**3.1.1. Course Outcomes (SAR should include course outcomes of one course from each semester of study, however, should be prepared for all courses) (05)**

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| **Course : Organic Chemistry-I - [ 301 ]** | |
| CO1 | Understand fundamental principles developed in organic chemistry including electronegativity, resonance and tautomerism, reaction intermediates, acidity and basicity, nomenclature of organic compounds. |
| CO2 | Understand stereochemistry and represention of molecules by the use of projection formulae. |
| CO3 | Explain aromaticity, Propose resonating structures of aromatic compounds along with electrophilic and nucleophilic aromatic substitution. |
| CO4 | Explain chemistry of functional groups including methods of preparation, structures, and reactions.( alkane, alkene, alkyne and alkyl halide) |
| CO5 | Recall reagents and predict products for a defined set of organic reactions. |

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| **Course : Biochemistry-II - [ 302 ]** | |
| CO1 | students will be able to explain/describe the synthesis of proteins, lipids, nucleic acids and carbohydrates and their role in metabolic pathways along with their regulation at the transcriptional, translational and post-translational levels including RNA and protein folding, modification and degradation. |
| CO2 | students will be able to apply these pathways knowledge in studying drug mechanism of action, study of pharmacology and pharmaceutical chemistry. |
| CO3 | students will be able to describe the biochemical reactions in metabolic pathways of proteins, lipids, nucleic acids and carbohydrates |
| CO4 | students will be able to explain the micro-level anatomy and various biological and chemical components in the metabolic pathways. |
| CO5 | students will be able to apply genetic knowledge in DNA replication |
| CO6 | students will be able to explain and write metabolic pathways and their organic reactions. |

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| **Course : Dispensing Pharmacy - [ 303 ]** | |
| CO1 | 1. Understand the process of prescription handling, dispensing of prescription and OTC products, record keeping, labelling and packaging of dispensed products, latin terms and abbreviation |
| CO2 | 2. Apply accurate and standardized information on extemporaneous compounding and dispensing so as to ensure safe and therapeutic regimen of the patient |
| CO3 | 3. Calculate and measure the exact quantity of active pharmaceutical ingredients using appropriate laboratory measuring equipments and follow good compounding practices to obtain dosage form of desired quality attributes. |
| CO4 | 4. To identify, explain and design various dosage forms for compounding and dispensing. |
| CO5 | 5. Illustrate physical and chemical incompatibilities among active and inactive pharmaceutical ingredients of a formulation, recommend and follow approaches to avoid incompatibilities and unwanted drug interactions. |

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| **Course : Pharmaceutical Engineering - [ 304 ]** | |
| CO1 | Explain fluid mechanics and Principles involved in fluid flow also classify pumps explain its construction & working |
| CO2 | Summarize processes/theory of heat and mass transfer, Crystallization, Evaporation, Refrigeration,Distillation and Conveying. |
| CO3 | Explain principle behind working and construction of Heat interchangers, Crystallizers, Evaporators, refrigeration apparatus, distillation apparatus and conveyors. |
| CO4 | Classify and summarize properties of material for construction of industrial plant and explain processes of corrosion, methods of combating corrosion and safety regulations for various industrial hazards. |

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| **Course : Anatomy, Physiology & Pathology - [ 305 ]** | |
| CO1 | Recognize and define various terminologies related to human body and human health |
| CO2 | Demonstrate the knowledge of anatomy of the different body systems mentioned in the course |
| CO3 | Discuss in detail the physiology of urinary, digestive, reproductive and cvs systems from a regional prospective |
| CO4 | Describe briefly the pathophysiology of various diseases of cardiovascular, urinary, digestive and reproductive system |

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| **Course : Mathematics - [ 306 ]** | |
| CO1 | Find nth derivative of a function and differentiate partially function of two variables and determine error,maxima minima and series expansion. |
| CO2 | Evaluate integrals and determine length of curve,area under a curve and volume of solid of revolution. |
| CO3 | Construct and solve some simple Differential equations . |
| CO4 | Solve system of Linear equations using determinants and matrices. |
| CO5 | Apply numerical methods for interpolation,estimation and to evaluate definite Integrals. |

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| **Course : Organic chemistry-I Lab - [ 307 ]** | |
| CO1 | Design procedure for isolation,purification and characterization of organic compounds demonstrating safety rules in laboratory. |
| CO2 | Evaluate the data collected and summarize findings in writing in a clear and concise manner. |
| CO3 | Follow the proper procedures and regulations for safe handling and use of chemicals. |
| CO4 | Communicate the concepts and results of their laboratory experiments through effective writing and oral communication skills. |
| CO5 | Understand the objective of their chemical experiments, properly carry out the experiments, and appropriately record and analyze the results. |
| CO6 | Use standard laboratory equipment, modern instrumentation, and classical techniques to carry out experiments. |

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| **Course : Biochemistry-I Lab - [ 308 ]** | |
| CO1 | Students will be able to explain the qualitative analysis of carbohydrates and proteins. |
| CO2 | Students will be able to explain the qualitative analysis of nucleic acids and enzymes. |
| CO3 | Students will be able to explain the quantitative analysis of carbohydrates by Willstater's and Lane Eynon's methods. |
| CO4 | Students will be able to explain the quantitative analysis of proteins by Folin and Biuret method. |
| CO5 | Students will be able to explain the quantitative analysis of enzymes by Vmax and Km determination and DNA, RNA. |
| CO6 | Students will be able to explain the quantitative analysis and properties of lipids by determining acid value, iodine value and saponification value. |

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| **Course : Dispensing & Community Pharmacy Lab\_SY - [ 309 ]** | |
| CO1 | Demonstrate ability to formulate various dosage forms like solutions, suspension, emulsion, suppositories, semisolids, solid dosage forms. |
| CO2 | Applying basic calculation for dispensing and compounding. |
| CO3 | Understand method of packaging and labelling of different dosage forms. |
| CO4 | Understand the basic stability problems of formulations and solutions of such kind of problems. |
| CO5 | Understand good dispensing and compounding. |
| CO6 | Understand the need and use of dispensing record. |

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| **Course : Pharmaceutical Chemistry-I - [ 201 ]** | |
| CO1 | Draw and explain the structures of various molecules or ions based on the concept of ionic and covalent bonding |
| CO2 | Explain the rate law of a chemical reaction and apply the knowledge of principles like hammonds postulate, reactivity and selectivity microscopic reversibility to predict the nature of reaction and product formation rate |
| CO3 | Differentiate the types of catalytic reactions and explain the role of catalyst |
| CO4 | Classify gastrointestinal agents, topical agents, saline cathartics,expectorants, emetics, antidotesand explain their mode of action.describe sclerosing agents and complexing agents |
| CO5 | Classify electrolytes/ elements and elaborate their physiological role. explain use of physiological ions in replacement therapy, acid-base balance and combination therapy. |
| CO6 | Explain the basic concepts of radiochemistry and biological effects of radiation; describe diagnostics and therapeutic uses of radiopharmaceuticals. |

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| **Course : Biochemistry-II\_SY - [ 202 ]** | |
| CO1 | List and identify the commonly occurring carbohydrates, amino acids and fatty acids |
| CO2 | Describe higher order stuctures like oligo and poly saccharides/peptides and membrane lipids |
| CO3 | Classify the different vitamins in terms of their aqueous solubility and the biochemical reactions/role they are involved in. |
| CO4 | Define the laws of thermodynamics and explain the concepts of gibbs free energy, favorable and unfavourable reactions and role of atp and nadh as energy carriers |
| CO5 | Describe the process of digestion, absorption, storage and retrieval of different cellular nutrients |
| CO6 | Describe the factors affecting enzyme activity,derivation of enzyme kinetic equation and endogenous regulation of enzyme activity |

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| **Course : Pharmaceutics-I - [ 203 ]** | |
| CO1 | Discuss in detail about the pharmacy profession, status of pharmaceutical industry in India along with various compendia and systems of medicine. |
| CO2 | Illustrate about various dosage form, routes of administration, Pharmacokinetics processes, bioavailability, biopharmaceutics, drug efficiency and dose efficiency. |
| CO3 | Explain and analyze various properties, preformulation, formulation, packaging, quality control aspects of monophasic liquids and powders along with overview on few examples of dosage form of above category. |
| CO4 | Calculate strengths and quantities required in formulations. |
| CO5 | Illustrate in detail about dissolution, rheology, diffusion and complexation and their applications in Pharmacy. |
| CO6 | Describe the importance of Good Manufacturing Practices and quality assurance in pharmacy. |

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| **Course : Physical Pharmacy-II - [ 204 ]** | |
| CO1 | Explain the concepts, laws, theories and importance of buffers, interfacial phenomena, solubility and distribution phenomenon in pharmacy. |
| CO2 | Demonstrate the concepts and application of chemical kinetics and accelerated stabilities |
| CO3 | Describe preparation and properties of colloids |
| CO4 | Understand the concept of electromotive force and describe different types of electrodes |
| CO5 | Derive different equations mention in the course |
| CO6 | Solve the different problems based on the topic mentioned in the course |

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| **Course : Anatomy, Physiology & Pathology-II - [ 205 ]** | |
| CO1 | Describe the concept of cell injury,cellular adaptation and disturbances in cell growth. |
| CO2 | Communicate the scientific terminologies and concepts of anatomy,physiology & pathophysiology mentioned in the course using both verbal and written communications. |
| CO3 | Describe the structure,function and mechanism involved in maintenance of normal functioning of human sense organ. |
| CO4 | Identify targets for the drug therapy based on pathophysiology of the diseases mentioned in the course. |
| CO5 | Recognize the disease mentioned in the course based on sign,symptoms and results of diagnostic tests. |
| CO6 | Discuss the biological roles of radiations on human body. |

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| **Course : Organic Chemistry-II - [ 411 ]** | |
| CO1 | Memorize and classify structures of organic functional groups |
| CO2 | Apply the basic rules of organic nomenclature to convert between structures and names |
| CO3 | Recall reagents and predict the products for defined set of organic reactions |
| CO4 | Propose resonating structures |
| CO5 | Propose and explain the name reactions along with rearrangement of particular functional group |
| CO6 | Apply the basic rules of shifting electrons from molecules to molecules |

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| **Course : Pharmaceutical Analysis-I - [ 412 ]** | |
| CO1 | - The aim of the course is to furnish students with the advanced technical skills and knowledge base that is required in the field of pharmaceutical titrimetric analysis and which will enable them to pursue careers as analysts in the chemical and/or pharmaceutical industry. After completion of topic student/learner will be able to:- 1. Understand the qualitative and quantitative estimation of chemical compounds. (CLO2) |
| CO2 | 2. Describe the methods of using different fundamental techniques. (CLO1) |
| CO3 | 3. Differentiate the analytical techniques used in pharmaceutical industry with reference to Indian Pharmacopoeia. (CLO2) |
| CO4 | 4. Apply theoretical applications of analytical methods of titration.(CLO3) |
| CO5 | 5. Associate separational techniques studied in separation of pharmaceutical drug products.(CLO2) |
| CO6 | 6. Categorize pharmacopeial official drugs by their method of titrations.(CLO4) |

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| **Course : Pharmaceutics-II - [ 413 ]** | |
| CO1 | Solve the stability related problems of dispersed system and explain it’s formulation, manufacturing and rheological aspect. |
| CO2 | Explain the mechanism of skin penetration, quality control and manufacturing of semisolids. |
| CO3 | Describe the mechanism rectal absorption, formulation, quality control of suppositories |
| CO4 | Describe use and quality control of various blood products. |
| CO5 | Classify sutures and ligature and describe their quality control test. |

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| **Course : Pharmacology-I - [ 414 ]** | |
| CO1 | Communicate the scientific terminologies of pharmacology mentioned in the course using both verbal and written communication. |
| CO2 | Describe the concepts of pharmacology mentioned in the course. |
| CO3 | Apply the general principles of pharmacology to justify the modified/toxic effects of drugs. |
| CO4 | Reproduce the classification of the diuretics and the drugs acting on ans,cvs |
| CO5 | Discuss mechanism of action and therapeutic rationale of diuretics and drugs acting on ans, cvs. |
| CO6 | Identify the prominent side effects and adverse effects of drugs mentioned in the course. |

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| **Course : Microbiology - [ 415 ]** | |
| CO1 | Describe the basics of microbiology. |
| CO2 | Describe the basics of microscopy |
| CO3 | Differentiate microorganisms based on various staining techniques |
| CO4 | Explain microorganisms like fungi, algae, protozoa, viruses, bacteria |
| CO5 | Explain various methods to control microorganisms |

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| **Course : Mathematics & Statistics - [ 416 ]** | |
| CO1 | Demonstrate various measures of central tendency for discrete as well as continuous data. |
| CO2 | Demonstrate various measures of dispersion for discrete as well as continuous data. |
| CO3 | Apply standard probability distributions to compute probability in various situations and fit proper curve to the given data. |
| CO4 | Apply proper technique to test null hypothesis against alternative hypothesis using various parametric as well as non parametric tests. |

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| **Course : Pharmaceutical Analysis Lab-I - [ 417 ]** | |
| CO1 | Provide students with the ability to plan and carry out experiments using instrumental techniques independently |
| CO2 | To interpret the data; assess the quality of the data and to assess the significance of the outcomes |
| CO3 | Understand the qualitative and quantitative estimation of chemical compounds. |
| CO4 | Identify and locate the impurities through different fundamental techniques. |
| CO5 | Differentiate the analytical techniques used in pharmaceutical with reference to indian pharmacopoeia. |

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| **Course : Pharmaceutics Lab-II - [ 418 ]** | |
| CO1 | Applying basic knowledge of stability of dispersed systems in preparation and evaluation of suspension and emulsions. |
| CO2 | Apply basic knowledge of preparation in formulation of semisolid and perform their micromeritic evaluation. |
| CO3 | Understand the basic concept of displacement value and implement that knowledge in the prepartion of suppositories. |
| CO4 | Understand method of packaging and labelling of different dosage forms |

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| **Course : Pharmacology\_Lab-I - [ 419 ]** | |
| CO1 | Discuss the role & scope of experimental pharmacology in the drug discovery process. |
| CO2 | Demonstrate the required techniques,skills and good laboratory practices for the experimental pharmacology |
| CO3 | Explain the scientific terminologies and principles of experimental pharmacology mentioned in the course. |
| CO4 | Interpret the obtained data and results of experiments mentioned in the course. |
| CO5 | Communicate the required skills for animal handling and ethical regulations for experimental pharmacology using both verbal and written communication tool. |

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| **Course : Microbiology Lab - [ 420 ]** | |
| CO1 | Demonstrate safe practices of microbiology laboratory. |
| CO2 | Transfer living microbes using aseptic technique |
| CO3 | Demonstrate expertise in the use of the laboratory techniques such as pour plate and streak plate isolation, bacterial staining and count and proper handling of bacterial culture. |
| CO4 | Visually identify macroscopic and microscopic characteristics of fungi, protozoa, and Bacteria. |
| CO5 | Explain macroscopic and microscopic characteristics of fungi, protozoa and bacteria and principle of different staining techniques. |
| CO6 | Present and interpret results of experiment |

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| **Course : Physical Organic Chemistry - [ 101 ]** | |
| CO1 | 1. describe molecular structure by the use of the valence bonding theory and molecular orbital theory |
| CO2 | 2. analyze kinetics as a tool for understanding reaction mechanisms , use kinetic data for interpretation of reaction mechanisms , calculate a reactions activation energy, enthalpy of activation and entropy of activation by help of arrhenius and eyrings equations |
| CO3 | 3. determine if a reaction is acid or base catalyzed (specific or general catalysis) from kinetic data , use of the hammett equation as a tool in studies of organic reactions |
| CO4 | 4. recognize reaction intermediates, symmetry controlled reactions and kinetics and charge transfer complexes. |

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| **Course : Physical Pharmacy-I - [ 102 ]** | |
| CO1 | Describe properties of various states of matter, concepts of liquid crystalline state, supercritical fluids, liquefication of gases and discuss their importance in pharmacy |
| CO2 | Understand basic physiochemical properties of substances such as refractive index, optical rotation and dipole moment |
| CO3 | Demonstrate concept of thermodynamics, explain laws of thermodynamics and various thermodynamic quantities |
| CO4 | Explain theory of electrolytes and non-electrolytes including colligative properties and process of distillation. |
| CO5 | Solve the problems mention in the syllabus |

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| **Course : Anatomy, Physiology & Pathology-I - [ 103 ]** | |
| CO1 | describes the structure, functions of various organs of the human body and mechanisms in the maintenance of normal functioning and disease state. |
| CO2 | Correlate the overall anatomy physiology and pathophysiology of organ systems with the different disorders mentioned in the course. |
| CO3 | identify the various tissues and organs of the different systems of the human body mentioned in the course. |
| CO4 | Identify the the abnormalities responsible for disease and targets for the drug therapy mentioned in the course. |

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| **Course : Environment Sciences - [ 104 ]** | |
| CO1 | To study the importance of environmental science and environmental studies |
| CO2 | To know the importance of key to the future of mankind. |
| CO3 | To study continuing problems of pollution, loss of forget, solid waste disposal, degradation of environment,issues like economic productivity and national security |
| CO4 | Study of global warming, the depletion of ozone layer and loss of biodiversity have made everyone aware of environmental issues. |
| CO5 | Students shall able to explain various source of energy and how to optimize the use of natural resource |

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| **Course : Physical Pharmacy-I Lab - [ 106 ]** | |
| CO1 | .understand use of various instrumental methods like abbe refractometer, polarimeter , ostwald viscometer to determine various physical properties, structure and composition of substance. |
| CO2 | Determine physicochemical properties of drug/s like partition coefficient and their application in pharmacy. |
| CO3 | .apply theoretical knowledge in determining molecular weight of substances using concept of colligative properties. |
| CO4 | .apply concept of thermochemistry and determine heat of solution. |

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| **Course : Anatomy, Physiology & Pathology Lab-1 - [ 107 ]** | |
| CO1 | Develop the skills required for performing haematological diagnostic test like rbc and wbc count etc |
| CO2 | 2.correlate the results of diagnostic findings with the pathological disorders. |
| CO3 | identify the types of bones and structure comprising axial and appendicular skeleton and discuss their physiological role. |
| CO4 | Discuss the normal finding of diagnostic test along with the significance in pharmacotherapeutics |
| CO5 | to identify the different tissues and discuss their function and clinical considerations. |

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| **Course : Computer Lab - [ 108 ]** | |
| CO1 | Explain computer hardware and operating system. |
| CO2 | Demonstrate knowledge of networking in day to day life |
| CO3 | Apply knowledge of computer in various field of pharmacy |

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| **Course : Pharmacology-II - [ 512 ]** | |
| CO1 | List the major drugs and drug classes currently used in microbial/parasite infections, endocrine and hematological disorders and as immunomodulators |
| CO2 | Explain the disease burden due to microbial/parasitic infection and pharmacology of major drugs used to treat these infections |
| CO3 | Understand the pathophysiology of endocrine/hematological disorders and pharmacology of drugs used in associated disease |
| CO4 | Apply pharmacotherapy principles in microbial/parasite infections, endocrine and hematological disorders |
| CO5 | Explain the pharmacology of major drugs used immunomodulators in treatment of disease conditions |

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| **Course : Organic Chemistry-III - [ 511 ]** | |
| CO1 | The course embedded with basic chemical reaction, which gives an immense chemical utility to develop and generalized the reaction condition. It also help to resolve the mechanism which involved in drug synthesis in pharmaceutical chemistry |
| CO2 | By utilizing the basic knowledge, students are able to design the reaction in synthon approach; the re-framed knowledge will help the students by approaching them to named reaction wherever necessary. Moreover the generalized reaction are well understood by executed to help the students to utilize it while creating the structure and writing the IUPAC naming of medicinally active bio-constituents, as well as generalizing the mechanism of reaction while writing drug synthesis and SAR study in medicinal chemistry. |
| CO3 | The course help to develop the reaction conditions in drug synthesis, direct the student to understand stereo-chemical and catalytic properties of the reaction involved in drug synthesis |

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| **Course : Cosmeticology - [ 514 ]** | |
| CO1 | Student will be able to describe and summarize status , history and regulatory aspects in cosmetics industry.. |
| CO2 | Student will able to acquire and apply knowledge of basic raw materials needed in formulating different cosmetics |
| CO3 | Student will be able to explain the formulation considerations, large scale operations ,q.a aspects of skin creams, colored products, hair products and baby products. |
| CO4 | Student will be able to understand and explain bis standards and evaluation parameters for cosmetic products. |
| CO5 | Student will be able to summarize basic events in toxicological reactions and explain sensitivity tests of cosmetic products. |

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| **Course : Pharmaceutical Biotechnology - [ 513 ]** | |
| CO1 | Describe various biotechnological techniques studied during course. |
| CO2 | Discuss use of bioprocess technology to derive biopharmaceutical and immunological products |
| CO3 | Explain the applications of biotechnology in pharmaceutical industries. |
| CO4 | To recognize the current status of development and economic importance of biotechnological products in pharmaceutical industry. |

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| **Course : Pharmaceutical Management - [ 515 ]** | |
| CO1 | Understand and analyze to deal strength, weakness, opportunity , threat of an industry. |
| CO2 | Analyse the strategies to be taken by industry to maximise the growth and avoid the early saturation. |
| CO3 | Analysis of various differing forces impacting market performance by collective set of methods or marketing models |
| CO4 | Understanding of management principles as applied to Pharmaceutical industry |
| CO5 | Understanding the role of major regulatory bodies and importance of quality management systems. |
| CO6 | Apply knowledge and principles of financial management, brand management & marketing in general |

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| **Course : Organic chemistry-II Lab - [ 517 ]** | |
| CO1 | Develop the practical knowledge to purify the organic compounds by re-crystallization , developed the solvent selection strategy to re-crystallized the organic compound. this knowledge will help the students to purified the synthesized compound in industry as well as drug synthesis in laboratory . |
| CO2 | Students learned the experimental skills to separate the binary mixtures of organic compounds, and identifying the individual component after separation by using Qualitative analysis, this knowledge help the students to separate and purify the mixture of organic compound by following GLP in industry level . |

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| **Course : Pharmaceutical Biotechnology Lab - [ 518 ]** | |
| CO1 | Demonstrate isolation techniques and various biochemical test used for identification of bacteria |
| CO2 | Apply the knowledge of antimicrobial assays of antibiotics in selection of chemotherapeutic agent. |
| CO3 | To examine various samples ,finish products, raw material as per ip methods. |
| CO4 | Demonstrate isolation of dna., immobilization of enzymes/cells and agarose gel electrophoresis through effective use of laboratory equipments. |

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| **Course : Cosmeticology Lab - [ 519 ]** | |
| CO1 | 1. Apply the concepts of emulsions, pastes etc in formulating cosmeceutical preparations. |
| CO2 | Design new formulation systems with applied concepts related to pharmaceutics. |
| CO3 | Evaluate cosmetic products to optimize and obtain a stable product. |

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| **Course : Pharmaceutical Chemistry-I Lab - [ 206 ]** | |
| CO1 | Students will have a firm foundation in the fundamentals and application of current chemical and scientific theories including those in analytical, inorganic, organic and physical chemistries. |
| CO2 | Students will be able to design and carry out scientific experiments as well as accurately record and analyze the results of such experiments. |
| CO3 | Students will be able to proper laboratory safety and techniques with the fundamentals of acid/base chemistry, including ph calculations, buffer behavior, and acid/base titration |
| CO4 | Students will be skilled in problem solving, critical thinking and analytical reasoning as applied to scientific problems in qualitative and quantitative determination of inorganic compound, according to ip monograph |

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| **Course : Pharmaceutics Lab - [ 207 ]** | |
| CO1 | Prepare monophasic liquid systems and powder systems, justify the components and method of preparation |
| CO2 | Demonstrate the properties of the developed dosage forms , comment on the quality. |
| CO3 | Perform experiments as per glp and record in the journals |

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| **Course : Physical Pharmacy\_2 Lab - [ 208 ]** | |
| CO1 | Determine relative strength of acids and order of reaction using different methods |
| CO2 | Determine surface tension, hlb and critical solution temperature |
| CO3 | Find cmc of surfactants, determine molecular weight of polymers from viscosity determination |
| CO4 | Demonstrate use of potentiometer for determing buffer capacity |
| CO5 | Demostrate oral and written communication skill and ability to plan the experimentation with proper management of time |
| CO6 | Find surface area of solids by studying solid liquid adsorption |

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| **Course : Pharmaceutical Chemistry-II - [ 611 ]** | |
| CO1 | Explain the pharmacodynamics |
| CO2 | Apply the knowledge of proteins as a drug targets |
| CO3 | Discuss the different classes of drugs with their chemical aspects |
| CO4 | Explain/describe the pharmacokinetics |
| CO5 | Apply the knowledge of nucleic acids as a drug targets |
| CO6 | Describe the synthesis of the drug molecules |

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| **Course : Pharmaceutical Analysis-II - [ 612 ]** | |
| CO1 | Describe analytical knowledge and modern instrumentation for analysis of drugs |
| CO2 | Identify suitable method for single and multiple drugs analysis using basic concepts of uv spectroscopy |
| CO3 | Describe the ich guidelines for analytical calibration methods for basic instruments |
| CO4 | Apply theoretical knowledge in separation, identification and quantification of drugs from dosage forms |
| CO5 | Explain components of different instruments included in the course |
| CO6 | Describe various statistical data handling calculation and calibration methods |

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| **Course : Pharmaceutics-III - [ 613 ]** | |
| CO1 | define various terms prescribed in syllabus of pharmaceutics iii |
| CO2 | List i) different advantages, limitations, ideal properties and types of tablet, capsule, aerosol, aerosol components, tablet coating, blister and strip packaging, qc test ii) capsule shell defects raw materials used, steps of manufacturing and test for evaluation. |
| CO3 | Describe machines used for manufacturing of dosage form and coating machines prescribed in syllabus, material of construction, problems and defects in manufacturing of dosage form, evaluation of dosage form prescribed in syllabus of pharmaceutics iii packaging & remedies for the same, layout of tablet and capsule manufacturing area |
| CO4 | Explain formulation and manufacturing of dosage form prescribed in syllabus, humidity control in the capsule manufacturing area prescribed in syllabus |
| CO5 | Discuss blister and strip packaging techniques, construction of different equipments, physics of tablet compression and preformulation of tablet, mechanism of disintegration, aerosol component |
| CO6 | Apply theoretical information to solve case study of tablet |

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| **Course : Pharmacognosy and Phytochemistry-I - [ 614 ]** | |
| CO1 | To recognize the knowledge of complementary and alternative medicine and their application in therapeutics, along with classification and sources of dono. |
| CO2 | Describe techniques and practices in cultivation, collection, preparation, storage, packaging along with methods and tools used to control the quality of drugs of natural origin. |
| CO3 | Explain aspects of morphology and histology of different plant organs of crude drugs. |
| CO4 | Describe primary and secondary plant metabolites their biosynthesis, evaluation and therapeutic application |
| CO5 | Discuss pharmacognostic studies of primary metabolites such as carbohydrates, enzymes, proteins and fibres. |

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| **Course : Hospital Pharmacy and Drug store Management - [ 615 ]** | |
| CO1 | Explain the differences in the functions, layout, legal requirements, organization, drug procurement, storage and dispensing of medicines in a retail versus hospital pharmacy setting and different hospital health accessories |
| CO2 | Discuss the importance of documentation in the functioning of a pharmacy |
| CO3 | Demonstrate the knowledge of the importance of a hospital level formulation and compounding of parenterals. |
| CO4 | Describe the importance and functioning of the hospital sterile supply services department. |
| CO5 | Discuss the dangers/detection/reporting of fraudulent pharmacy practices and code of pharmaceutical ethics. |
| CO6 | Explain the concept of rational drug therapy. |

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| **Course : Pharmaceutical Chemistry Lab-II - [ 616 ]** | |
| 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 |

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| **Course : Pharmaceutical Analysis Lab-II - [ 617 ]** | |
| CO1 | Evaluate the data collected and summarize the finding in writing |
| CO2 | Understand the principle of pharmaceutical analysis and instrumentation of basic spectroscopy |
| CO3 | Apply the knowledge and skills to perform drug and dosage form analysis using different spectroscopy |
| CO4 | Perform separation, identification and quantification of drugs using different analytical methods for single components |
| CO5 | Demonstrate working of modern analytical instruments |
| CO6 | Describe various calculation parameters |

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| **Course : Pharmacognosy and Phytochemistry Lab-I - [ 619 ]** | |
| CO1 | Examine quality control and quantitative microscopy of crude drugs by different methods as per pharmacopeia |
| CO2 | Identify and explain morphological and histological features in entire and the powdered condition of suitable medicinal plants |
| CO3 | Demonstrate various chemical tests used for identification of primary metabolites |
| CO4 | Demonstrate the extraction techniques for isolation and purification of carbohydrates |

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| **Course : Pharmaceutics Lab-III - [ 618 ]** | |
| CO1 | Formulate and evaluate different granules (grc), tablets, and capsule, listed in the syllabus of pharmaceutics lab iii. |
| CO2 | Design the elegant label for different granules (grc), tablets, and capsule, listed in the syllabus of pharmaceutics lab iii. |
| CO3 | Name/ explain the role of every excipient in the formula, important labeling directions, important evaluation test |
| CO4 | Conclude the relation between failures of evaluation test with formulation parameters or performance of dosage form |
| CO5 | interprete the relation between bd, td, hours ratio and carrs index with flow rate. |

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| **Course : Pharmacology-III - [ 713 ]** | |
| 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. |

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| **Course : Pharmacology\_Lab-II - [ 719 ]** | |
| CO1 | Define bio-assay, list the types, methods and applications of bio-assay. |
| CO2 | Plan and perform bioassay using cock ileum. |
| CO3 | Record, calculate and interpret unknown drug or concentration of agonist/antagonist. |
| CO4 | Discuss the preclinical models which provide evidences on drug and their pharmacological activity. |
| CO5 | Relate and able to use ethical, regulatory and toxicity guidelines/rules (ich, oecd, cpcsea, schedule y) in drug/lead testing using preclinical animals. |
| CO6 | Demonstrate ability to effectively communicate the pharmacological terms and concepts mentioned in the course. |

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| **Course : Pharmaceutical Chemistry-III - [ 711 ]** | |
| CO1 | Discuss drugs chemical structures, classifications, synthesis, and nomenclature along with the generic names. |
| CO2 | Describe the relationship between drug’s chemical structure (sar), stereochemistry and its therapeutic properties |
| CO3 | Explain mechanism of action in relation to molecular targets (eg. receptors, neurotransmitters etc.) |
| CO4 | Identify metabolites of the drugs and predict whether they are active / inactive metabolites. |
| CO5 | Explain adverse drug reactions (adr), drug interactions and contraindications with proper justifications. |

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| **Course : Pharmaceutical Analysis Lab-III - [ 717 ]** | |
| CO1 | Evaluate the data collected and summarize the finding in writing in a clear and concise manner |
| CO2 | Understand the principle of pharmaceutical analysis and instrumentation |
| CO3 | Apply the knowledge and skills to drug analysis, dosage form analysis and pharmacokinetic calculations |
| CO4 | Perform separation, identification and quantification of drugs using different analytical methods |
| CO5 | Demonstrate working of modern analytical instruments |
| CO6 | Describe various analytical validation parameters |

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| **Course : Pharmaceutical Analysis-III - [ 712 ]** | |
| CO1 | Apply standard analytical techniques and modern instrumentation for analysis of drugs |
| CO2 | Differentiate polar and non-polar analyte separation methods |
| CO3 | Perform structure elucidation / evaluate using basic concepts of uv, mass and nmr spectroscopy |
| CO4 | Describe the ich guidelines for analytical method validation |
| CO5 | Apply theoretical knowledge in separation, identification and quantification of drugs from dosage forms |
| CO6 | Explain components of different instruments included in the course |

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| **Course : Pharmaceutics-IV - [ 714 ]** | |
| CO1 | Discuss in detail diverse routes of administration like parenterals, ocular, oral for sustained and controlled release system along with their formulations , processing and packaging considerations. |
| CO2 | Implement the acquired knowlege to suggest safe and effective formulations, processing and quality control of mentioned parenteral, ocular and oral sr/cr product along with quality control of parenteral packaging |
| CO3 | Understand concept, importance, kinetics, degradation pathways, methods to enhance stability of drugs and pharmaceuticalss, ich guidlines and regulatory aspects of marking drug product globally |
| CO4 | Solve the problems based on dose and shelf life calculation for pharmaceuticals |
| CO5 | Describe various quality control tests for various containers and closures used for parenterals products |

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| **Course : Pharmaceutics Lab-IV - [ 718 ]** | |
| CO1 | Prepare and document various types of injections formulation mentioned in the syllabus |
| CO2 | Prepare and document various types of opthalmic formulation mentioned in the syllabus |
| CO3 | Perform testing to identify the type of glass containers and rubber closures along with one example of product package interaction testing |
| CO4 | Perform stability testing of product along with its importance in pharmaceutical formulations |
| CO5 | Understand the importance of sterility tetsing by performing the sterility tetsing by demonstrated methods |

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| **Course : Pharmacognosy and Phytochemistry-II - [ 715 ]** | |
| CO1 | Discuss the natural products with respect to sources, active constituents (phytochemicals) ,biopotential and applications from different classes mentioned in the course. |
| CO2 | Describe the classification , biogenetic pathway , extraction method ,storage, evaluation and chemical test of identification of natural drugs mentioned in the course. |
| CO3 | Discuss natural drugs as nutraceuticals with respect to biological source, probable active constituents and uses. |
| CO4 | Give examples of few marketed nutraceutical preparations and commercially available pesticides and their composition. |
| CO5 | Explain detail pharmacognostic scheme of bold drugs. |

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| **Course : Pharmacognosy and Phytochemistry Lab-II - [ 720 ]** | |
| CO1 | To prepare sections and recognize histological and powder characteristics of crude drugs |
| CO2 | Demonstrate the ability to perform thin layer chromatography technique in identifying the active constituent with reference to standards. |
| CO3 | identify the composition of powder binary mixture of organized drugs by microscopically and natural drug specimens morphologically. |
| CO4 | Perform chemical test to identify different phytochemical classes present in the crude drugs |
| CO5 | Perform quantification of any one alkaloid by u.v. and discuss the applications of hptlc. |

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| **Course : Pharmaceutical Jurisprudence - [ 716 ]** | |
| CO1 | Define various terms used in pharmaceutical jurisprudence |
| CO2 | Describe - composition and working of regulating body, processes coming under various acts, labelling directions, various content prescribed in syllabus |
| CO3 | Explain objectives behind various act, offences under various acts, provisions coming under various acts, terms of references and recommendation of different committee, schedule m and y, |
| CO4 | Differentiate- between different content described in syllabus |
| CO5 | State schedules, qualification , duties and power of governing official |
| CO6 | Understand the various concepts of the pharmaceutical legislation prescribed in syllabus |

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| **Course : Pharmaceutics-V - [ 812 ]** | |
| CO1 | Explain the need of ndds with the concepts, advantages, theories, design, methods of preparations, evaluation and application of typical novel and targeted drug delivery systems. |
| CO2 | Appraise the importance quality assurance in industry along with gmp and cgmp guidelines. |
| CO3 | Illustarte the pilot plant scaling up for various dosage forms and process validation in industry. |
| CO4 | Describe different aspects of production management. |
| CO5 | Explain the general considerations and details for the layout designing in factory for various dosage forms. |
| CO6 | Relate the importance of documentation with preparations of few important documents related to pharma field. |

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| **Course : Pharmaceutics Lab-V - [ 817 ]** | |
| CO1 | Formulate(experiment) and evaluate the oral novel drug delivery systems like sustained release oral granules/tablets, buccal film, microcapsules, enteric coated tablet. |
| CO2 | Explain the basis for selection of dissolution media for different drugs based on bcs class, dissolution apparatus and test based on various dosage forms and relate importance of dissolution testing from regulatory point of veiw |
| CO3 | Demonstrate the validation of the process of mixing, dissolution for equipment used for these unit operations. |
| CO4 | Explain the importance of preparing sops for various apparatus or equipment and specification documents for raw material and apis to meet the regulatory standards. |
| CO5 | Prepare sops for of dissolution apparatus/tablet press/coating equipment and specification documents for various excipients and apis. |
| CO6 | Calculate different pharmacokinetic parameters from the plasma samples. |

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| **Course : Pharmaceutical Chemistry-IV - [ 811 ]** | |
| CO1 | Discuss drugs chemical structures, classifications, synthesis, and nomenclature along with the generic names. |
| CO2 | Describe the relationship between drug’s chemical structure (sar), stereochemistry and its therapeutic properties |
| CO3 | Explain mechanism of action in relation to molecular targets (eg. receptors, neurotransmitters etc.) |
| CO4 | Identify metabolites of the drugs and predict whether they are active / inactive metabolites. |
| CO5 | Explain adverse drug reactions (adr), drug interactions and contraindications with justifications. |

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| **Course : Pharmaceutical Chemistry Lab-III - [ 816 ]** | |
| CO1 | Develop an ability to work safely and efficiently in handling the common laboratory equipments and , chemicals that are used to carry out laboratory procedures. |
| CO2 | Explain the different reaction mechanisms of each synthesized product. |
| CO3 | Demonstrate purification techniques along with its physical characteristics |
| CO4 | Compare different methods of synthetic procedures. |
| CO5 | Summarize, compile and analyze experimental data. |