceutical Analysis III - [BPH\_C\_703\_T]**  **Term: 7 - Semester** | | | | | | | | | | | |
| **CO** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** |
| CO1 | 2 |  |  |  |  |  |  |  |  |  |  |
| CO2 |  |  | 1 |  |  |  |  |  |  |  |  |
| CO3 |  |  | 1 |  |  |  |  |  |  |  |  |
| CO4 |  |  |  | 2 |  |  |  |  |  |  |  |
| CO5 | 1 |  | 2 |  |  |  |  |  |  |  |  |

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| --- |
| CO1: Explain various methods used for multicomponent analysis of drugs by uv spectroscopy. |
| CO2: Summarize chromatographic and hyphenated techniques used for the separation, identification and quantification of analytes. |
| CO3: Describe the working of proton 1h nmr spectroscopy and mass spectrometry. |
| CO4: Interpret spectral data to predict structure of a given compound. |
| CO5: Summarize the parameters of ich guidelines for analytical method validation. |

**Course Outcomes (COs):**

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| **Course: Pharmacology III - [BPH\_C\_704\_T]**  **Term: 7 - Semester** | | | | | | | | | | | |
| **CO** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** |
| CO1 | 2 |  |  |  |  |  |  |  |  |  |  |
| CO2 | 2 |  |  |  |  |  |  |  |  |  |  |
| CO3 | 2 |  |  |  |  |  |  |  |  |  |  |
| CO4 | 2 |  |  |  |  |  |  |  |  |  |  |
| CO5 | 2 |  |  |  |  |  |  |  |  |  |  |

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| --- |
| CO1: Classify the drugs on the basis of their structure and pharmacological action. |
| CO2: Explain pharmacology of drugs acting on central nervous system and associated diseases. |
| CO3: Discuss the pharmacology of anti-inflammatory drugs make use of knowledge of these drugs to justify their use in asthma and gout. |
| CO4: Describe the pharmacology of drugs used in gastrointestinal disorders. |
| CO5: Identify the symptoms and discuss the management of heavy metal, drugs, methanol and opioid poisoning. |

**Course Outcomes (COs):**

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| **Course: Pharm Juri - [BPH\_C\_705\_T]**  **Term: 7 - Semester** | | | | | | | | | | | |
| **CO** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** |
| CO1 | 2 |  |  |  |  |  |  |  |  |  |  |
| CO2 | 2 |  |  |  |  |  |  |  |  |  |  |
| CO3 | 2 |  |  |  |  |  |  |  |  |  |  |
| CO4 | 2 |  |  |  |  |  |  |  |  |  |  |

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| --- |
| CO1: Interpre pharmaceutical legislation |
| CO2: Understand pricing of drugs and pharmaceuticals |
| CO3: Summarize offences and penalties concerned with laws for drugs and pharmaceuticals |
| CO4: Gain an insight into drug regulatory affairs |

**Course Outcomes (COs):**

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| **Course: Pharmacognosy Lab II - [BPH\_C\_706\_L]**  **Term: 7 - Semester** | | | | | | | | | | | |
| **CO** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** |
| CO1 | 2 |  |  |  |  |  |  |  |  |  |  |
| CO2 | 2 |  |  |  |  |  |  |  |  |  |  |
| CO3 | 2 |  |  |  |  |  |  |  |  |  |  |
| CO4 | 2 |  |  |  |  |  |  |  |  |  |  |
| CO5 | 2 |  |  |  |  |  |  |  |  |  |  |
| CO6 | 2 |  |  |  |  |  |  |  |  |  |  |

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| --- |
| CO1: 1. identify crude drugs based on morphological characters, microscopic characters and give biological source with the chemical constituents and therapeutic uses. |
| CO2: 2. apply the knowledge of microscopic characters in ascertaining the genuinely of powdered formulations. |
| CO3: 3. extract and perform qualitative chemical rests on the crude drugs containing anthraquinone glycosides, cardiac glycosides, flavonoids, cyanogenetic glycosides, alkaloids, triterpenoid and steroidal glycosides, saponins, tannins. |
| CO4: 4. apply analytical procedures and principles for quantitative determination of total aldehyde content / phenol content / total alkaloids from crude drugs. |
| CO5: 5. understand principles involved apply these for carrying out extraction of active constituents. |
| CO6: 6. identify crude drugs based on the morphological characters and quote some formulations available in market with their therapeutic utility. |

**Course Outcomes (COs):**

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| **Course: Pharmaceutical Analysis Lab III - [BPH\_C\_707\_L]**  **Term: 7 - Semester** | | | | | | | | | | | |
| **CO** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** |
| CO1 | 2 |  |  | 1 |  |  |  |  |  |  |  |
| CO2 | 1 |  |  | 1 |  |  |  |  |  |  |  |
| CO3 | 2 |  |  | 1 |  |  |  |  |  |  |  |
| CO4 | 2 |  | 2 |  |  |  |  |  |  |  |  |

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| --- |
| CO1: Record, calculate and interpret data obtained by uv spectrophotometric analysis for pka determination and concentration determination by multicomponent analysis techniques. |
| CO2: Apply ich guidelines to validate an analytical method by uv spectroscopy and interpret results obtained. |
| CO3: Develop and optimize mobile phase composition for qualitative analysis by tlc and interpret qualitative analysis data by tlc and paper chromatography. |
| CO4: Outline working and application of column chromatography, hplc and gc. |

**Course Outcomes (COs):**

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| **Course: Pharmaceutical Chemistry III - [BPH\_C\_801\_T]**  **Term: 8 - Semester** | | | | | | | | | | | |
| **CO** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** |
| CO1 | 3 |  |  |  |  |  |  |  | 1 |  | 1 |
| CO2 | 3 |  |  |  |  |  |  |  |  |  |  |
| CO3 | 3 |  |  |  |  |  |  |  |  |  |  |
| CO4 | 3 |  |  |  |  |  |  |  |  |  |  |
| CO5 | 3 |  |  |  |  |  |  |  |  |  |  |

|  |
| --- |
| CO1: Gain knowledge about therapeutic uses, side effects of drugs used in cns, ans disorders and as nsaid, steroids. |
| CO2: Learn structure including stereochemistry, generic name, chemical name and selected synthesis of different drugs. |
| CO3: Explain the effects of structural modifications on different drugs activity (sar), rational development if any. |
| CO4: Explain mechanism of action in relation to molecular targets (eg. receptors, neurotransmitters etc.) |
| CO5: Identify metabolites of the drugs and predict whether they are active / inactive metabolites. |

**Course Outcomes (COs):**

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| **Course: Pharmaceutics-IV - [BPH\_C\_802\_T]**  **Term: 8 - Semester** | | | | | | | | | | | |
| **CO** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** |
| CO1 | 2 |  |  |  |  |  |  |  |  |  |  |
| CO2 | 2 |  |  |  |  |  |  |  |  |  |  |
| CO3 | 2 |  |  |  |  |  |  |  |  |  |  |
| CO4 | 2 |  |  |  |  |  |  |  |  |  |  |

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| --- |
| CO1: Apply the knowledge of sterile technology in designing safe and effective injectables and ophthalmic products |
| CO2: Study the rationale for oral sr/cr products, principles of design, development and evaluation of sr formulations |
| CO3: Understand the concepts of validation and pilot plant scale up for large scale manufacturing operations |
| CO4: Understand the concept of biopharmaceutics and significance of various pharmacokinetic parameters |

**Course Outcomes (COs):**

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| **Course: Pharm. Chemistry Lab II - [BPH\_C\_803\_L]**  **Term: 8 - Semester** | | | | | | | | | | | |
| **CO** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** |
| CO1 | 2 |  |  |  |  |  |  |  |  |  |  |
| CO2 | 2 |  |  | 1 |  |  |  |  |  |  |  |
| CO3 | 2 |  |  |  |  |  |  |  |  |  |  |
| CO4 | 2 |  |  |  |  |  |  |  |  |  |  |

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| --- |
| CO1: The learner should be able to design and perform various unit operations of organic synthetic reactions. |
| CO2: The learner should be able to characterize reaction intermediates and final products. |
| CO3: The learner should be able to know the theoretical concepts behind organic synthesis. |
| CO4: The learner should be able to understand the concept and techniques of waste management. |

**Course Outcomes (COs):**

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| **Course: Pharmaceutics Lab IV - [BPH\_C\_804\_L]**  **Term: 8 - Semester** | | | | | | | | | | | |
| **CO** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** |
| CO1 | 2 |  |  |  |  |  |  |  |  |  |  |
| CO2 | 2 |  |  |  |  |  |  |  |  |  |  |
| CO3 | 2 |  |  |  |  |  |  |  |  |  |  |
| CO4 | 2 |  |  |  |  |  |  |  |  |  |  |
| CO5 | 2 |  |  |  |  |  |  | 2 |  |  |  |
| CO6 | 2 |  |  |  |  |  |  | 2 |  |  |  |

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| --- |
| CO1: Demonstrate the intricacies of formulation and development of parenterals and ophthalmic products. |
| CO2: Understand and know about quality control and documentation of a manufacturing process. |
| CO3: Know about the pharmacopoeial tests for these products and their packaging materials. |
| CO4: Explain the concept of dissolution testing as an important quality control tool and relate to its importance from regulatory point of view. |
| CO5: Apply pharmacokinetic principles of oral routes of administration. |
| CO6: Demonstrate oral and written communication skills and ability to plan the experimentation with proper time management |

**Course Outcomes (COs):**

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| **Course: Novel Drug Delivery System - [BPH\_E\_805\_T]**  **Term: 8 - Semester** | | | | | | | | | | | |
| **CO** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** |
| CO1 | 2 |  |  |  |  |  |  |  |  |  |  |
| CO2 | 1 |  |  |  |  |  |  |  |  |  |  |
| CO3 | 1 |  |  |  |  |  |  |  |  |  |  |
| CO4 | 1 |  |  |  |  |  |  |  |  |  |  |
| CO5 | 1 |  |  |  |  |  |  |  |  |  |  |

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| --- |
| CO1: Understand the basic concept of ndds |
| CO2: Discuss the different ndds for different routes-oral, transdermal, ocular, transmucosal and implantable |
| CO3: Explain the need and concepts of targeting and active & passive targeting |
| CO4: elaborate on principles and targeting systems for brain, colon, lymphatics and tumors |
| CO5: Discuss the various multiparticulate systems for targeting |

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| **Course: Clinical Pharmacy - [BPH\_E\_806\_T]**  **Term: 8 - Semester** | | | | | | | | | | | |
| **CO** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** |
| CO1 | 3 |  | 1 |  |  |  |  |  |  |  |  |
| CO2 | 3 |  |  |  |  |  |  |  |  |  |  |
| CO3 | 3 |  | 1 |  |  |  |  |  |  |  |  |
| CO4 | 3 |  | 2 |  |  |  |  |  |  |  |  |

**Course Outcomes (COs):**

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| --- |
| CO1: Relate the role of the pharmacist in different setups like clinics, pharmacies and in the community and explain the crucial role of pharmacists in patient counseling and eventually in drug adherence and compliance to therapy. |
| CO2: Discuss the types, risk factors, classification, methods of detection, monitoring and reporting of adrs, drug interactions, pharmacovigilance and tdm in normal as well as special populations. |
| CO3: Outline the process of drug discovery and development, ethical guidelines/schedules, role of ethics committee, essential documents in clinical trials/research, ba-be studies and, apply the role of gcp in the conduct of clinical research. |
| CO4: Identify and analyze the trends in drug use to optimize health outcomes |

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| **Course Outcomes (COs) - Program Specific Outcomes (PSOs) matrices:-** |