# SRI INDU INSTITUTE OF PHARMACY

**Sponsored by New Loyola Model Educational Society, Hyderabad.**
**(Approved by PCI – New Delhi, Affiliated to JNTUH- Hyderabad.)**
**Sheriguda, Ibrahimpatnam, R.R. Dist –501 510, Hyderabad, Telangana State.**
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## COURSE OUTCOMES OF B.PHARMACY (R17 Regulations)

| **COURSE OUTCOMES OF B. PHARMACY 1ST YEAR 1ST SEMESTER** | |
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| **COURSE CODE:PS101** | **COURSE NAME: HUMAN ANATOMY AND PHYSIOLOGY** |
| CO1 | To understand the morphology, structure and functions of various organs of the human body |
| CO2 | Describe various homeostatic mechanisms and their imbalances |
| CO3 | To study the functions of peripheral nervous systems and endocrine systems |
| CO4 | Identify various tissues of different systems of human body |
| **COURSE CODE:PS102** | **COURSE NAME: PHARMACEUTICAL ANALYSIS** |
| CO1 | Gain knowledge on fundamentals of analytical chemistry |
| CO2 | Helps to develop the fundamentals of various titrations |
| CO3 | Integrate the knowledge of volumetric and electrochemical analysis |
| CO4 | Comprehended details regarding minimization of errors |
| **COURSE CODE:PS103** | **COURSE NAME: PHARMACEUTICS 1** |
| CO1 | Fundamental knowledge on various dosage forms |
| CO2 | Idea on historical background and development of pharmacy |
| CO3 | Acquainted with basics of different dosage forms, pharmaceutical incompatibility and pharmaceutical calculations. |
| CO4 | Preparations of various conventional dosage forms |
| **COURSE CODE:PS104** | **COURSE NAME: PHARMACEUTICAL INORGANIC CHEMISTRY 1** |
| CO1 | Understand the medicinal and pharmaceutical importance of inorganic compounds |

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| CO2 | Divulge on the sources of impurities and methods to determine the impurities in inorganic drugs and pharmaceuticals |
| CO3 | Inculcate the knowledge of monographs of inorganic drugs and pharmaceuticals |
| CO4 | Understanding the concept of assay of inorganic compounds |
| **COURSE CODE: HS105** | **COURSE NAME: COMMUNICATION SKILLS** |
| CO1 | Understand the behavioral needs for a pharmacist to function effectively in the areas of pharmaceutical operation |
| CO2 | Good verbal and nonverbal communications |
| CO3 | Developing interview skills |
| CO4 | Establish leadership qualities and essentials |
| **COURSE CODE:BS106** | **COURSE NAME: REMEDIAL BIOLOGY** |
| CO1 | Understand basic components of anatomy and physiology of animals with special reference to humans |
| CO2 | Know the classification and salient features of five kingdoms of life |
| CO3 | Broaden the knowledge of morphology of plants. |
| CO4 | Amplification of information on bodily functions |
| **COURSE CODE:BS107** | **COURSE NAME: REMEDIAL MATHEMATICS** |
| CO1 | Know the theory and their application in pharmacy |
| CO2 | Appreciate the important application of mathematics in pharmacy |
| CO3 | Solve the problems by applying theory. |
| CO4 | Understanding the concepts of partial fraction, logarithm, calculus, analytical geometry etc. |
| **COURSE CODE:PS108** | **COURSE NAME: HUMAN ANATOMY AND PHYSIOLOGY-I LAB** |
| CO1 | To handling of compound microscope and memorize various animal tissues |
| CO2 | To summarize the characteristics of different bones |
| CO3 | Blood sampling and analyzing various components |
| CO4 | Study the integumentary and special senses using specimens and models. |

| **COURSE CODE:PS109** | **COURSE NAME: PHARMACEUTICAL ANALYSIS I LAB** |
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| CO1 | Determination and assessment of various analytical compounds by using qualitative methods of analysis. |
| CO2 | To perform the assay of various compounds along with standardization of titrant |
| CO3 | Preparation and standardization by titrimetric analysis |
| CO4 | To determine the normality by electroanalytical methods |
| **COURSE CODE:PS110** | **COURSE CODE: PHARMACEUTICS I LAB** |
| CO1 | Understand the process of formulation by using different excipients and API |
| CO2 | Perceive the solubility enhancement techniques |
| CO3 | To formulate various dosage forms |
| CO4 | To recall the principles used in the preparation of solid, liquid and semi solid dosage forms. |
| **COURSE CODE:PS111** | **COURSE NAME: PHARMACEUTICAL INORGANIC CHEMISTRY I LAB** |
| CO1 | To estimate quality of inorganic pharmaceuticals |
| CO2 | To execute limit test for various ions |
| CO3 | Identification of inorganic compounds in pharmaceuticals |
| CO4 | Preparation of inorganic pharmaceuticals |
| **COURSE CODE: HS112** | **COURSE NAME: COMMUNICATION SKILLS LAB** |
| CO1 | To discriminate pronunciation of vowel and consonant sounds |
| CO2 | To develop the interview handling skills and improve in email etiquette. |
| CO3 | Pursue effective communication with advanced learning and presentation skills |
| CO4 | Matriculate effective writing skills and listening comprehension. |
| **COURSE CODE:BS113** | **COURSE NAME: REMEDIAL BIOLOGY LAB** |
| CO1 | To identify various plant parts and to organize their modifications |
| CO2 | To determine blood group, blood pressure and tidal volume. |
| CO3 | Detailed study of cell and its inclusions. |

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| CO4 | Learning various aspects of microscopic studies. |
| **COURSE OUTCOMES OF B. PHARMACY 1ST YEAR 2ND SEMESTER** | |
| **COURSE CODE:PS201** | **HUMAN ANATOMY AND PHYSIOLOGY II** |
| CO1 | Describe the gross morphology, structure and functions of various organs of the human body |
| CO2 | Perform Hematological tests like blood cell count, hemoglobin estimation and record blood pressure, heart rate, pulse and respiratory volume. |
| CO3 | Appreciate the inter linked mechanisms in the maintenance of homeostasis of human body |
| **COURSE CODE:PS202** | **PHARMACEUTICAL ORGANIC CHEMISTRY I** |
| CO1 | Confirm the identification of organic compounds |
| CO2 | Put down the structure, name and type of isomerism of organic compounds |
| **COURSE CODE:BS203** | **BIOCHEMISTRY** |
| CO1 | Recognize the catalytic role of enzymes, importance of enzyme inhibitors in design of new drugs, therapeutic and diagnostic applications of enzymes. |
| CO2 | Understand the genetic organization of mammalian genome and functions of DNA in the synthesis of RNA and proteins. |
| **COURSE CODE:BS204** | **PATHOPHYSIOLOGY** |
| CO1 | Narrate the etiology and pathogenesis of the selected disease states. |
| CO2 | Mention the complications of the diseases. |
| **COURSE CODE:CS205** | **COMPUTER APPLICATIONS IN PHARMACY** |
| CO1 | Be familiar with various types of applications of computers in pharmacy |
| CO2 | Well acquainted with various applications of data bases in pharmacy |
| **COURSE CODE:BS206** | **ENVIRONMENTAL SCIENCES** |
| CO1 | Create the awareness about environmental problems among beginners |

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| CO2 | Transmit basic knowledge about the environment and its allied problems |
| **COURSE CODE:BS209** | **BIOCHEMISTRY LAB** |
| CO1 | To study the enzymatic hydrolysis of starch and study the effect of temperature on salivary amylase activity |
| CO2 | Determination of blood creatinine, blood sugar, serum total cholesterol. |
| **COURSE CODE:CS210** | **COMPUTER APPLICATIONS IN PHARMACY LAB** |
| CO1 | To design a questionnaire using a word processing package to gather information about a particular disease |
| CO2 | To create mailing labels using label wizard, generating label in MS word |
| **COURSE CODE:PS207** | **HUMAN ANATOMY AND PHYSIOLOGY II LAB** |
| CO1 | To assess the knowledge on family planning, pregnancy diagnostic tests, tissues of vital organs and gonads |
| CO2 | To analyze the function of cranial nerves by various sensory and motor functions |
| **COURSE CODE:PS208** | **PHARMACEUTICAL ORGANIC CHEMISTRY LAB** |
| CO1 | To explain qualitative analysis and preparation of pharmaceutical organic compounds |
| CO2 | To find the presence of several functional groups in pharmaceutical compounds |
| **COURSE OUTCOMES OF B.PHARMACY 2ND YEAR 1ST SEMESTER** | |
| **COURSE CODE:PS301** | **PHARMACEUTICAL ORGANIC CHEMISTRY II** |
| CO1 | To gain knowledge on structure and medicinal uses of pharmaceutical organic compounds. |
| CO2 | To estimate the analytical constants of fats and oils. |
| CO3 | Explanation of reactivity and stability of organic compounds. |
| CO4 | In detailed study of named reactions and structural orientation. |
| **COURSE CODE:PS302** | **PHYSICAL PHARMACEUTICS I** |
| CO1 | To know the principles of chemical kinetics and to use them in assigning |

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| | expiry date for formulation. |
| CO2 | Appreciate physicochemical properties of drug molecules in formulation research and development. |
| CO3 | To get a better insight into various areas of formulation and development and stability studies of pharmaceuticals. |
| CO4 | Understand various physic-chemical properties of drug molecules in the designing of dosage forms |
| **COURSE CODE:BS303** | **PHARMACEUTICAL MICROBIOLOGY** |
| CO1 | To know the microbiological standardization of pharmaceuticals. |
| CO2 | Understand methods of identification, cultivation and preservation of various microorganisms |
| **COURSE CODE: PC304** | **PHARMACEUTICAL ENGINEERING** |
| CO1 | To appreciate various preventive methods used for corrosion control in pharmaceutical industry |
| CO2 | To understand the material handing techniques |
| **COURSE CODE:PS305** | **PHARMACEUTICAL ORGANIC CHEMISTRY LAB** |
| CO1 | To determine the purity of fats and oils by acid value, saponification value and iodine value |
| CO2 | To gain knowledge on different recrystallisation and steam distillation techniques |
| **COURSE CODE:PS306** | **PHYSICAL PHARMACEUTICS I LAB** |
| CO1 | To deduce the HLB value and critical micellar concentration of surfactant |
| CO2 | To determine stability constant and donor acceptor ratio of cupric glycine complex by PH titration method |
| **COURSE CODE:BS307** | **PHARMACEUTICAL MICRO BIOLOGY LAB** |
| CO1 | To isolate pure culture of microorganisms by multiple streak plate techniques and other techniques. |
| CO2 | To demonstrate various staining methods/simple gram staining and acid |

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| | fast staining |
| **COURSE CODE:PC308** | **PHARMACEUTICAL ENGINEERING LAB** |
| CO1 | To verify the laws of size reduction using ball mill and determining kicks, Rittingers, bonds coefficients, power requirements and critical speed of ball mill |
| CO2 | To determine moisture content loss on drying and construct drying curves for calcium carbonate and starch. |
| **COURSE OUTCOMES B.PHARMACY 2ND YEAR 2ND SEMESTER** | |
| **COURSE CODE:PS401** | **PHARMACEUTICAL ORGANIC CHEMISTRY III** |
| CO1 | To explain stereo isomerism in biphenyl compounds and conditions for optical activity. |
| CO2 | To identify medicinal uses, their applications of organic compounds |
| **COURSE CODE:PC402** | **MEDICINAL CHEMISTRY I** |
| CO1 | To explain the physical properties stearic aspects of drugs and their metabolic pathways |
| CO2 | To understand the chemistry of drugs with respect to their pharmacological activity |
| **COURSE CODE:PS403** | **PHYSICAL PHARMACEUTICS** |
| CO1 | To be familiar with the principles of chemical kinetics and use them in assigning expiry date for formulation |
| CO2 | To deliberate the importance of zeta potential in stabilization of disperse systems |
| **COURSE CODE:PC404** | **PHARMACOLOGY I** |
| CO1 | Recognize the correlation of pharmacology with other biomedical sciences |
| CO2 | Apply the basic pharmacological knowledge in the prevention and treatment of various diseases. |
| **COURSE CODE: PC405** | **PHARMACOGNOSY AND PHYTO CHEMISTRY** |

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| CO1 | To illustrate students about cultivation, collection, processing and storage of crude drugs |
| CO2 | To elaborate the application of advanced technologies of polyploid, mutation and hybridization in medicinal plants |
| **COURSE CODE: PC406** | **MEDICINAL CHEMISTRY LAB** |
| CO1 | To perform assay of various drugs |
| CO2 | To prepare various drugs and metabolites |
| **COURSE CODE: PS407** | **PHYSICAL PHARMACEUTICS LAB II** |
| CO1 | Determine the surface tension of liquids by drop count and drop weight method |
| CO2 | Determination of sedimentation volume with effect of different suspending agents and effect of concentration of suspending agents |
| CO3 | Determination of Freundlich and Langmuir constants using activated charcoal |
| **COURSE CODE: PC408** | **PHARMACOLOGY I LAB** |
| CO1 | To recall the instruments used in experimental pharmacology |
| CO2 | To recall the instruments used in experimental pharmacology |
| CO3 | To examine the effect of hepatic microsomal enzyme inducers on the phenobarbitone sleeping time in mice and effect of skeletal muscle relaxants using rotarod apparatus |
| **COURSE CODE: PC409** | **PHARMACOGNOSY AND PHYTOCHEMISTRY I LAB** |
| CO1 | Examination of crude drugs by chemical tests. |
| CO2 | To determine number of starch grains by lycopodium spore method |
| **COURSE CODE:MC400** | **GENDER SENSITIZATION LAB** |
| CO1 | To manifest the students to debate on the politics and economics of work |
| CO2 | To come up with a critical perspective on the socialization of men and women. |
| **COURSE OUTCOMES OF B.PHARMACY 3RD YEAR 1ST SEMESTER** | |
| **COURSE** | **MEDICINAL CHEMISTRY II** |

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| **CODE:PS501** | |
| CO1 | To understand the chemistry of drugs with respect to their pharmacological activity |
| CO2 | To study the chemical synthesis of selected drugs |
| **COURSE CODE:PS502** | **INDUSTRIAL PHARMACY I** |
| CO1 | To outline the objectives and applications of preformulation studies in the development and stability of dosage forms |
| CO2 | To summarize formulation, manufacturing and evaluation of cosmetic preparations, pharmaceutical aerosols and appraise the science of packaging materials. |
| **COURSE CODE:PS503** | **PHARMACOLOGY II** |
| CO1 | To predict principles of bioassay and to construct the bioassay methods of various compounds |
| CO2 | To identify the role of autocoids and related drugs |
| **COURSE CODE:PS504** | **PHARMACOGNOSY AND PHYTOCHEMISTRY II** |
| CO1 | To carry out isolation and identification of phytoconstituents |
| CO2 | To know the modern extraction techniques, characterization and identification of the herbal drugs and phytoconstituents |
| **COURSE CODE:PS505** | **GENERIC PRODUCT DEVELOPMENT** |
| CO1 | To enhance the knowledge of students with clear information about the scale up studies |
| CO2 | To learn the analytical method development and dossier approval process |
| **COURSE CODE:PS509** | **INDUSTRIAL PHARMACY LAB** |
| CO1 | To illustrate the formulation and evaluation of tablets |
| CO2 | To evaluate glass containers as per pharmacopoeia specifications |
| **COURSE CODE:PS510** | **PHARMACOLOGY II LAB** |
| CO1 | To determine PA2 and PD values of drugs using rat anococcygeous |

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| | muscle by schilds plot method |
| CO2 | To predict anti inflammatory and analgesic activity of drugs |
| **COURSE CODE:PS511** | **PHARMACOGNOSY AND PHYTOCHEMISTRY II LAB** |
| CO1 | An exercise involving isolation and detection of active principles |
| CO2 | To remember the wide variety of the crude drugs and their sources by morphological characteristics. |
| **COURSE CODE:MC500** | **ENVIRONMENTAL SCIENCES** |
| CO1 | Create the awareness about environmental problems among learners |
| CO2 | Acquire skills to help the concerned individuals in identifying and solving environmental problems |
| **COURSE OUTCOMES OF B. PHARMACY 3RD YEAR 2ND SEMESTER** | |
| **COURSE CODE:PS601** | **MEDICINAL CHEMISTRY III** |
| CO1 | To discuss the approaches in drug design including QSAR, pharmacophore modelling,docking and combinatorial chemistry |
| CO2 | Understand the importance of drug design and different techniques of drug design. |
| **COURSE CODE:PS602** | **PHARMACOLOGY III** |
| CO1 | Comprehend the principles of toxicology and treatment of various poisonings and appreciate correlation of pharmacology with related medical sciences |
| CO2 | Appreciate the correlation of pharmacology with related medical sciences |
| CO3 | Understand the mechanism of drug action and its relevance in the treatment of different infectious diseases |
| **COURSE CODE:PS603** | **HERBAL DRUG TECHNOLOGY** |
| CO1 | To illustrate the scope and future prospects of the herbal drug industry |
| CO2 | To appreciate patenting of herbal drugs and GMP |
| **COURSE CODE:PS604** | **BIOPHARMACEUTICS AND PHARMACOKINETICS** |

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| CO1 | Critically evaluate biopharmaceutic studies involving drug product equivalency |
| CO2 | Use plasma data and derive the pharmacokinetic parameters to describe the process of drug absorption, distribution, metabolism and elimination. |
| **COURSE CODE:PS605** | **PHARMACEUTICAL QUALITY ASSURANCE** |
| CO1 | Understand the aspects of cGMP in pharmaceutical industry |
| CO2 | Appreciate the importance of documentation |
| **COURSE CODE:PS609** | **MEDICINAL CHEMISTRY III LAB** |
| CO1 | Acknowledge the principles underlying the preparation of drugs and intermediates |
| CO2 | Determination of physicochemical properties using drug design software and drug likeliness screening. |
| **COURSE CODE:PS610** | **PHARMACOLOGY III LAB** |
| CO1 | To demonstrate the effect of gastro intestinal motility and effect of agonist/antagonist on Guinee pig ileum |
| CO2 | To predict the pharmacokinetic parametres and adapt the biostatistics methods in experimental pharmacology |
| **COURSE CODE:PS611** | **HERBAL DRUG TECHNOLOGY LAB** |
| CO1 | To determine aldehyde, phenolic and total alkaloidal content |
| CO2 | To perform preliminary phytochemical screening of crude drugs. |
| **COURSE CODE:MC600** | **HUMAN VALUES AND PROFESSIONAL ETHICS** |
| CO1 | To enable the students to imbibe and internalize the values and ethical behavior in the personal and professional lives. |
| CO2 | Learn the rights and responsibilities as an employee, team member and a global citizen |
| **COURSE OUTCOMES B.PHARMACY 4$^{TH}$ YEAR 1$^{ST}$ SEMESTER** | |
| **COURSE CODE:PS701** | **INSTRUMENTAL METHODS OF ANALYSIS** |

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| CO1 | To elaborate various principles, theory and instruments employed for the characterization and analysis of drugs. |
| CO2 | To gain knowledge on interaction of electromagnetic radiation with matter |
| CO3 | To build the analytical understanding at the level of atom, group and molecular structure of organic and inorganic compounds with different functional groups and their application in pharmacy. |
| CO4 | Perform qualitative and quantitative analysis of drugs using various analytical instruments. |
| **COURSE CODE:PS702** | **INDUSTRIAL PHARMACY II** |
| CO1 | To acknowledge the approval process and regulatory requirements for drug products. |
| CO2 | To outline various aspects of technology transfer involved from R&D to production. |
| CO3 | To know different laws and acts that regulate pharmaceutical industry in India and US. |
| CO4 | To notice the process of pilot plant and scale up of pharmaceutical dosage forms. |
| **COURSE CODE:PS703** | **PHARMACY PRACTICE** |
| CO1 | To appreciate the pharmacy stores management and inventory control. |
| CO2 | To categorize and evaluate the role of hospital pharmacist in pharmacy and therapeutic committee and drug information services. |
| CO3 | Drug therapy monitoring-medication chart review, clinical review, pharmacist intervention and pharmaceutical care. |
| CO4 | Rational use of common over the counter medications. |
| **COURSE CODE:PS704** | **NOVEL DRUG DELIVERY SYSTEMS** |
| CO1 | To understand the criteria for selection of drugs and polymers for the development of novel drug delivery systems. |
| CO2 | Drug delivery systems formulation and evaluation. |
| CO3 | To illustrate the principles and fundamentals of drug targeting in the design of site specific drug delivery systems. |

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| CO4 | Various approaches for the development of controlled drug delivery systems. |
| **COURSE CODE:PS705** | **PHARMACEUTICAL MARKETING** |
| CO1 | Provide an understanding of marketing concepts and techniques. |
| CO2 | Application of marketing concepts in the pharmaceutical industry. |
| CO3 | Overview of Drug price control order and National pharmaceutical pricing authority. |
| CO4 | Product decisions, product life cycle and product portfolio analysis of products in pharmaceutical industry. |
| **COURSE CODE:PS706** | **PHARMACEUTICAL REGULATORY SCIENCE** |
| CO1 | To know the regulatory authorities and agencies governing the manufacture and sale of pharmaceuticals. |
| CO2 | To understand the regulatory approval process and their registration in Indian and international markets. |
| CO3 | To learn the process of drug discovery and development. |
| CO4 | Developing, managing, and monitoring of clinical trial protocols. |
| **COURSE CODE:PS707** | **PHARMACOVIGILANCE** |
| CO1 | Study of history and development of pharmacovigilance |
| CO2 | Developing international standards for classification of diseases and drugs. |
| CO3 | Advancements in adverse drug reaction reporting systems and communication in pharmacovigilance. |
| CO4 | Overview on adverse drug reactions. |
| **COURSE CODE:PS708** | **QUALITY CONTROL AND STANDARDIZATION OF HERBALS** |
| CO1 | Be familiar with WHO guidelines for quality control of herbal drugs |
| CO2 | Know the regulatory approval process and their registration in Indian and international markets. |
| CO3 | Be acquainted with quality assurance in herbal drug industry. |
| CO4 | Appreciate EU and ICH guidelines for quality control of herbal drugs. |
| **COURSE** | **INSTRUMENTAL METHODS OF ANALYSIS LAB** |

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| **CODE:PS709** | |
| CO1 | To recall the principle involved in spectroscopy and importance of absorption maximum in the estimation of organic compounds |
| CO2 | To estimate the amount of sodium and potassium ions by flame photometry. |
| CO3 | To estimate dextrose and sulphanilamide by calorimetry. |
| CO4 | Conduct demo experiments on HPLC and GC |
| **COURSE CODE:PS710** | **PRACTICE SCHOOL** |
| CO1 | To realize the importance of realistic learning through practice in various domains such as community pharmacy, drug testing and manufacturing, preclinical testing and clinical practice. |
| CO2 | To get familiarize with the aspects of realistic practice in the domain interest. |
| CO3 | Collect and analyze some important cases filed by drug control officers. |
| CO4 | Collect the data related to the most important prescribed medicines in that area, prescription patterns, medical audit and submit the report. |
| **COURSE CODE:PS711** | **INDUSTRIAL TRAINING** |
| CO1 | To expose the students to real work of environment experience. |
| CO2 | To gain the knowledge through hands on observation and job execution. |
| CO3 | To develop skills in work ethics, communication and management. |
| CO4 | Application of theoretical knowledge to practice and realize their actual potential. |
| **COURSE OUTCOMES OF B. PHARMACY 4$^{TH}$ YEAR 2$^{ND}$ SEMESTER** | |
| **COURSE CODE:PS801** | **BIOSTATISTICS AND RESEARCH METHODOLOGY.** |
| CO1 | To understand the basic aspects of statistics such as central tendency, dispersion and correlation. |
| CO2 | To build the ability to perform various parametric and nonparametric statistical tests and to draw graphs and plots based on type of data. |
| CO3 | To design and analyze the experiments based on factorial design and response surface methodology. |
| CO4 | Know the operation of MS Excel, SPSS, R and MINITAB, Design of |

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| | experiments. |
| **COURSE CODE: PS802** | **SOCIAL AND PREVENTIVE PHARMACY** |
| CO1 | To create awareness about various preventive measures of stated communicable and non-communicable diseases. |
| CO2 | To elaborate various vaccines under National immunization program and their schedule. |
| CO3 | Have a critical way of thinking based on current healthcare development. |
| CO4 | Acquire high consciousness of current issues related to health and pharmaceutical problems with in the country and worldwide. |
| **COURSE CODE:PS803** | **PHARMACEUTICAL JURISPRUDENCE** |
| CO1 | To relate the significance of drugs and cosmetics act 1940 and its rules 1945 in relation to import, manufacture, sale and distribution of drugs. |
| CO2 | To discuss the salient features of Pharmacy act 1948, Drugs and Magic Remedies act, Prevention of Cruelty to Animal's act and Drug Price Control Order. |
| CO3 | To be familiarized with the code of ethics during the pharmaceutical practice and Pharmaceutical Services in Trade and Profession. |
| CO4 | To understand the pharmaceutical legislations and their implications in the development and marketing of Drugs and Pharmaceuticals. |
| **COURSE CODE:PS804** | **COMPUTER AIDED DRUG DESIGN** |
| CO1 | To perceive the role of drug design in drug discovery process. |
| CO2 | To understand the concept of QSAR and DOCKING. |
| CO3 | To design new drug molecules using molecular modelling software. |
| CO4 | To know the various stages of drug discovery and development and get well acquainted with analog based drug design. |
| **COURSE CODE:PS805** | **NANO TECHNOLOGY** |
| CO1 | Be able to select the right kind of materials In the synthesis of nano materials. |
| CO2 | To develop nano formulations with appropriate technologies. |
| CO3 | To perform characterization, drug release and stability studies of nano |

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| | materials. |
| CO4 | Accustomed with nano technology products used for invitro diagnostics and their applications in imaging. |
| **COURSE CODE:PS806** | **EXPERIMENTAL PHARMACOLOGY** |
| CO1 | Appraise the regulations and ethical requirements for the usage of experimental animals. |
| CO2 | Epitomize various animals and newer screening methods used in drug discovery. |
| CO3 | Be aware of research methodology to be followed in biostatistical data interpretation of the assays. |
| CO4 | To recall the techniques for blood collection and common routes of drug administration in laboratory animals. |
| **COURSE CODE:PS807** | **ADVANCED INSTRUMENTATION TECHNIQUES** |
| CO1 | To elaborate various principles and procedures employed in radio immune assay and extraction techniques. |
| CO2 | To maximize knowledge on characterization and estimation of drugs by spectroscopical and thermal techniques. |
| CO3 | To impart advanced knowledge on the principles and instrumentation of chromatographic hyphenated techniques. |
| CO4 | Emphasize on theoretical and practical knowledge on modern analytical instruments used for drug testing. |
| **COURSE CODE:PS808** | **PROJECT WORK** |
| CO1 | Challenge's students to think beyond boundaries of the class room. |
| CO2 | Help them to develop the skills, behavior and confidence necessary for success. |
| CO3 | Describe the assessment that evaluates content knowledge as well as additional skills like problem solving and innovation. |
| CO4 | To assess work quality, understanding and participation from the moment students begin to work. |

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| COURSE OUTCOMES OF B. PHARMACY 1ST YEAR 1ST SEMESTER | |
|---|---|
| **COURSE CODE:BS101** | **COURSE NAME: REMEDIAL MATHEMATICS** |
| CO1 | Application of basics of mathematics in pharmaceutical calculations |
| CO2 | Application of determinants to solve simultaneous equations |
| CO3 | Integrations of trigonometric functions |
| CO4 | Formation of differential equation of first order and first degree |
| **COURSE CODE:BS102** | **COURSE NAME: REMEDIAL BIOLOGY I** |
| CO1 | To know about classification and some aspects of physiology of frogs and animals |
| CO2 | Study the types of tissues, their functions and tissue systems |
| CO3 | Knowledge on histology of root, stem, bark, leaf, flower, fruit and seed |
| CO4 | Study systemic position and classification of families like Umbelliferae, Apocyanaceae and Liliaceae |
| **COURSE CODE:PS103** | **COURSE NAME: DISPENSING AND GENERAL PHARMACY** |
| CO1 | Should be familiar with the hospital pharmacy organization and drug distribution procedures |
| CO2 | Know about storage, incompatibilities and patient related factors |
| CO3 | Aware of principles involved and procedures adopted in dispensing of liquid, semisolid dosage forms |
| CO4 | Comprehensive knowledge on pharmaceutical ethics and ethical guidelines for retail pharmacist, manufacturing pharmacist and pharmaceutical researches |
| **COURSE** | **COURSE NAME: ANATOMY, PHYSIOLOGY, HEALTH** |

| CODE:PS104 | EDUCATION I |
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| CO1 | Cognition on the structure and functions of various organs of human bodies and mechanisms in maintenance of normal functioning |
| CO2 | Physiology of muscle contraction and physiological properties of skeletal muscles |
| CO3 | Insight on basic anatomy, physiology and conduction system of heart, blood vessels and circulation |
| CO4 | Brief outline of communicable diseases, demography and family planning |
| **COURSE CODE:BS105** | **PHARMACEUTICAL ORGANIC CHEMISTRY I** |
| CO1 | Includes detailed study on the mechanisms involved in various reactions |
| CO2 | Understand the synthesis of higher organic compounds |
| CO3 | Isomerism, relative and ring stabilities of cyclohexane |
| CO4 | Insight on stability and addition reactions of conjugated alka dienes |
| **COURSE CODE: HS106** | **PROFESSIONAL COMMUNICATION IN ENGLISH** |
| CO1 | Includes skill development, fostering ideas and practicing language skills. |
| CO2 | Use English language effectively in spoken and written forms. |
| CO3 | Comprehend the given texts and respond appropriately. |
| CO4 | Communicate confidently in formal and informal contexts. |
| **COURSE CODE:PS107** | **DISPENSING AND GENERAL PHARMACY LAB** |
| CO1 | Includes dispensing of prescriptions of mixtures, solutions, emulsions, creams etc. |
| CO2 | Dispensing of prescriptions involving adjustment of tonicity. |
| CO3 | Categorization and storage of pharmaceutical products based on legal requirements of labelling and storage. |
| CO4 | Dispensing procedures involving pharmaceutical calculations, pricing of prescriptions and dosage calculations for pediatric and geriatric patients. |
| **COURSE** | **COURSE NAME: ANATOMY, PHYSIOLOGY, HEALTH** |

| CODE:PS108 | EDUCATION I LAB |
|---|---|
| CO1 | Estimation of haemoglobin in blood, bleeding time and clotting time |
| CO2 | Determination of vital capacity |
| CO3 | Study of special senses with the help of charts and models |
| CO4 | Recording of body temperature, pulse rate and blood pressure |
| **COURSE CODE:BS109** | **PHARMACEUTICAL ORGANIC CHEMISTRY I LAB** |
| CO1 | Systematic qualitative analysis of monofunctional organic compounds |
| CO2 | Preparation of organic compounds each involving a specific organic reaction |
| CO3 | Determination of melting point and boiling point by Thiels method |
| CO4 | Recrystallization of organic compounds |
| **COURSE CODE:BS102** | **COURSE NAME: REMEDIAL BIOLOGY I LAB** |
| CO1 | Introduction to simple and compound microscope and their handling |
| CO2 | Morphological study of various parts of plants |
| CO3 | Study of structure of human parasites and insects mentioned with the help of specimen |
| CO4 | Microscopic examination of specimen slides related to plant and animal tissues |
| **COURSE OUTCOMES OF B. PHARMACY 1ST YEAR 2ND SEMESTER** | |
| **COURSE CODE:BS201** | **PHARMACEUTICAL INORGANIC CHEMISTRY** |
| CO1 | Know the classification of inorganic pharmaceuticals based upon their applications and therapeutic uses |
| CO2 | Gain knowledge on electrolytes, acid base regulators and dialysis fluids |
| CO3 | Detailed study of gastro intestinal agents, laxatives and mineral nutrients |
| CO4 | Understand different categories of pharmaceutical aids and topical agents |
| **COURSE CODE:BS202** | **PHARMACEUTICAL ORGANIC CHEMISTRY II** |

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| CO1 | Understand the basic principles and mechanisms of different types of organic reactions |
| CO2 | Detailed study of synthesis of higher organic compounds |
| CO3 | Study the nomenclature of various organic compounds |
| CO4 | Understand the concept of intermolecular association and stability of carboxylate ion |
| **COURSE CODE:PS203** | **PHYSICAL PHARMACY I** |
| CO1 | Know the physical properties of molecules |
| CO2 | Thorough knowledge on phase equilibria and phase rule |
| CO3 | Aware of buffers, buffered isotonic solutions and methods of adjusting tonicity |
| CO4 | Understand the importance of physical properties of molecules in formulation development |
| **COURSE CODE:BS204** | **STATISTICAL METHODS AND COMPUTER APPLICATIONS** |
| CO1 | Recognize the importance of Biostatistics in pharmacy |
| CO2 | Know the basic concepts of sampling and quality control |
| CO3 | Knowledge on calculation of statistical parameters using excel, working with texts and graphics |
| **CO4** | Aware of database management systems and structured query language |
| **COURSE CODE:PS205** | **COURSE NAME: ANATOMY, PHYSIOLOGY, HEALTH EDUCATION II** |
| CO1 | Impart fundamental knowledge on the structure and functions of human body |
| CO2 | Enhance the understanding of mechanism of action of drugs on various body systems |
| CO3 | Knowledge on interlinked mechanisms in the maintenance of homeostasis of human body |
| CO4 | Know the basic principles of cell injury, adaptation and process of inflammation |
| **COURSE CODE:BS206** | **PHARMACEUTICAL INORGANIC CHEMISTRY II LAB** |

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| CO1 | Preparation and purification of different compounds |
| CO2 | Perform identification test as per Indian pharmacopeia |
| CO3 | Determine the impurities qualitatively by performing test for purity |
| CO4 | Analyze the purity of compounds quantitatively by performing assay |
| **COURSE CODE:BS207** | **STATISTICAL METHODS AND COMPUTER APPLICATIONS LAB** |
| CO1 | Know the graphical representation of data with the help of calculators and software programs |
| CO2 | Program to calculate simple and complex arithmetic expressions |
| CO3 | Programs using loops and nested loops and simple programs using arrays |
| CO4 | Well versed with Software packages like MS WORD, EXCEL, ACCESS and POWERPOINT |
| **COURSE CODE:PS208** | **PHYSICAL PHARMACY I LAB** |
| CO1 | Calculation and determination of % composition by capillary flow method |
| CO2 | Molecular weight determination by Landsberger method |
| CO3 | Calibration of pH meter |
| CO4 | Know the effect of dielectric constant on drug solubility |
| **COURSE OUTCOMES OF B. PHARMACY 2ND YEAR 1ST SEMESTER** | |
| **COURSE CODE:PS301** | **PHARMACEUTICAL ORGANIC CHEMISTRY III** |
| CO1 | Discussion on structural and stereochemical aspects and chemistry of organic compounds |
| CO2 | Good command over evaluation and analyzing the chemistry of organic compounds |
| CO3 | Study and application of stereochemistry of organic compounds |
| CO4 | Detailed study of mechanisms and applications invoved in name reactions |
| **COURSE CODE:PS302** | **PHARMACEUTICAL UNIT OPERATIONS I** |
| CO1 | Understand the concepts of flow of fluids |
| CO2 | Understand the safety factors and possess a sound knowledge on |

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| | different unit operations |
| CO3 | To be aware of different laws related to distillation |
| CO4 | Be familiar with industrial hazards and their safety precautions |
| **COURSE CODE:PS303** | **HOSPITAL AND COMMUNITY PHARMACY** |
| CO1 | Familiar with hospital pharmacy organization, incompatibilities and patient related factors |
| CO2 | Appreciate the practice-based research methods |
| CO3 | Know the manufacturing practices of various formulations in hospital setup |
| CO4 | Provide unbiased drug information to the doctors |
| **COURSE CODE:PS304** | **PHARMACOGNOSY I** |
| CO1 | Know the medicinal and pharmaceutical importance of drugs obtained from natural sources |
| CO2 | Acquire the knowledge on crude drugs by studying them under a suitable pharmacognostic scheme |
| CO3 | Aware of different sources of crude drugs, cultivation aspects of medicinal and aromatic plants |
| CO4 | Appreciate the role of crude drugs as excipients in various pharmaceutical dosage forms |
| **COURSE CODE:PS305** | **PHARMACEUTICAL ANALYSIS** |
| CO1 | Knowledge on computation of analytical results, calibration of analytical equipment used in volumetric analysis |
| CO2 | Study of separations and determinations involving different chromatographic techniques |
| CO3 | Working principles and applications of Flame photometry, Refractometry, Polarimetry |
| CO4 | Different physical and chemical methods of determination of moisture content |
| **COURSE CODE:PS306** | **PHARMACEUTICAL ORGANIC CHEMISTRY II LAB** |
| CO1 | To carry out Systematic analysis of organic binary mixtures |

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| CO2 | Synthesize some simple heterocyclic compounds from parent compounds |
| CO3 | To know the molecular rearrangements occurring in some named reactions |
| **COURSE CODE:PS307** | **PHARMACOGNOSY I LAB** |
| CO1 | To recall the materials required for microscopic work and preparation of histological slides |
| CO2 | To identify cell contents in plant materials by microscopical and microchemical tests |
| CO3 | Measure the dimensions of cells and cell contents using camera lucida |
| CO4 | To detect carbohydrates and lipids by chemical tests |
| **COURSE CODE:PS308** | **PHARMACEUTICAL ANALYSIS I LAB** |
| CO1 | To perform assay of pharmaceutical compounds based on chemical methods |
| CO2 | To identify amino acids and alkaloids by chromatography |
| CO3 | To determine ions by flame photometry |
| CO4 | To determine refractive index of liquids by Abbe refractometer |
| **COURSE CODE:MC309ES** | **ENVIRONMENTAL STUDIES** |
| CO1 | Understand the importance of ecological balance for sustainable development |
| CO2 | Know the impact of development activities and mitigation measures |
| CO3 | Aware of environmental policies and regulations |
| CO4 | Develop technologies on the basis of ecological principles which help in sustainable development |
| **COURSE OUTCOMES OF B. PHARMACY 2$^{ND}$ YEAR 2$^{ND}$ SEMESTER** | |
| **COURSE CODE:PS401** | **PHARMACEUTICAL UNIT OPERATIONS II** |
| CO1 | Know the basic concepts of phase equilibria, factors affecting evaporation and types of evaporators |
| CO2 | To be familiar with concepts of size reduction and types of mills |

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| CO3 | To be well acquainted with theory of mixing and types of mixers |
| CO4 | Understand the concepts of size separation and equipment's used for size separation |
| **COURSE CODE:BS402** | **BIOCHEMISTRY** |
| CO1 | Understand the classification of enzymes and co enzymes, their structure and mechanism of action |
| CO2 | Know the concept of free energy and laws of thermodynamics |
| CO3 | Recall the biochemical organization of cell and molecular constituents of membrane |
| CO4 | Know the biochemistry of carbohydrates and proteins |
| **COURSE CODE:PS403** | **PHARMACEUTICAL JURISPRUDENCE** |
| CO1 | Familiarization with all the legal tenets and enforceable in the country, besides pharmaceutical ethics and policies. |
| CO2 | Brief review on pharmaceutical legislations. |
| CO3 | Be aware of salient features of WTO and Indian patents act 1970. |
| CO4 | Elaborate study of pharmacy act and drugs and cosmetics act 1940 and rules 1945. |
| **COURSE CODE:PS404** | **PHYSICAL PHARMACY II** |
| CO1 | know the influence of temperature and other factors on rate of reactants. |
| CO2 | Aware on formulation, evaluation and stability aspects on coarse dispersions. 2 |
| CO3 | Study the working of various visco meters in the determination of viscosity. |
| CO4 | Know the methods to determine surface area, particle size and surface area of particles. |
| **COURSE CODE:HS405** | **INTELLECTUAL PROPERTY RIGHTS** |
| CO1 | Know the background, salient features and impact of international conventions. |
| CO2 | Aware of patent filing procedures under PCT, non infringement |

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| | techniques and design around strategies. |
| CO3 | Provide clear information about the salient features of Indian patents act 1999. |
| CO4 | Know the opposition, regrant opposition and post grant opposition of patents. |
| **COURSE CODE:PS405** | **HERBAL DRUG TECHNOLOGY** |
| **CO1** | Be informed with methods of preparation and evaluation of herbal solid, liquid and semisolid dosage forms. |
| **CO2** | Reconcile with different companies manufacturing with different herbal extracts, standardized extracts and claims regarding their uses. |
| **CO3** | Have good command on processes and equipment's used in extraction of herbal constituents. |
| **CO4** | Command on different pharmaceutical excipients, their uses and their storage conditions. |
| **COURSE CODE:BS405** | **GREEN CHEMISTRY** |
| CO1 | Emphasis about the chemicals and solvents which are eco friendly. |
| CO2 | Detailed study of various catalytic reagents used in synthesis of pharmaceutical products. |
| CO3 | Know the significance and importance and principles of green chemistry. |
| CO4 | Be conversant with microwave synthesis |
| **COURSE CODE:BS407** | **BIOCHEMISTRY LAB** |
| CO1 | To prepare standard buffers and measure pH. |
| CO2 | To perform separation of lipids by TLC. |
| CO3 | Conduct tests for identification of carbohydrates, amino acids and lipids. |
| CO4 | To estimate the effect of temperature on the activity of alpha amylase. |
| **COURSE CODE:PS408** | **PHYSICAL PHARMACY LAB** |

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| CO1 | To determine the viscosity by Ostwald and Brookfield viscometer. |
| CO2 | To demonstrate preparation of micro and multiple emulsions, zeta potential. |
| CO3 | To determine flow properties of powders. |
| CO4 | Microscopic size analysis, plotting of graphs, calculation of geometric mean and diameter of powders. |
| **COURSE CODE:MC409HS** | **GENDER SENSITIZATION LAB** |
| CO1 | Men and women students and professionals will be better equipped to work and live together and as equals. |
| CO2 | Will attain a finer grasp on how gender discrimination works in our society and how to counter it. |
| CO3 | Students will develop sense of appreciation of women in all walks of life. |
| CO4 | Develop a better understanding of important issues related to gender in contemporary India. |
| **COURSE OUTCOMES OF B. PHARMACY 3 RD YEAR 1ST SEMESTER** | |
| **COURSE CODE:PS501** | **PHARMACEUTICAL MICRO BIOLOGY** |
| CO1 | Know the anatomy, identification and cultivation of micro organisms. |
| CO2 | Perform sterilization of various pharmaceutical products, equipment and culture media. |
| CO3 | Perform sterility testing of pharmaceutical products. |
| CO4 | Do micro biological analysis of air, water and milk. |
| **COURSE CODE:PS502** | **PHARMACUETICAL TECHNOLOGY I** |
| CO1 | Know the preformulation parameters in designing the dosage forms. |
| CO2 | Be aware of different types of tablets and machinery used in granulation techniques. |
| CO3 | Well versed with fundamentals of cosmetic science, formulation , preparation and packaging of cosmetics. |
| CO4 | Gain knowledge on different micro encapsulation techniques and their importance in pharmacy. |

| COURSE CODE:PS503 | PHARMACOLOGY I |
|---|---|
| CO1 | Understand the pharmacological aspects of drugs. |
| CO2 | Learn about the drug with regard to classification, pharmacodynamics and pharmacokinetics aspects. |
| CO3 | Know the importance of pharmacology subject as a basis of therapeutics and correlate the knowledge therapeutically. |
| CO4 | Have a good command on adverse effects, uses, dose, route of administration, contra indication and interaction of drugs. |
| **COURSE CODE:PS504** | **PHARMACOGNOSY II** |
| CO1 | Knowledge on the formation of pharmaceutically important secondary metabolites in plants and their commercial significance. |
| CO2 | Appreciate the role of fibers, natural sweetening agents, tannins and resins in pharmaceutical, cosmetic and food industry. |
| CO3 | Know about the various applications of crude drugs in the preparation of formulations as medicaments and excipients. |
| CO4 | To make the student aware of Ayurveda and its various preparations. |
| **COURSE CODE:PS505** | **DRUG REGULATORY AFFAIRS** |
| CO1 | Be aware of organization structure of India in central and state division of drug controller of India and their function. |
| CO2 | Procedure for import and export of drugs and their permission. |
| CO3 | To know various procedures for approval of formulations and API's |
| CO4 | To know the salient features and principles of QBD,ICH and WHO. |
| **COURSE CODE:PS506** | **ACTIVE PHARMACEUTICAL INGREDIENT PROCESS DEVELOPMENT** |
| CO1 | Understand the various aspects regarding process development and synthesis from pilot preparation to bulk drug |
| CO2 | Development and scale up techniques for the manufacture of new API's |
| CO3 | Includes process technologies for natural products from plants, animals, marine and microbial sources |

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| CO4 | Includes commercial production of bulk drugs |
| **COURSE CODE:MS507** | **ENTERPRENUERSHIP AND SMALL BUSINESS ENTERPRISES** |
| CO1 | Enable to learn the basics of entrepreneurship and entrepreneurial development which helps to provide vision for own startup |
| CO2 | Evolution and entrepreneurial training methods are included |
| CO3 | Know about the final harvest of new venture technology and business incubation |
| CO4 | Explains about factors in service marketing responsible for key success |
| **COURSE CODE:PS508** | **PHARMACEUTICAL MICROBIOLOGY LAB** |
| CO1 | Preparation of various culture media and cultivation of microbes |
| CO2 | Learn about sterilization techniques and validations |
| CO3 | Know about characterization of microbes by staining techniques |
| CO4 | Notice oligodynamic action of metals on bacteria |
| **COURSE CODE:PS509** | **PHARMACEUTICAL TECHNOLOGY I LAB** |
| CO1 | Perceive solubility profile estimation in different pH media |
| CO2 | Study the effect of crystallinity and amorphous structures on the solubility of drugs |
| CO3 | Consists of preparation and evaluation of ointments and gels |
| CO4 | Covers the evaluation of packaging materials such as glass, plastics and cotton |
| **COURSE CODE:PS510** | **PHARMACOLOGY I LAB** |
| CO1 | Introduces various preparation methods for different solutions used in experiments |
| CO2 | Covers common laboratory animals and anesthetics used in animal studies |
| CO3 | Includes the study of the effect of autonomic drugs on rabbits' eye |
| CO4 | To record the concentration response curve of acetylcholine using rectus abdominus muscle of frog |
| **COURSE** | **PROFESSIONAL ETHICS** |

| CODE:MC500 | |
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| CO1 | Understand the importance of values and ethics in personal life and professional careers |
| CO2 | Learn the rights and responsibilities as an employee, team member and global citizen |
| CO3 | Consists of governing ethics, life skills and emotional intelligence |
| CO4 | Introduce norms of professional conduct Vs profession, responsibilities and obligations |
| **COURSE OUTCOMES OF B. PHARMACY 3 RD YEAR 2ND SEMESTER** | |
| **COURSE CODE:PS601** | **MEDICINAL CHEMISTRY I** |
| CO1 | Knowledge about basic considerations of drug activity |
| CO2 | Organized way of explanation regarding synthesis and mechanism of action of adrenergic and cholinergic agents |
| CO3 | Brief study of the chemistry of neurotransmitters |
| CO4 | Helps to understand the medicinal uses of compounds |
| **COURSE CODE:PS602** | **PHARMACEUTICAL TECHNOLOGY II** |
| CO1 | Know the formulation and evaluation of tablets, coated tablets and capsules |
| CO2 | Aware of preformulation factors and formulation details pertaining to parenteral products |
| CO3 | Well versed with packaging of pharmaceutical products and stability aspects of packaging |
| CO4 | Knowledge on general formulation, manufacturing and packaging methods of pharmaceutical aerosols |
| **COURSE CODE:PS603** | **PHARMACOLOGY II** |
| CO1 | Provide opportunity to learn about the drug with regard to classification |
| CO2 | Know about pharmacology of drugs acting on hematopoietic system and urinary system |
| **CO3** | Understand the importance of pharmacology as a basis of therapeutics and correlate the knowledge therapeutically |

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| **CO4** | Aware of pharmacodynamic and pharmacokinetic aspects, precautions, contraindications and interaction with other drugs |
| **COURSE CODE:PS604** | **CHEMISTRY OF NATURAL PRODUCTS** |
| CO1 | Clear information about the chemistry and pharmaceutical importance of purine and xanthine derivatives |
| CO2 | Aware of general properties and importance of sterols |
| CO3 | Know the general methods of isolation, chemistry and structure elucidation of terpenoids |
| CO4 | Enhanced knowledge about the poly functional natural products |
| **COURSE CODE:PS605** | **GENERAL DRUG PRODUCT DEVELOPMENT** |
| CO1 | Well versed with concept of generic drug product and its history |
| CO2 | Aware of drug product approval process in India and US |
| CO3 | Grasp the knowledge on analytical method development for verification and validation of active ingredients |
| CO4 | Be clear about the bioequivalence studies and in vitro tests to ensure bioequivalence of test product |
| **COURSE CODE:PS606** | **DRUG DESIGN AND DISCOVERY** |
| CO1 | Emphasizes on the conceptual background and development of medicinal chemistry and drug design |
| CO2 | Helps in identification of lead for new drug design |
| CO3 | Modification of lead aimed at changing pharmacodynamic and pharmacokinetics |
| CO4 | Gain knowledge on Principles of combinatorial chemistry |
| **COURSE CODE:PS607** | **SCREENING METHODS IN PHARMACOLOGY** |
| CO1 | Know the care handling and breeding techniques of laboratory animals |
| CO2 | Aware of guidelines for handling animals |
| CO3 | Understand the regulations for screening new drug molecules and human volunteers |
| CO4 | Command over CPCSEA and OECD guidelines |

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| **COURSE CODE:PS608** | **MEDICINAL CHEMISTRY I** |
| CO1 | Able to synthesize some medicinal compounds and their analogues |
| CO2 | Qualitative estimation of halogens by Strepheno's method |
| CO3 | Qualitative estimation of methoxy groups by Zeissel's method |
| CO4 | Qualitative estimation of carboxy groups by silver salt method |
| **COURSE CODE:PS609** | **PHARMACEUTICAL TECHNOLOGY II** |
| CO1 | Demonstrate different coatings of tablets |
| CO2 | Illustrate preparation and evaluation of gastro retentive dosage forms |
| CO3 | Formulate and evaluate chewable and buccal tablets |
| CO4 | Aim to prepare and evaluate pharmaceutical products like fast dissolving and sublingual tablets |
| **COURSE CODE:PS610** | **PHARMACOLOGY-II LAB** |
| CO1 | Calculate the PA2 value of atropine using acetylcholine as an antagonist on rat ileum preparation. |
| CO2 | To calculate the PA2 value of mepyramine using histamine as antagonist on guinea pig ileum. |
| CO3 | Calculating the strength of acetylcholine, histamine, 5-HT, oxytocin. |
| CO4 | Performing matching, two point and three point assay methods. |
| **COURSE CODE:HS611** | **ADVANCED COMMUNICATION SKILLS LAB** |
| CO1 | Improve students fluency in spoken English. |
| CO2 | Enable them to listen to English spoken at normal conversational speed. |
| CO3 | Communicate their ideas relevantly and coherently in writing. |
| CO4 | Develop proficiency in academic reading and writing. |
| **COURSE OUTCOMES OF B. PHARMACY 4$^{th}$YEAR 1$^{st}$ SEMESTER** | |
| **COURSE CODE:PS701** | **PHARMACEUTICAL ANALYSIS-II** |

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| CO1 | Includes the study of pharmaceuticals which are useful in academia and industry. |
| CO2 | Study of principles, instrumentation and applications of fluorimetry. |
| CO3 | Basic principles in the interpretation of NMR spectra. |
| CO4 | Instrumentation and applications of atomic absorption spectroscopy. |
| **COURSE CODE:PS702** | **BIOPHARMACEUTICS AND PHARMACOKINETICS** |
| CO1 | Be able to understand bioavailability, bioequivalence, biopharmaceutical parameters. |
| CO2 | Detailed study on pharmacodynamic and pharmacokinetics of drug. |
| CO3 | Explains the ADME of the drug besides non linear pharmacokinetics. |
| CO4 | Involves the study of compartment modeling and calculations of pharmacokinetic parameters. |
| **COURSE CODE:PS703** | **PHARMACOLOGY III** |
| CO1 | Know the importance of pharmacology as a basis of therapeutics and correlate the knowledge therapeutically. |
| CO2 | Well versed with experimental methodologies on various animal models. |
| CO3 | Therapeutic approach for the management of diseases. |
| CO4 | Study on chemotherapeutic agents and their application. |
| **COURSE CODE:PS704** | **MEDICINAL CHEMISTRY II** |
| CO1 | Knowledge about drug discovery and design with respect to the lead molecules. |
| CO2 | Able to participate in the community pharmacy activities with the knowledge they gained through the study. |
| CO3 | Provide information about various antibiotics and their chemotherapeutic agents. |
| CO4 | Know the concept of CADD. |
| **COURSE CODE:HS705** | **PHARMACY ADMINISTRATION** |
| CO1 | Expose the students to facets of business administration in the new |

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| | economic environment. |
| CO2 | Be familiar with manufacturing management and statistical quality control charts. |
| CO3 | Know about social and behavior aspects of pharmacy. |
| CO4 | Familiarize with structure of pharma industry in India, export and import of drugs and pharmaceuticals. |
| **COURSE CODE:PS706** | **PHARMACEUTICAL ANALYSIS II LAB** |
| CO1 | Interpret IR spectra of different compounds. |
| CO2 | Determine absorption maximum of bulk drugs. |
| CO3 | Carry out Assay of bulk drugs and formulations by various spectroscopic methods. |
| CO4 | Demonstrate gel electrophoresis and HPLC. |
| **COURSE CODE:PS707** | **BIOPHARMACEUTICS AND PHARMACOKINETICS LAB** |
| CO1 | Estimation of various pharmacokinetic parameters from the data given. |
| CO2 | Know the influence of dosage form on dissolution behavior of same API. |
| CO3 | Enhance the dissolution rate of drugs by different approaches. |
| CO4 | Statistical treatment of pharmaceutical data by using Chi-square test and ANOVA. |
| **COURSE CODE:PS708** | **MEDICINAL CHEMISTRY II LAB** |
| CO1 | Estimation of ascorbic acid and vitamin B1. |
| CO2 | Estimation of alkaloids by gravimetry. |
| CO3 | Determination of ibuprofen by volumetric method. |
| CO4 | Identification of isoniazid and benzoic acid. |
| **COURSE OUTCOMES OF B. PHARMACY 4$^{th}$YEAR 2$^{nd}$ SEMESTER** | |
| **COURSE CODE:PS801** | **NOVEL DRUG DELIVERY SYSTEMS** |
| CO1 | Fundamental study of different types of oral controlled drug delivery systems |
| CO2 | Impart knowledge on transdermal drug delivery systems |

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| CO3 | Helps to know how regulatory agencies act on release of ANDA and NDA |
| CO4 | Aware of principle and fabrication of Intra-uterine devices and Implants |
| **COURSE CODE:PS802** | **CLINICAL PHARMACY** |
| CO1 | Know the pathophysiology of selected disease states and the rationale for drug therapy |
| CO2 | Understand the needs to identify the patient specific parameters relevant in initiating drug therapy and its monitoring |
| CO3 | Impart quality use of medicines and their therapeutics if various disease management |
| CO4 | Monitor adverse drug reaction, interpret and formulate drug or medicine information |
| **COURSE CODE:PS803** | **PHARMACEUTICAL BIOTECHNOLOGY** |
| CO1 | Know screening of industrially interesting microbes |
| CO2 | Optimize fermentation process parameters |
| CO3 | Know about bioinformatics and its applications in pharmacy |
| CO4 | Familiarizes about regulatory control of biotechnological products |
| **COURSE CODE:PS803** | **PHARMACOGNOSY III** |
| CO1 | Learn about therapeutically important crude drugs and phytopharmaceuticals |
| CO2 | Understand the importance of plant tissue culture in pharmacy |
| CO3 | Aware of biologically important molecules from marine sources and nutraceuticals |
| CO4 | Knowledge on the use of crude drugs in a systematic way and the use of crude drugs and phytopharmaceuticals |
| **COURSE CODE:PS805** | **NANO TECHNOLOGY** |
| CO1 | Able to select the right kind of materials for developing nano formulations |
| CO2 | Able to develop nano formulations with appropriate technologies |

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| CO3 | Evaluate the product related test and for identified diseases |
| CO4 | Develop expertise regarding suitability and evaluation of nanomaterials |
| **COURSE CODE:PS806** | **PHARMACOEPIDEMIOLOGY, PHARMACOECONOMICS AND PHARMACOVIGILANCE** |
| CO1 | Understand the risk of pharmacoepidemiology history |
| CO2 | Impart knowledge and skills in vigilance |
| CO3 | Understand the need of Pharmacoeconomics and assessment of pharmacovigilance |
| CO4 | Enable the students to understand cost effectiveness in the management of disease and ADR's |
| **COURSE CODE:PS807** | **MEDICINAL PLANT BIOTECHNOLOGY** |
| CO1 | Get exposed to various techniques of plant tissue culture |
| CO2 | Gain knowledge o metabolic engineering of secondary metabolic pathways, scaleup and commercialization of secondary metabolites |
| CO3 | Understand the strategies for production of secondary metabolites and transgenic technology |
| CO4 | Aware of the concept of totipotency and sterilization techniques |
| **COURSE CODE:PS808** | **NOVEL DRUG DELIVERY SYSTEMS AND REGULATORY AFFAIRS LAB** |
| CO1 | Assignment on product development and filing to various regulatory agencies |
| CO2 | Prepare and evaluate film coated and enteric coated tablets |
| CO3 | Formulate and evaluate mucoadhesive delivery systems |
| CO4 | Prepare and evaluate nano particles |
| **COURSE CODE:PS808** | **PHARMACOGNOSY III LAB** |
| CO1 | Isolate Caffeine and Piperine |
| CO2 | Differentiate glycoside and its aglycone by TLC |
| CO3 | Identification of powdered crude drugs containing alkaloids and glycosides by chemical tests |
| CO4 | Identification of crude drugs by organoleptic method |

# SRI INDU INSTITUTE OF PHARMACY

**Sponsored by New Loyola Model Educational Society, Hyderabad.**
**(Approved by PCI – New Delhi, Affiliated to JNTUH- Hyderabad.)**
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## COURSE OUTCOMES OF B. PHARMACY (R15 Regulations)

| COURSE OUTCOMES OF B. PHARMACY 1ST YEAR | |
|---|---|
| **COURSE CODE:R10001** | **COURSE NAME: REMEDIAL MATHEMATICS** |
| CO1 | Application of basics of mathematics in pharmaceutical calculations |
| CO2 | Application of determinants to solve simultaneous equations |
| CO3 | Integrations of trigonometric functions |
| CO4 | Formation of differential equation of first order and first degree |
| **COURSE CODE:R10002** | **COURSE NAME: DISPENSING AND GENERAL PHARMACY** |
| CO1 | Should be familiar with the hospital pharmacy organization and drug distribution procedures |
| CO2 | Know about storage, incompatibilities and patient related factors |
| CO3 | Aware of principles involved and procedures adopted in dispensing of liquid, semisolid dosage forms |
| CO4 | Comprehensive knowledge on pharmaceutical ethics and ethical guidelines for retail pharmacist, manufacturing pharmacist and pharmaceutical researches |
| **COURSE CODE:R10003** | **COURSE NAME: PHARMACEUTICAL INORGANIC CHEMISTRY** |
| CO1 | Know the classification of inorganic pharmaceuticals based upon their applications and therapeutic uses |
| CO2 | Gain knowledge on electrolytes, acid base regulators and dialysis fluids |
| CO3 | Detailed study of gastro intestinal agents, laxatives and mineral nutrients |
| CO4 | Understand different categories of pharmaceutical aids and topical agents |

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| **COURSE CODE:R10004** | **COURSE NAME: PHARMACEUTICAL ORGANIC CHEMISTRY I** |
| CO1 | Includes detailed study on the mechanisms involved in various reactions |
| CO2 | Understand the synthesis of higher organic compounds |
| CO3 | Isomerism, relative and ring stabilities of cyclohexane |
| CO4 | Insight on stability and addition reactions of conjugated alka dienes |
| **COURSE CODE:R10005** | **COURSE NAME: ANATOMY, PHYSIOLOGY, HEALTH EDUCATION** |
| CO1 | Cognition on the structure and functions of various organs of human bodies and mechanisms in maintenance of normal functioning |
| CO2 | Physiology of muscle contraction and physiological properties of skeletal muscles |
| CO3 | Insight on basic anatomy, physiology and conduction system of heart, blood vessels and circulation |
| CO4 | Brief outline of communicable diseases, demography and family planning |
| **COURSE CODE: R10006** | **COURSE NAME: ENGLISH** |
| CO1 | Includes skill development, fostering ideas and practicing language skills. |
| CO2 | Use English language effectively in spoken and written forms. |
| CO3 | Comprehend the given texts and respond appropriately. |
| CO4 | Communicate confidently in formal and informal contexts. |
| **COURSE CODE:R10007** | **COURSE NAME: REMEDIAL BIOLOGY** |
| CO1 | To know about classification and some aspects of physiology of frogs and animals |
| CO2 | Study the types of tissues, their functions and tissue systems |
| CO3 | Knowledge on histology of root, stem, bark, leaf, flower, fruit and seed |
| CO4 | Study systemic position and classification of families like Umbelliferae, Apocyanaceae and Liliaceae |
| **COURSE** | **COURSE NAME: REMEDIAL BIOLOGY I LAB** |

| CODE:R10051 | |
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| CO1 | Introduction to simple and compound microscope and their handling |
| CO2 | Morphological study of various parts of plants |
| CO3 | Study of structure of human parasites and insects mentioned with the help of specimen |
| CO4 | Microscopic examination of specimen slides related to plant and animal tissues |
| **COURSE CODE:R10052** | **DISPENSING AND GENERAL PHARMACY LAB** |
| CO1 | Includes dispensing of prescriptions of mixtures, solutions, emulsions, creams etc. |
| CO2 | Dispensing of prescriptions involving adjustment of tonicity. |
| CO3 | Categorization and storage of pharmaceutical products based on legal requirements of labelling and storage. |
| CO4 | Dispensing procedures involving pharmaceutical calculations, pricing of prescriptions and dosage calculations for pediatric and geriatric patients. |
| **COURSE CODE:R10053** | **PHARMACEUTICAL INORGANIC CHEMISTRY LAB** |
| CO1 | Preparation and purification of different compounds |
| CO2 | Perform identification test as per Indian pharmacopoeia |
| CO3 | Determine the impurities qualitatively by performing test for purity |
| CO4 | Analyze the purity of compounds quantitatively by performing assay |
| **COURSE CODE:R10054** | **PHARMACEUTICAL ORGANIC CHEMISTRY I LAB** |
| CO1 | Systematic qualitative analysis of monofunctional organic compounds |
| CO2 | Preparation of organic compounds each involving a specific organic reaction |
| CO3 | Determination of melting point and boiling point by Thiels method |
| CO4 | Recrystallization of organic compounds |
| **COURSE CODE:R10055** | **ANATOMY, PHYSIOLOGY, HEALTH EDUCATION LAB** |
| CO1 | Estimation of haemoglobin in blood, bleeding time and clotting time |

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| CO2 | Determination of vital capacity. |
| CO3 | Study of special senses with the help of charts and models |
| CO4 | Recording of body temperature, pulse rate and blood pressure. |
| **COURSE CODE:R10056** | **ENGLISH LANGUAGE COMMUNICATION SKILLS LAB** |
| CO1 | To improve the fluency in spoken English and neutralize mother tongue influence. |
| CO2 | To sensitize the students to the nuances of English speech sounds, word accent, intonation and rhythm. |
| CO3 | To train students to use language appropriately for interviews, group discussion and public speaking. |
| CO4 | To facilitate computer aided multimedia instruction enabling individualized and independent language learning. |
| **COURSE OUTCOMES OF B. PHARMACY 2nd Year 1st SEMESTER** | |
| **COURSE CODE:R30007** | **PHARMACEUTICAL UNIT OPERATIONS I** |
| CO1 | Understand the concepts of flow of fluids |
| CO2 | Understand the safety factors and possess a sound knowledge on different unit operations |
| CO3 | To be aware of different laws related to distillation |
| CO4 | Be familiar with industrial hazards and their safety precautions |
| **COURSE CODE:R30008** | **PHARMACEUTICAL ORGANIC CHEMISTRY II** |
| CO1 | Includes detailed study on the mechanisms involved in various reactions |
| CO2 | Detailed study of synthesis of higher organic compounds |
| CO3 | Study the nomenclature of various organic compounds |
| CO4 | Understand the concept of intermolecular association and stability of carboxylate ion |
| **COURSE CODE:R30009** | **STATISTICAL METHODS AND COMPUTER APPLICATIONS** |
| CO1 | Recognize the importance of Biostatistics in pharmacy |
| CO2 | Know the basic concepts of sampling and quality control |
| CO3 | Knowledge on calculation of statistical parameters using excel, |

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| | working with texts and graphics |
| CO4 | Aware of database management systems and structured query language |
| **COURSE CODE:R30010** | **PHYSICAL PHARMACY I** |
| CO1 | Know the physical properties of molecules |
| CO2 | Thorough knowledge on phase equilibria and phase rule |
| CO3 | Aware of buffers, buffered isotonic solutions and methods of adjusting tonicity |
| CO4 | Understand the importance of physical properties of molecules in formulation development |
| **COURSE CODE:R30011** | **COURSE NAME: ANATOMY, PHYSIOLOGY AND PATHOPHYSIOLOGY** |
| CO1 | Impart fundamental knowledge on the structure and functions of human body |
| CO2 | Enhance the understanding of mechanism of action of drugs on various body systems |
| CO3 | Knowledge on interlinked mechanisms in the maintenance of homeostasis of human body |
| CO4 | Know the basic principles of cell injury, adaptation and process of inflammation |
| **COURSE CODE:R30057** | **PHARMACEUTICAL ORGANIC CHEMISTRY II LAB** |
| CO1 | To synthesize some simple heterocyclic compounds |
| CO2 | Know the molecular rearrangements occurring in reactions |
| CO3 | Synthesis of compounds from named reactions |
| CO4 | Systematic analysis of organic binary mixtures |
| **COURSE CODE:R30058** | **STATISTICAL METHODS AND COMPUTER APPLICATIONS LAB** |
| CO1 | Know the graphical representation of data with the help of calculators and software programs |
| CO2 | Program to calculate simple and complex arithmetic expressions |
| CO3 | Programs using loops and nested loops and simple programs using arrays |

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| CO4 | Well versed with Software packages like MS WORD, EXCEL, ACCESS and POWERPOINT |
| **COURSE CODE:R30059** | **PHYSICAL PHARMACY I LAB** |
| CO1 | Calculation and determination of % composition by capillary flow method |
| CO2 | Molecular weight determination by Landsberger method |
| CO3 | Calibration of pH meter |
| CO4 | Know the effect of dielectric constant on drug solubility |
| **COURSE CODE:R30060** | **COURSE NAME: ANATOMY, PHYSIOLOGY AND PATHOPHYSIOLOGY LAB** |
| CO1 | Study of reproductive system with the help of charts and models |
| CO2 | Aware of various devices used in family planning |
| CO3 | Microscopic study of abnormal tissue sections |
| CO4 | Study of special senses with the help of charts and models |
| **COURSE OUTCOMES OF B. PHARMACY 2ND YEAR 2 ND SEMESTER** | |
| **COURSE CODE:R40012** | **COURSE NAME: PHARMACEUTICAL UNIT OPERATIONS II** |
| CO1 | Know the basic concepts of phase equilibria, factors affecting evaporation and types of evaporators |
| CO2 | To be familiar with concepts of size reduction and types of mills |
| CO3 | To be well acquainted with theory of mixing and types of mixers |
| CO4 | Understand the concepts of size separation and equipment's used for size separation |
| **COURSE CODE:R40013** | **COURSE NAME: PHARMACEUTICAL BIOCHEMISTRY** |
| CO1 | Includes concept of free energy,laws of thermodynamics. |
| CO2 | Study of biochemistry of carbohydrates. |
| CO3 | Detailed study on biochemistry of proteins and amino acids. |
| CO4 | Over view on structure, mechanism of action and factors affecting enzymes action. |
| **COURSE CODE:R40014** | **COURSE NAME: PHARMACOGNOSY I** |
| CO1 | Know the medicinal and pharmaceutical importance of drugs |

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| | obtained from natural sources |
| CO2 | Acquire the knowledge on crude drugs by studying them under a suitable pharmacognostic scheme |
| CO3 | Aware of different sources of crude drugs, cultivation aspects of medicinal and aromatic plants |
| CO4 | Appreciate the role of crude drugs as excipients in various pharmaceutical dosage forms |
| **COURSE CODE:R40015** | **COURSE NAME: PHYSICAL PHARMACY II** |
| CO1 | Know the influence of temperature and other factors on rate of reactants. |
| CO2 | Aware on formulation, evaluation and stability aspects on coarse dispersions. |
| CO3 | Study the working of various viscometers in the determination of viscosity. |
| CO4 | Know the methods to determine surface area, particle size and surface area of particles. |
| **COURSE CODE:R40016** | **COURSE NAME: ENVIRONMENTAL STUDIES** |
| CO1 | Understand the importance of ecological balance for sustainable development |
| CO2 | Know the impact of development activities and mitigation measures |
| CO3 | Aware of environmental policies and regulations |
| CO4 | Develop technologies on the basis of ecological principles which help in sustainable development |
| **COURSE CODE:R40061** | **COURSE NAME: PHARMACEUTICAL UNIT OPERATIONS II LAB** |
| CO1 | Determine rate of drying, free moisture content and bound moisture content |
| CO2 | Determination of humidity using dry bulb and wet bulb thermometers |
| CO3 | Illustrate the principles of size reduction, laws governing energy and power requirements of size reduction |
| CO4 | Measure the flow of fluids and their pressure |
| **COURSE** | **COURSE NAME: PHARMACEUTICAL BIOCHEMISTRY** |

| CODE:R40062 | LAB |
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| CO1 | To prepare standard buffers and measure pH. |
| CO2 | To perform separation of lipids by TLC. |
| CO3 | Conduct tests for identification of carbohydrates, amino acids and lipids. |
| CO4 | To estimate the effect of temperature on the activity of alpha amylase. |
| **COURSE CODE:R40063** | **COURSE NAME: PHARMACOGNOSY I LAB** |
| CO1 | To recall the materials required for microscopic work and preparation of histological slides |
| CO2 | To identify cell contents in plant materials by microscopical and microchemical tests |
| CO3 | Measure the dimensions of cells and cell contents using camera lucida |
| CO4 | To detect carbohydrates and lipids by chemical tests |
| **COURSE CODE:R40064** | **COURSE NAME: PHYSICAL PHARMACY II LAB** |
| CO1 | To determine the viscosity by Ostwald and Brookfield viscometer. |
| CO2 | To demonstrate preparation of micro and multiple emulsions, zeta potential. |
| CO3 | To determine flow properties of powders. |
| CO4 | Microscopic size analysis, plotting of graphs, calculation of geometric mean and diameter of powders. |
| **COURSE OUTCOMES OF B. PHARMACY 3rd YEAR 1st SEMESTER** | |
| **COURSE CODE:R50017** | **COURSE NAME: PHARMACEUTICAL ANALYSIS I** |
| CO1 | Study of separations and determinations involving chromatographic techniques. |
| CO2 | Detailed study of neutralization and complexometric titrations. |
| CO3 | Know the basic concepts and different types of conductometric titrations and their applications in pharmaceutical analysis. |
| CO4 | Knowledge on computation of analytical results and calibration of analytical equipments used in volumetric analysis. |

| COURSE CODE:R50018 | PHARMACEUTICAL MICRO BIOLOGY |
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| CO1 | Know the anatomy, identification and cultivation of micro organisms. |
| CO2 | Perform sterilization of various pharmaceutical products, equipment and culture media. |
| CO3 | Perform sterility testing of pharmaceutical products. |
| CO4 | Do micro biological analysis of air, water and milk. |
| **COURSE CODE:R50019** | **PHARMACOGNOSY II** |
| CO1 | Knowledge on the formation of pharmaceutically important secondary metabolites in plants and their commercial significance. |
| CO2 | Appreciate the role of fibers, natural sweetening agents, tannins and resins in pharmaceutical, cosmetic and food industry. |
| CO3 | Know about the various applications of crude drugs in the preparation of formulations as medicaments and excipients. |
| CO4 | To make the student aware of Ayurveda and its various preparations. |
| **COURSE CODE:R50020** | **PHARMACUETICAL TECHNOLOGY I** |
| CO1 | Know the preformulation parameters in designing the dosage forms. |
| CO2 | Be aware of different types of tablets and machinery used in granulation techniques. |
| CO3 | Well versed with fundamentals of cosmetic science, formulation , preparation and packaging of cosmetics. |
| CO4 | Gain knowledge on different micro encapsulation techniques and their importance in pharmacy. |
| **COURSE CODE:R50021** | **PHARMACOLOGY I** |
| CO1 | Understand the pharmacological aspects of drugs. |
| CO2 | Learn about the drug with regard to classification, pharmacodynamics and pharmacokinetics aspects. |
| CO3 | Know the importance of pharmacology subject as a basis of therapeutics and correlate the knowledge therapeutically. |
| CO4 | Have a good command on adverse effects, uses, dose, route of |

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| | administration, contra indication and interaction of drugs. |
| **COURSE CODE:R50065** | **PHARMACEUTICAL ANALYSIS I LAB** |
| CO1 | To perform assay of pharmaceutical compounds based on chemical methods |
| CO2 | To identify amino acids and alkaloids by chromatography |
| CO3 | To determine ions by flame photometry |
| CO4 | To determine refractive index of liquids by Abbe refractometer. |
| **COURSE CODE:R50066** | **PHARMACEUTICAL MICRO BIOLOGY LAB** |
| CO1 | Preparation of various culture media and cultivation of microbes |
| CO2 | Learn about sterilization techniques and validations |
| CO3 | Know about characterization of microbes by staining techniques |
| CO4 | Notice oligodynamic action of metals on bacteria. |
| **COURSE CODE:R50067** | **PHARMACOGNOSY II LAB** |
| CO1 | Determination of essential oil content of eucalyptus by clavenger's apparatus. |
| CO2 | Morphological and microscopic study of fennel and clove. |
| CO3 | Identification of crude drugs by organoleptic method. |
| CO4 | Detection of eugenol in clove oil by TLC. |
| **COURSE CODE:R50068** | **PHARMACEUTICAL TECHNOLOGY I LAB** |
| CO1 | Perceive solubility profile estimation in different pH media |
| CO2 | Study the effect of crystallinity and amorphous structures on the solubility of drugs |
| CO3 | Consists of preparation and evaluation of ointments and gels |
| CO4 | Covers the evaluation of packaging materials such as glass, plastics and cotton |
| **COURSE OUTCOMES OF B. PHARMACY 3 RD YEAR 2 ND SEMESTER** | |
| **COURSE CODE:R60022** | **MEDICINAL CHEMISTRY I** |
| CO1 | Knowledge about basic considerations of drug activity. |
| CO2 | Organized way of explanation regarding synthesis and mechanism |

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| | of action of adrenergic and cholinergic agents. |
| CO3 | Brief study of the chemistry of neurotransmitters. |
| CO4 | Helps to understand the medicinal uses of compounds. |
| **COURSE CODE:R60023** | **PHARMACEUTICAL TECHNOLOGY II** |
| CO1 | Know the formulation and evaluation of tablets, coated tablets and capsules |
| CO2 | Aware of preformulation factors and formulation details pertaining to parenteral products |
| CO3 | Well versed with packaging of pharmaceutical products and stability aspects of packaging |
| CO4 | Knowledge on general formulation, manufacturing and packaging methods of pharmaceutical aerosols |
| **COURSE CODE:R60024** | **PHARMACOLOGY II** |
| CO1 | Provide opportunity to learn about the drug with regard to classification |
| CO2 | Know about pharmacology of drugs acting on hematopoietic system and urinary system |
| CO3 | Understand the importance of pharmacology as a basis of therapeutics and correlate the knowledge therapeutically |
| CO4 | Aware of pharmacodynamic and pharmacokinetic aspects, precautions, contraindications and interaction with other drugs |
| **COURSE CODE:R60025** | **CHEMISTRY OF NATURAL PRODUCTS** |
| CO1 | Clear information about the chemistry and pharmaceutical importance of purine and xanthine derivatives |
| CO2 | Aware of general properties and importance of sterols |
| CO3 | Know the general methods of isolation, chemistry and structure elucidation of terpenoids |
| CO4 | Enhanced knowledge about the poly functional natural products |
| **COURSE CODE:R60026** | **PHARMACEUTICAL JURISPRUDENCE** |
| CO1 | Familiarization with all the legal tenets and enforceable in the |

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| | country, besides pharmaceutical ethics and policies. |
| CO2 | Brief review on pharmaceutical legislations. |
| CO3 | Be aware of salient features of WTO and Indian patents act 1970. |
| CO4 | Elaborate study of pharmacy act and drugs and cosmetics act 1940 and rules 1945. |
| **COURSE CODE:R60069** | **ADVANCED COMMUNICATION SKILLS LAB** |
| CO1 | Improve students fluency in spoken English. |
| CO2 | Enable them to listen to English spoken at normal conversational speed. |
| CO3 | Communicate their ideas relevantly and coherently in writing. |
| CO4 | Develop proficiency in academic reading and writing. |
| **COURSE CODE:R60070** | **MEDICINAL CHEMISTRY I LAB** |
| CO1 | Able to synthesize some medicinal compounds and their analogue. |
| CO2 | Qualitative estimation of halogens by Strepheno's method. |
| CO3 | Qualitative estimation of methoxy groups by Zeissel's method. |
| CO4 | Qualitative estimation of carboxy groups by silver salt method. |
| **COURSE CODE:R60071** | **PHARMACEUTICAL TECHNOLOGY II LAB** |
| CO1 | Demonstrate different coatings of tablets |
| CO2 | Illustrate preparation and evaluation of gastro retentive dosage forms |
| CO3 | Formulate and evaluate chewable and buccal tablets |
| CO4 | Aim to prepare and evaluate pharmaceutical products like fast dissolving and sublingual tablets |
| **COURSE CODE:R60072** | **PHARMACOLOGY-II LAB** |
| CO1 | Calculate the PA2 value of atropine using acetylcholine as an antagonist on rat ileum preparation. |
| CO2 | To calculate the PA2 value of mepyramine using histamine as antagonist on guinea pig ileum. |
| CO3 | Calculating the strength of acetylcholine, histamine, 5-HT, oxytocin. |
| CO4 | Performing matching, two point and three point assay methods. |

| COURSE CODE:R60073 | CHEMISTRY OF NATURAL PRODUCTS LAB |
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| CO1 | Preparation of different alkaloid testing reagents. |
| CO2 | Identification of alkaloids by specific color tests. |
| CO3 | TLC and examination of alkaloids, steroids, steroidal glycosides and cardiac glycosides. |
| CO4 | Volatile oil production by steam distillation . |
| **COURSE OUTCOMES OF B. PHARMACY 4th YEAR 1st SEMESTER** | |
| **COURSE CODE:R70027** | **PHARMACOGNOSY III** |
| CO1 | Learn about therapeutically important crude drugs and phytopharmaceuticals |
| CO2 | Understand the importance of plant tissue culture in pharmacy |
| CO3 | Aware of biologically important molecules from marine sources and nutraceuticals |
| CO4 | Knowledge on the use of crude drugs in a systematic way and in the use of crude drugs and phytopharmaceuticals |
| **COURSE CODE:R70028** | **BIOPHARMACEUTICS AND PHARMACOKINETICS** |
| CO1 | Be able to understand bioavailability, bioequivalence, biopharmaceutical parameters. |
| CO2 | Detailed study on pharmacodynamic and pharmacokinetics of drug. |
| CO3 | Explains the ADME of the drug besides non linear pharmacokinetics. |
| CO4 | Involves the study of compartment modeling and calculations of pharmacokinetic parameters. |
| **COURSE CODE:R70029** | **PHARMACOLOGY III** |
| CO1 | Know the importance of pharmacology as a basis of therapeutics and correlate the knowledge therapeutically. |
| CO2 | Well versed with experimental methodologies on various animal models. |
| CO3 | Therapeutic approach for the management of diseases. |
| CO4 | Study on chemotherapeutic agents and their application. |

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| **COURSE CODE:R70030** | **MEDICINAL CHEMISTRY II** |
| CO1 | Knowledge about drug discovery and design with respect to the lead molecules. |
| CO2 | Able to participate in the community pharmacy activities with the knowledge they gained through the study. |
| CO3 | Provide information about various antibiotics and their chemotherapeutic agents. |
| CO4 | Know the concept of CADD. |
| **COURSE CODE:R70031** | **PHARMACY ADMINISTRATION** |
| CO1 | Expose the students to facets of business administration in the new economic environment. |
| CO2 | Be familiar with manufacturing management and statistical quality control charts. |
| CO3 | Know about social and behavior aspects of pharmacy. |
| CO4 | Familiarize with structure of pharma industry in India, export and import of drugs and pharmaceuticals. |
| **COURSE CODE:R70074** | **SEMINAR/INDUSTRIAL VISIT** |
| CO1 | Provide an exposure to students about practical working environment. |
| CO2 | Provide students a good opportunity to gain full awareness about industrial practices. |
| CO3 | Participants engage in discussion of an academic subject for the aim of gaining better insight in to the subject. |
| CO4 | Improves communication skills, gaining expert knowledge, networking with others and renewing motivation and confidence. |
| **COURSE CODE:R70075** | **PHARMACOGNOSY III LAB** |
| CO1 | Isolate Caffeine and Piperine |
| CO2 | Differentiate a glycoside and its aglycone by TLC |
| CO3 | Identification of powdered crude drugs containing alkaloids and glycosides by chemical tests |

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| CO4 | Identification of crude drugs by organoleptic method |
| **COURSE CODE:R70076** | **BIOPHARMACEUTICS AND PHARMACOKINETICS LAB** |
| CO1 | Estimation of various pharmacokinetic parameters from the data given. |
| CO2 | Know the influence of dosage form on dissolution behavior of same API. |
| CO3 | Enhance the dissolution rate of drugs by different approaches. |
| CO4 | Statistical treatment of pharmaceutical data by using Chi square test and ANOVA. |
| **COURSE CODE:R70077** | **PHARMACOLOGY III LAB** |
| CO1 | Study the anti secretery and anti ulcer activity using pilorous ligated rats. |
| CO2 | Calculate $PA_2$ value of atropine using acetyl choline as an agonist on rat ileum preparation. |
| CO3 | Find out the strength of given sample using a suitable isolated muscle preparation by matching two point and three point assays. |
| CO4 | Calculate $PA_2$ value of mepyramine using histamine as agonist on guinea pig ileum. |
| **COURSE CODE:R70078** | **MEDICINAL CHEMISTRY II LAB** |
| CO1 | Estimation of ascorbic acid and vitamin B1. |
| CO2 | Estimation of alkaloids by gravimetry. |
| CO3 | Determination of ibuprofen by volumetric method. |
| CO4 | Identification of isoniazid and benzoic acid. |
| **COURSE OUTCOMES OF B. PHARMACY 4$^{th}$YEAR 2$^{nd}$ SEMESTER** | |
| **COURSE CODE:R80032** | **NOVEL DRUG DELIVERY SYSTEMS AND REGULATORY AFFAIRS** |
| CO1 | Fundamental study of different types of oral controlled drug delivery systems |
| CO2 | Impart knowledge on transdermal drug delivery systems |
| CO3 | Helps to know how regulatory agencies act on release of NDA and NDA |

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| CO4 | Aware of principle and fabrication of Intrauterine devices and Implants |
| **COURSE CODE:R80033** | **PHARMACEUTICAL BIOTECHNOLOGY** |
| CO1 | Know screening of industrially interesting microbes |
| CO2 | Optimize fermentation process parameters |
| CO3 | Know about bioinformatics and its applications in pharmacy |
| CO4 | Familiarizes about regulatory control of biotechnological products. |
| **COURSE CODE:R80034** | **PHARMACEUTICAL ANALYSIS II** |
| CO1 | Basic information about UV visible spectrophotometry and fluorimetry. |
| CO2 | Knowledge about instrumentation and basic principles in the interpretation of IR spectra. |
| CO3 | Aware of theory, instrumentation, applications and principles in interpretation of mass spectra. |
| CO4 | Should be familiar with principle, theory, quenching, instrumentation and applications of fluorimetry. |
| **COURSE CODE:R80035** | **HUMAN VALUES AND PROFESSIONAL ETHICS** |
| CO1 | Appreciate the essential complimentality between values and skills to ensure sustained happiness and prosperity which are the core aspirations of all human beings. |
| CO2 | Facilitate the development of a holistic perspective among students towards life, profession and happiness. |
| CO3 | To highlight plausible implications of holistic understanding in terms of ethical human conduct. |
| CO4 | Understanding harmony in the family and society. |
| **COURSE CODE:R80036** | **CLINICAL PHARMACY PRACTICE** |
| CO1 | Know the pathophysiology of selected disease states and the rationale for drug therapy |
| CO2 | Understand the needs to identify the patient specific parameters relevant in initiating drug therapy and its monitoring |

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| CO3 | Impart quality use of medicines and their therapeutics if various disease management |
| CO4 | Monitor adverse drug reaction, interpret and formulate drug or medicine information |
| **COURSE CODE:R80079** | **PROJECT WORK** |
| CO1 | Challenge's students to think beyond boundaries of the class room. |
| CO2 | Help them to develop the skills, behavior and confidence necessary for success. |
| CO3 | Describe the assessment that evaluates content knowledge as well as additional skills like problem solving and innovation. |
| CO4 | To assess work quality, understanding and participation from the moment students begin to work. |
| **COURSE CODE:R80080** | **NOVEL DRUG DELIVERY SYSTEMS AND REGULATORY AFFAIRS LAB** |
| CO1 | Assignment on product development and filing to various regulatory agencies |
| CO2 | Prepare and evaluate film coated and enteric coated tablets |
| CO3 | Formulate and evaluate mucoadhesive delivery systems |
| CO4 | Prepare and evaluate nano particles |
| **COURSE CODE:R80081** | **PHARMACEUTICAL BIOTECHNOGY LAB** |
| CO1 | Perform microbiological assay of antibiotics by cup plate and turbidimetry method. |
| CO2 | To produce alcohol by fermentation technique. |
| CO3 | Isolate mutants by gradient plate technique. |
| CO4 | Preparation and standardization of bacterial vaccine. |
| **COURSE CODE:R80082** | **PHARMACEUTICAL ANALYSIS II LAB** |
| CO1 | Interpret IR spectra of different compounds. |
| CO2 | Determine absorption maximum of bulk drugs. |
| CO3 | Carry out assay of bulk drugs and formulations by various spectroscopic methods. |
| CO4 | Demonstrate gel electrophoresis and HPLC. |

# SRI INDU INSTITUTE OF PHARMACY

**Sponsored by New Loyola Model Educational Society, Hyderabad.**
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## COURSE OUTCOMES OF PHARM.D.

| COURSE OUTCOMES OF PHARM D 1ST YEAR | |
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| **COURSE CODE:1.1** | **COURSE NAME: HUMAN ANATOMY AND PHYSIOLOGY** |
| CO1 | Describe the structure and functions of various organs of human body. |
| CO2 | Describe the various Homeostatic mechanism and their imbalances of various systems. |
| CO3 | Identify the various tissue and organs of the different systems of the human body. |
| CO4 | Perform the hematological test and also record Blood pressure, heart rate, Pulse and Respiratory volumes. |
| CO5 | Appreciate coordinated working pattern of different organs of each systems. |
| CO6 | Appreciate the interlinked mechanism in the maintenance of normal functioning (Homeostasis) of human body. |
| CO7 | Exemplify different types of tissues and explain various anatomical models. |
| CO8 | Identify the bones of skeletal system |
| CO9 | Find out blood cell count. Hemoglobin, blood grouping, ESR, bleeding time and clotting time |
| CO10 | Record blood pressure, pulse rate and body temperature |
| CO11 | Identify family planning devices and perform pregnancy diagnostic test. |
| **COURSE CODE:1.2** | **COURSE NAME: PHARMACEUTICS** |
| CO1 | Know the formulation accepts of different dosage forms |
| CO2 | Do different pharmaceuticals calculations involved in formulations |
| CO3 | Formulate different types of dosage forms |
| CO4 | Appreciate the importance of good formulation for effectiveness |
| CO5 | Formulate various solid and liquid dosage forms |
| CO6 | Identify and apply suitable remedial measures to solve in incompability |

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| | problems observe in formulations |
| C07 | Demonstrate different techniques involved in formulations |
| **COURSE CODE 1.3** | **MEDICINAL BIOCHEMSTRY** |
| CO1 | Understand the catalytic activity of enzymes and importance of Iso enzymes in diagnosis of diseases |
| CO2 | Know the metabolic process of biomolecules in health and illness |
| CO3 | Understand the genetic organization of mammalian genome; protein synthesis; Replication; Mutations and Repair mechanism |
| CO4 | Know the biochemical principles of organ function test of kidney, liver and Endocrine gland |
| CO5 | Do the qualitative analysis and determination of biomolecules in the body fluids |
| CO6 | Interpret the Lipid profile and Liver function test |
| CO7 | Estimate various electrolytes in serum |
| CO8 | Determine the biomolecules by qualitative and quantitative analysis of Urine and blood samples |
| **COURSE CODE 1.4** | **PHARMACEUTICAL ORGANIC CHEMISTRY** |
| CO1 | IUPAC / common system of nomenclature of simple organic compounds belonging to different classes of organic compounds |
| CO2 | Some important physical property of organic compounds |
| CO3 | Free radicals / Nucleophilic / nucleophilicsubstitution, free radicals / nucleophilic / electrophilic addition, elimination, oxidation and reduction reactions with mechanism, orientation of the reaction, order of reactivity, stability of compounds. |
| CO4 | Some named organic reactions with mechanisms |
| CO5 | Methods of preparation, Test for purity, Principles involved in the assay, important medicinal uses of some important organic compounds |
| CO6 | Introduction to the various laboratory techniques through demonstration involving synthesis of different compounds |
| CO7 | Apply stereo models and explain structural aspects of organic compounds |
| CO8 | Identify various classes of organic compounds by systematic qualitative analysis |

| COURSE CODE 1.5 | PHARMACEUTICAL INORGANIC CHEMISTRY |
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| CO1 | Understand the principles and procedures of Analysis of drugs and also regarding the application of inorganic pharmaceuticals. |
| CO2 | Know the analysis of the inorganic pharmaceuticals and their applications |
| CO3 | Appreciate the importance of inorganic pharmaceuticals in preventing and curing diseases |
| CO4 | Perform identification test as per Indian pharmacopeia |
| CO5 | Determine the impurities qualitatively by performing test for purity |
| CO6 | Analyze the purity of compounds quantitatively by performing assay |
| **COURSE CODE 1.6** | **REMEDIAL BIOLOGY** |
| CO1 | Explain the classification of plants, plant cell and its organization, types of tissue and their functions |
| CO2 | Describe Taxonomical Characters of various family's |
| CO3 | Classify plants based on morphological and microscopic characters |
| CO4 | Identify a given plant part based on its morphological and microscopic characters |
| CO5 | Identify the cell wall constituents and cell inclusions |
| CO6 | Perform Experiment related to plants physiology |
| CO7 | Identify the crude drugs by its morphological characteristics and study the anatomical characters by preparing slides. |
| **COURSE CODE 1.6** | **REMEDIAL MATHEMATICS** |
| CO1 | Explain the principles of matrix Algebra, determinants, Trigonometry, Analytical geometry, Differential calculus, Integral calculus, Differential equations and Laplace Transforms |
| CO2 | State and explain the theorems such as Leibnitz's theorem, Euleus Theorem. |
| CO3 | Identify appropriate standard form for a differential equation. |
| CO4 | Solve complex mathematical problems associated with matrix algebra, differential equation, differential and integral calculus as well as Laplace transform. |

| COURSE OUTCOMES OF PHARM D 2ND YEAR | |
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| **COURSE CODE 2.1** | **PATHOPHYSIOLOGY** |
| CO1 | Describe the etiology and pathogenies of the selected diseases |
| CO2 | Name the sign and symptoms of diseases |
| CO3 | Mention the complication of diseases |
| **COURSE CODE 2.2** | **PHARMACEUTICAL MICROBIOLOGY** |
| CO1 | Know the anatomy, Identification, growth factors and sterilization of micro-organisms |
| CO2 | Know the mode of transmission of diseases causing microorganisms, symptoms of diseases and treatment aspects |
| CO3 | Do estimation of RNA and DNA and there by identify the source |
| CO4 | Do cultivation and identification of the microorganisms in the laboratory |
| CO5 | Do identification of diseases by performing the diagnostic test |
| CO6 | Appreciate the behavior of motility and behavior characteristics of micro-organisms |
| CO7 | Prepare various culture medium for the growth of microorganism |
| CO8 | Identify and isolate bacteria |
| CO9 | Evaluate antimicrobial and determine the minimum inhibitory concentration of antimicrobial agents |
| CO10 | Perform micro biological assay of antibiotics and vitamins by cup plate method and turbidometry method |
| **COURSE 2.3** | **PHARMACOGNOSY AND PHYTOPHARMACEUTICALS** |
| CO1 | Understand the basic principles of cultivation, collection and storage of crude drugs |
| CO2 | Know the source, active constituents and uses of crude drugs |
| CO3 | Appreciate the application of primary and secondary metabolite of the plants |
| CO4 | Study of cell wall constituent and cell inclusions |
| CO5 | Identify the crude drugs by its morphological characteristics and study the anatomical characteristic by preparing slides |
| CO6 | Perform chemical test to identify unorganized crude drugs and lipids |

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| CO7 | Determination of various values like acid value, Ester, Iodine value and saponification value. |
| **COURSE CODE 2.4** | **PHARMACOLOGY – I** |
| CO1 | Understand the pharmacological aspects of drugs |
| CO2 | Appreciate the importance of Pharmacology subjects as a basis of therapeutics |
| CO3 | Correlates and apply the knowledge therapeutically |
| CO4 | To gain knowledge on pharmacokinetic and pharmacodynamics aspects of drugs on different organ system |
| **COURSE CODE 2.5** | **COMMUNITY PHARMACY** |
| CO1 | Know the pharmaceutical care services |
| CO2 | Know the business and professional practice management skills in community pharmacies |
| CO3 | Do patient counselling and provide health screening services to public in community pharmacy |
| CO4 | Respond to minor ailments and provide appropriate medications |
| CO5 | Show Empathy and Sympathy to patients |
| CO6 | Appreciate the concept of Rational drug therapy |
| **COURSE CODE 2.6** | **PHARMACOTHERAPEUTICS I** |
| CO1 | The pathophysiology of selected diseases state and Rational for drug therapy |
| CO2 | The therapeutic approach to management of this diseases |
| CO3 | The controversy in drug therapy |
| CO4 | The importance of preparation of Individualized therapeutic plan based on diagnosis |
| CO5 | Needs to identify the patient specific parameter relevant in initiating drug therapy and monitoring therapy |
| CO6 | Describe the pathophysiology of selected diseases state and explain the rational for drug therapy |
| CO7 | Summarize the therapeutic approach to management of the diseases including reference to the latest available evidence |

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| CO8 | Discuss the controversy of drug therapy |
| CO9 | Discuss the preparation of individualized therapeutic plan based evidence |
| CO10 | Identify the patient specific parameter relevant in initiating drug therapy and monitoring therapy |
| CO11 | Discuss the therapeutic approach to management of therapy diseases |
| CO12 | Prepare Individualized therapeutic plan based on diagnosis |
| **COURSE OUTCOMES OF PHARM D 3RD YEAR** | |
| **COURSE CODE 3.1** | **PHARMACOLOGY II** |
| CO1 | Understand the pharmacological aspects of drugs. |
| CO2 | Appreciate the importance of drugs as the basis of therapeutics |
| CO3 | To know the knowledge of anti-microbial therapy in various infectious diseases |
| CO4 | To know the knowledge of genetics |
| CO5 | Correlate and apply the knowledge therapeutically |
| CO6 | Carry out the animal experiment confidently |
| CO7 | To gain knowledge on the pharmacological actions through animal experimentations |
| **COURSE CODE 3.2** | **PHARMACEUTICAL ANALYSIS** |
| CO1 | Understand the theoretical aspects, instrumentation, elements of interpretation of data and applications of absorption spectroscopy, flame photometry, atomic absorption spectrometry, atomic emission spectroscopy |
| CO2 | To get familiarize with the principles and its techniques of separation of drugs from excipients like column chromatography, gas chromatography, gel filtration and affinity chromatography |
| CO3 | To understand the concepts of statistical quality control and regulatory control |
| CO4 | At the end of the course, students will be able to operate and handle instrument such as UV visible and IR spectrophotometer to obtain the spectra of given sample |
| CO5 | To study the Quenching effect in fluorimetry |
| CO6 | Determination of dissociate constant of indicator using UV visible |

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| | spectrometry |
| CO7 | To compare the UV spectrum of the compounds with that of its derivatives |
| **COURSE CODE 3.3** | **PHARMACOTHERAPEUTICS II** |
| CO1 | To know the pathophysiology of selected diseases state and the rational for drug therapy |
| CO2 | Know the therapeutic approach to management of diseases |
| CO3 | Know the controversy in drug therapy |
| CO4 | Know the importance of preparation of individualized therapeutic plans based on diagnosis |
| CO5 | Appreciate the need to identify the patient specific parameter relevant in initiating drug therapy and monitoring therapy |
| CO6 | Discus the therapeutic approach to management of selected diseases |
| CO7 | Identify drug interaction and rationalize the prescription |
| CO8 | Prepare individualized therapeutic plan based on diagnosis |
| CO9 | Understand the patient problems related to drug therapy and Provide Patient counseling |
| **COURSE CODE 3.4** | **PHARMACEUTICAL JURISPRUDENCE** |
| CO1 | Practice the professional ethics |
| CO2 | Understand the various concepts of the pharmaceutical legislation in India |
| CO3 | Know the various parameter in the drug and cosmetic act rule |
| CO4 | Know the drug policy, DPCO, Patent and designs act |
| CO5 | Understand the labeling requirement and packaging guidelines for drugs and cosmetics |
| CO6 | Be able to understand the concepts of dangerous drug of pharmacy act and excise duty act |
| CO7 | Others laws as prescribed by the pharmacy council of India from time to time including international laws |
| **COURSE CODE 3.5** | **MEDICINAL CHEMSITRY** |
| CO1 | Brief introduction to quantitative structure activity relationship, pro drug, combinatorial chemistry and computer added drug design and concepts of |

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| | anti-sense molecules |
| CO2 | Study the SAR, mechanism of action, synthesis, chemical nomenclature and side effects of different classes of drugs |
| CO3 | Explain the mode of action, the mode of resistance, therapeutic uses of different classes of drugs |
| CO4 | Cogitate of modern concepts of rational drug design pretending to diuretics, thyroid and anti-thyroid agents, diagnostic agents, steroidal hormones and adreno corticoids |
| CO5 | Conduct monographic analysis of different pharmaceuticals compounds |
| CO6 | Determine partition co efficient, dissociation constant and Molar refractometry of different compounds |
| CO7 | Preparation of medicinally important compounds or intermediates required for synthesis of drugs |
| **COURSE CODE 3.6** | **PHARMACEUTICAL FORMULATION** |
| CO1 | Understand the principle involved in formulation of various pharmaceuticals dosage forms |
| CO2 | Prepare various pharmaceutical formulation |
| CO3 | Perform evaluation of pharmaceutical dosage forms |
| CO4 | Understand and appreciate the concepts of bioavailability and bioequivalence, their role in clinical situations. |
| CO5 | Manufacturing of tablets using different techniques |
| CO6 | Formulation and filing of hard gelatin capsule |
| CO7 | Perform different quality control test for various dosage forms |
| CO8 | Preparation of various cosmetics like lipsticks, cold cream, vanishing cream, clear liquid shampoo and Dentifrices |
| **COURSE OUTCOMES OF PHARM D 4TH YEAR** | |
| **COURSE CODE 4.1** | **PHARMACOTHERAPUTICS III** |
| CO1 | Understand the pathophysiology of selected diseases state and the rational for drug therapy |
| CO2 | Acknowledge the therapy approach to management of the diseases |

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| CO3 | Understand the controversy in drug therapy |
| CO4 | Importance of preparation of individualized therapeutic plan based on diagnosis |
| CO5 | Understand the needs to identify the patient specific parameter relevant in initiating drug therapy and monitoring therapy |
| CO6 | Describe the pathophysiology of selected diseases state and explain the rational for drug therapy |
| CO7 | To summarize the therapeutic approach to management of these diseases including reference to the latest available evidence |
| CO8 | Discuss the therapeutic approach to management of selected diseases |
| CO9 | Identify drug interaction and rationalize the prescription |
| CO10 | Prepare individualized therapeutic plan based on diagnosis |
| CO11 | Understand the patient problems related to drug therapy and Provide Patient counselling |
| **COURSE CODE 4.2** | **HOSPITAL PHARMACY** |
| CO1 | To know the various drug distribution method |
| CO2 | To know the professional practice, management skills in hospital pharmacy |
| CO3 | Provide unbiased drug information to the doctors |
| CO4 | To know the manufacturing practices of various formulations in hospital set up |
| CO5 | Appreciate the practice-based research method |
| CO6 | Appreciate the stores management and inventory control |
| CO7 | Analyze prescriptions for drug interactions |
| CO8 | Formulate and prepare parenteral formulation and powders |
| CO9 | Perform inventory analysis |
| CO10 | Provide drug information query thought literature search |
| **COURSE CODE 4.3** | **CLINICAL PHARMACY** |
| CO1 | Monitor drug therapy of patient through medication chart Review and clinical review |
| CO2 | Obtain medication history interview and council the patient |

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| CO3 | Identifying and resolve drug related problems |
| CO4 | Detect, assess and monitor adverse drug reaction |
| CO5 | Interpret selected laboratory result of spficfic diseases case |
| CO6 | Retrieve, Analyze, interpret and formulate drug or medication information |
| CO7 | Assess prescription for drug interaction and provide drug information query |
| CO8 | Perform Patient counselling on medication and conduct medication history regarding |
| CO9 | Analyzes and interpret the data obtained through laboratory test |
| CO10 | Perform patient medication history interview |
| **COURSE 4.4** | **BIOSTATISTICS AND RESEARCH METHODOLOGY** |
| CO1 | Explain the importance of research methods in the design of pharmacoepidemiologic study |
| CO2 | Discuss the method of collection of data and its analysis and interpretation |
| CO3 | Explain the various method of testing hypothesis |
| CO4 | Discuss and evaluate various software for statistical analysis of data |
| CO5 | Recognize the importance of Biostatistics in pharmacy |
| **COURSE 4.5** | **BIOPHARMACEUTICS AND PHARMACOKINETICS** |
| CO1 | Explain the mechanism and factors affecting ADME process. |
| CO2 | Discuss the significance of pharmacokinetics in the design and evolution of dosage forms |
| CO3 | Differentiate between bioavailability and bioequivalence along with their measurement |
| CO4 | Identify and select right pharmacokinetic model for drugs administered by different routes |
| CO5 | Compare the invitro dissolution profiles of different marketed products of same drug |
| CO6 | Perform solubility enhancement technique for improvement of drug release of poorly watersoluble drugs |
| CO7 | Calculate and interpret various pharmacokinetic parameter from the given clinical data |
| CO8 | Estimate the bioavailability and bioequivalence for the given clinical data |
| **COURSE CODE 4.6** | **CLINICAL TOXICOLOGY** |

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| CO1 | Discuss clinical symptoms and management of acute poisoning for the given compounds |
| CO2 | Discuss clinical symptoms and management of Chronic poisoning for the given compounds |
| CO3 | Detect sign and symptoms of drug abuse and suggest suitable remedial methods |
| CO4 | Select appropriate laboratory test to identifying and determining of severity of poisoning |
| **COURSE OUTCOMES OF PHARM D 5TH YEAR** | |
| **COURSE CODE 5.1** | **CLINICAL RESEARCH** |
| CO1 | Discuss the pharmacological and toxicological consideration in process of drug development |
| CO2 | Discuss the principles and phases in clinical trials of drug |
| CO3 | Recognize different roles and obligations of the principal investigator, sponsor and Contract basis organization |
| CO4 | Explain the guidelines GCP and methods of post marketing surveillance |
| **COURSE CODE 5.2** | **PHARMACOEPIDEMIOLOGY AND PHARMACOECONOMICS** |
| CO1 | Discuss the scope need, origin and evaluation of pharmacoepidemiology |
| CO2 | Explain the importance of measurement of outcomes in pharmacoepidemiology |
| CO3 | Discuss the basic principles, roles, and relevance of Pharmacoeconomics in the development of new drug |
| CO4 | Identify, justify and appropriate evaluation method of Pharmacoeconomic study of diseases |
| **COURSE CODE 5.3** | **CLINICAL PHARMACOKINETICS AND PHARMACOTHERAPEUTIC DRUG MONITORING** |
| CO1 | Determine Dose, dosing intervals and dosage adjustment of a drug for a given patient |
| CO2 | Apply the principles of pharmacokinetics to analysis and predict the drug interaction |
| CO3 | Discuss the concept of genetic polymorphism in drug metabolism, drug |

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| | transport and drug targets |
| CO4 | Discuss the pharmacokinetic principles to individualized drug therapy |
| **COURSE CODE 5.4** | **CLERKSHIP** |
| CO1 | Discuss the role of pharmacist in clinical pharmacy services |
| CO2 | Demonstrate the skills of clinical pharmacist |
| CO3 | Discuss the available therapeutic option in the management of diseases |
| CO4 | Prepare a pharmaceutical care plan for a given case |
| CO5 | Detect interpret and report medication errors and drug interaction |
| **COURSE OUTCOMES OF PHARM D 5TH YEAR** | |
| **COURSE CODE 5.5** | **PROJECT** |
| CO1 | Address a problem related to pharmacy practice in hospital, community service or clinical setup with a wider perspective and generality |
| CO2 | Define the problem to be addressed and translate into the statement of aim, objective, scope and planning for the project |
| CO3 | Carry out and report an information survey and take account of funding in executing project |
| CO4 | Evaluate select and apply relevant theories and techniques from the full range of courses studied using conceptual models and framework enhance depth of understanding |
| CO5 | Select appropriate methodology for investigative work, taking into the account the fors and against of the alternative available and developed solution proposals based on reasoned judgment |
| CO6 | Present a coherent, logically argued, fully referenced report and engaged in a professional manner in a viva voce discussion about the project |
| **COURSE OUTCOMES OF PHARM D 6TH YEAR** | |
| **INTERNSHIP** | |
| CO1 | Explain the pathophysiology of diseases state and rational for drug therapy |
| CO2 | Discuss the available therapeutic option to provide patient care in cooperation with patient, prescribed dose and other members of an inter professional health care team |

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| CO3 | Identify, manage and use resources of the health care system, incorporation with patient, prescribers and other health care providers |
| CO4 | Analyze the therapeutic approaches to promote healthcare improvement, wellness and diseases prevention |
| CO5 | Demonstrate skills in monitoring of the national health programs and scheme |
| CO6 | Develop Leadership quality to function effectively as a member of health care team |
| CO7 | Communicate effectively with patient and the community |

**Sponsored by New Loyola Model Educational Society, Hyderabad.**
**(Approved by PCI – New Delhi, Affiliated to JNTUH- Hyderabad.)**
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# COURSE OUTCOMES OF M.PHARM (PHARMACEUTICS)
## R19 REGULATIONS

| M.PHARMACY (PHARMACEUTICS) I YEAR I SEMESTER | |
|---|---|
| **COURSE CODE: PC I** | **MODERN PHARMACEUTICS I** |
| CO1 | To know about formulation and designing of dosage form |
| CO2 | To know the active pharmaceutical ingredients and generic drug product development |
| CO3 | To attain the knowledge of using excipients in different dosage forms |
| CO4 | To know the different physical properties in preformulation. |
| **COURSE CODE: PC II** | **APPLIED BIOPHARMACEUTICS AND PHARMACOKINETICS** |
| CO1 | To understand various ADME parameters |
| CO2 | To understand factors effecting bioavailability and stability of dosage forms. |
| CO3 | To know Drug interactions and problems associated in pharmacokinetic parameters. |
| CO4 | To know bioequivalence studies and protocols to bioequivalence studies. |
| **COURSE CODE: PE I** | **DRUG REGULATORY AFFAIRS** |
| CO1 | Know about different competent regulatory authorities globally |
| CO2 | To be aware of technical aspects pertaining to the marketing authorisation application |
| CO3 | To know about regulatory guidelines framed by regulatory authorities. |
| CO4 | Be familiar with GMP and ICH guidelines for stability testing |
| **PE I** | **ADVANCED PHYSICAL PHARMACEUTICS** |
| CO1 | Deduce the factors affecting dissolution, and solubility in related *invitro* and *invivo* correlations. |

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| CO2 | Have knowledge about stability calculations, shelf life calculations and accelerated stability studies. |
| CO3 | Anticipating the analysis of particle size, solid dispersion, physics of tablets, polymer classification and its applications. |
| CO4 | Understand rheology, absorption, related to liquids and semi-solid dosage forms. |
| **PE I** | **TOTAL QUALITY MANAGEMENT** |
| CO1 | Establish regular guidelines in GMP, GCP, GLP, USFDA, WHO, ISO etc. |
| CO2 | Acquire vast knowledge regarding the quality control aspects of different regulatory bodies. |
| CO3 | Regulatory requirements of single dose and repeat dose toxicity studies |
| CO4 | To escalate the knowledge of students in various quality control and regulatory aspects. |
| **COURSE CODE: PE II** | **COSMETICS AND COSMECEUTICALS** |
| CO1 | Expand scientific knowledge on developing cosmetics and cosmeceuticals and herbal products. |
| CO2 | To know regulatory biological aspects of cosmetics, excipients used in various formulations. |
| CO3 | Perceive the knowledge of designing of cosmeceuticals and herbal products. |
| CO4 | Sunscreen Products classifications and regulatory aspects. |
| **PE II** | **PHARMACEUTICAL VALIDATION** |
| CO1 | Be acquainted with the knowledge of validation of instruments and equipment's. |
| CO2 | Carry out validation of manufacturing processes |
| CO3 | Interpretation of various methods of validation. |
| CO4 | Application of various methodologies in pharmaceutical validation. |
| **PE II** | **STABILITY OF DRUGS AND DOSAGE FORMS** |
| CO1 | To characterize the evaluation of stability of solutions, solids and formulations against adverse conditions. |
| CO2 | Competency of students to retain stability and storage conditions. |
| CO3 | Proficiency of students in retaining the efficacy of the pharmaceutical |

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| | products. |
| CO4 | Knowledge on methods of sampling and tests for various cosmetics according to bureau of Indian standards. |
| **COURSE CODE: MC** | **RESEARCH METHODOLOGY AND IPR** |
| CO1 | To analyse the research related information. |
| CO2 | To emphasise the need of information about intellectual property rights among students. |
| CO3 | Figure out research problems and formulations. |
| CO4 | Investigations of solutions research problems, data collection, analysis and interpretation of data. |
| **COURSE CODE: LAB I** | **MODERN PHARMACEUTICS I LAB** |
| CO1 | To execute the preformulation studies of solid dosage forms. |
| CO2 | Calculate the effect of compressional force on tablet disintegration time. |
| CO3 | Preparation and evaluation of beta cyclodextrin complexes of new drugs |
| CO4 | Perform accelerated stability testing of different tablets. |
| **COURSE CODE: LAB II** | **APPLIED BIO PHARMACEUTICS AND PHARMACOKINETICS LAB** |
| CO1 | Computation of pharmacokinetic parameters of one compartment oral data and two compartment IV data. |
| CO2 | Calculation of bioavailability and bioequivalence studies. |
| CO3 | Evaluation of drug protein binding analysis. |
| CO4 | Construction of calibration curves of different API's by UV/HPLC/HPTLC**.** |
| **COURSE CODE: AUDIT COURSE I** | **ENGLISH FOR RESEARCH PAPER WRITING** |
| CO1 | To know how to improve writing skills and level of readability. |
| CO2 | Fathom the skills needed when writing Title Ensure the good quality of paper at very first submission. |
| CO3 | Ascertain about what to write in each section. |
| CO4 | Flourish with skills needed when writing methods, results, conclusions |

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| | etc. |
| **AUDIT COURSE I** | **DISASTER MANAGEMENT** |
| CO1 | Learn to demonstrate and critical understanding of key concepts in disaster risk reduction and humanitarian response. |
| CO2 | Critically evaluate disaster risk reduction and humanitarian response policy and practice from multiple perspectives. |
| CO3 | Planning and programming in different countries, particularly their home country or the countries they work in. |
| CO4 | Critically understand the strengths and weakness of disaster management approaches. |
| **AUDIT COURSE I** | **SANSKRIT FOR TECHNICAL KNOWLEDGE** |
| CO1 | To obtain working knowledge in illustrious Sanskrit,the scientific language in the world. |
| CO2 | Learning of Sanskrit to improve brain functioning. |
| CO3 | The engineering scholars equipped with Sanskrit will be able to explore the huge knowledge from ancient literature. |
| CO4 | Learning of Sanskrit to develop the logic in mathematics, science, and other subjects enhancing the memory power. |
| **AUDIT COURSE I** | **VALUE EDUCATION** |
| CO1 | Sympathise value of education and self-development. |
| CO2 | Imbibe good values in students. |
| CO3 | Developing the overall personality. |
| CO4 | learn the importance of character and competence. |

| **M.PHARMACY (PHARMACEUTICS) I YEAR II SEMESTER** | |
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| **COURSE CODE: PC III** | **MODERN PHARMACEUTICS II** |
| CO1 | Perceive the planning of pilot plant techniques used for all pharmaceutical dosage forms such as tablets, capsules, parenteral, aerosols, cosmetics and nutraceuticals. |
| CO2 | Distinguish Formulation approaches, preparation & method of manufacturing labelling & Q.C. of anti-ageing products, sun screen lotion and fairness creams. |
| CO3 | Overview of role of nutraceuticals in cancer prevention & cardio |

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| | vascular disorders. |
| CO4 | Advances in propellants, metered dose inhaler designs, manufacture and quality control. |
| **COURSE CODE: PC IV** | **ADVANCED DRUG DELIVERY SYSTEMS** |
| CO1 | Selection of the drugs for CDDS design of the formulation |
| CO2 | fabrication of systems of above drug delivery systems with relevant applications. |
| CO3 | Biochemical and molecular biology approaches to controlled drug delivery of Bioadhesive drug delivery systems |
| CO4 | Drug targeting to particular organs lungs , brain etc |
| **COURSE CODE: PE III** | **INDUSTRIAL PHARMACY** |
| CO1 | Explain the machinery involved in milling, mixing, filtration and drying used in production of pharmaceutical materials. |
| CO2 | Learn salient features of GMP, TQM applicable in industry. |
| CO3 | Understand the effluent treatments and prevention of pollution. |
| CO4 | Evaluate the validation of analytical methods and processes. |
| **PE III** | **HERBAL COSMETICS** |
| CO1 | Gain knowledge on classification, economic aspects and regulatory provisions related to manufacture of cosmetics. |
| CO2 | Get exposed to processes involved in manufacturing of herbal cosmetics related to skin. |
| CO3 | Brief account on herbal extracts and herbal products of cosmetic importance. |
| CO4 | Elaborative study of formulations related to hair care with regard to their composition and claims for various herbs used in them. |
| **PE III** | **PHARMACEUTICAL MANGEMENT** |
| CO1 | Useful for the students to know how to manage a pharma industry. |
| CO2 | Aids the students to develop leadership qualities, communication and interpersonal skills. |
| CO3 | Helps to understand the concepts of managerial control and its importance in pharma industry. |

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| CO4 | Helps the students to understand various managerial functions and professional skills required for a dynamic profession. |
| **COURSE CODE: PE IV** | **NANO BASED DRUG DELIVERY SYSTEMS** |
| CO1 | Able to apply the properties related to the fabrication of nano pharmaceuticals. |
| CO2 | Be aware of molecular formulations based on nano technology and science behind them. |
| CO3 | Be able to select the right kind of materials and evaluate the product. |
| CO4 | Improvements to medical or molecular imaging using nano technology. |
| **PE IV** | **NUTRACEUTICALS** |
| CO1 | Recognise the occurrence and characteristic features of phytochemicals as nutraceuticals. |
| CO2 | Know the importance of nutraceuticals in various common problems with the concept of free radicals. |
| CO3 | Acknowledge the role of antioxidants in free radical induced disease conditions. |
| CO4 | Expose to various food laws and regulations, health claims and dietery supplement claims. |
| **PE IV** | **CLINICAL RESEARCH AND PHARMACOVIGILANCE** |
| CO1 | Demonstrate the types of clinical trial designs |
| CO2 | Execute safety monitoring, reporting, and close out activities |
| CO3 | Detect new adverse drug reactions and their assessment |
| CO4 | Perform the adverse drug reaction reporting system and communication in pharmacovigilance. |
| **COURSE CODE: LAB III** | **MODERN PHARMACEUTICS-II** |
| CO1 | To evaluate the effect of surfactant in invitro drug release. |
| CO2 | Preparation and evaluation of film coated, floating, fast dissolving and chewable tablets. |
| CO3 | To formulate and evaluate cold cream, vanishing cream, foundation and cleansing creams. |

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| CO4 | Preparation of oral care products like mouth washes. |
| **COURSE CODE: LAB IV** | **ADVANCED DRUG DELIVERY SYSTEMS LAB** |
| CO1 | Study on diffusion of drugs through various polymeric membranes. |
| CO2 | Preparation and evaluation of enteric coated pellets. |
| CO3 | To formulate and evaluate sustained release oral matrix and reservoir systems. |
| CO4 | Compare invitro dissolution profiles of various sustained release products available in the market. |
| | **MINI PROJECT WITH SEMINAR** |
| CO1 | Allows the students to study, do research and act by themselves using their abilities. |
| CO2 | Improves communication skills and networking with others. |
| CO3 | Helps in gaining expert knowledge and renewing motivational confidence. |
| CO4 | Provides latest information in the field of science and technology. |
| **COURSE CODE: AUDIT COURSE II** | **CONSTITUTION OF INDIA** |
| CO1 | Understanding the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics. |
| CO2 | Confer the intellectual origins of the frame work of argument that informed the conceptualization of social reforms leading to revolution in India. |
| CO3 | Dissertate the circumstances surrounding the foundation of the congress socialist party under the leadership of Jawaharlal Nehru and eventual failure of the proposal of direct elections through adult suffrage in the Indian constitution. |
| CO4 | Discuss the passage of the Hindu Code Bill of 1956. |
| **AUDIT COURSE II** | **PEDAGOGY STUDIES** |
| CO1 | Figure out what pedagogical practices are being used by teachers in formal and informal class rooms in developing countries. |
| CO2 | The evidence on the effectiveness of these pedagogical practices, in what conditions and with what population of learners. |
| CO3 | How can teacher education, school curriculum and guidance materials best support effective pedagogy? |

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| CO4 | Identify critical evidence gaps to guide the development. |
| **AUDIT COURSE II** | **STRESS MANAGEMENT BY YOGA** |
| CO1 | Develop healthy mind in a healthy body thus improving social health. |
| CO2 | Improve efficiency |
| CO3 | overcome stress. |
| CO4 | To get well acquinted with types of pranayama. |
| **AUDIT COURSE II** | **PERSONALITY DEVELOPMENT THROUGH LIFE ENLIGHTENMENT SKILLS** |
| CO1 | Study of Shrimad-Bhagwad-Geeta help the student in developing his personality and achieve the highest goal in life. |
| CO2 | Study of neethishatakam will help in developing versatile personality of students. |
| CO3 | To awaken wisdom in students. |
| CO4 | To became a person with stable mind, pleasing personality and determination. |
| **M.PHARMACY (PHARMACEUTICS) II YEAR I SEMESTER** | |
| **COURSE CODE: PE V** | **BIOSTATISTICS** |
| CO1 | Discuss the basic concept and importance of statistical analysis. |
| CO2 | Explain various methods of testing hypothesis. |
| CO3 | Dissert the methods of collection of data, analysis and interpretation. |
| CO4 | To understand the basic aspects of statistics such as central tendency, dispersion and correlation. |
| **PE V** | **SCALE UP AND TECHNOLOGY TRANSFER** |
| CO1 | Manage the scale up process in pharmaceutical industry. |
| CO2 | Assist in technology transfer. |
| CO3 | To establish safety guidelines which prevent industrial hazards. |
| CO4 | Be aware of process validation. |
| **PE V** | **PRODUCTION AREA DESIGN AND PACKAGING DEVELOPMENT** |
| CO1 | To elaborate the current good manufacturing practices. |
| CO2 | To maximise knowledge on pharmaceutical packaging and design. |

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|---|---|
| CO3 | To familiarise the packaging of solids, semisolids, parenterals, ophthalmic and aerosols. |
| CO4 | To be acquainted with components of packaging and packaging materials. |
| **COURSE CODE: OE I** | **SCREENING METHODS IN PHARMACOLOGY** |
| CO1 | Know various techniques for screening of drugs for different pharmacological activities. |
| CO2 | Aware of guidelines and regulations for screening new drug molecules on animals. |
| CO3 | Notice the guidelines for handling animals and animal ethics for screening of drugs. |
| CO4 | Care handling and breeding techniques of laboratory animals. |
| **OE I** | **ENTREPRENEURSHIP MANAGEMENT** |
| CO1 | Be able to involve in the role of enterprise in national and global economy. |
| CO2 | Able to handle entrepreneurship concepts |
| CO3 | Should meet the demands and challenges of growth strategies and networking. |
| CO4 | Be able to launch and organise an enterprise. |
| **OE I** | **COSMETIC SCIENCE** |
| CO1 | Know various cosmetics their preparation, properties, MOA and uses. |
| CO2 | Understanding the properties and evaluation of cosmetics by analytical methods. |
| CO3 | Should be able to suggest proper usage of cosmetics. |
| CO4 | Application of skin care products in the formulation of cosmeceuticals. |
| **OE I** | **HAZARDS AND SAFETY MANAGEMENT** |
| CO1 | should disclose environmental problems among learners. |
| CO2 | Develop an attitude of concern for the industrial environment. |
| CO3 | Ensure safety standards in pharmaceutical industry. |
| CO4 | Empower ideas to clear mechanism and management in different kinds of hazard management system. |

| OE I | AUDITS AND REGULATORY COMPLIANCE |
|---|---|
| CO1 | Capable of understanding the importance of auditing. |
| CO2 | Have sound knowledge on methodology of auditing. |
| CO3 | Understand the process of auditing in pharmaceutical industries. |
| CO4 | Be competent with the planning process, responsibilities andadministration**.** |
| **COURSE CODE: DISSERTATION** | **DISSERTATION WORK REVIEW II** |
| CO1 | Search and evaluate the available literature in your given subject or chosen topic area |
| CO2 | Read the selected articles thoroughly and evaluate them |
| CO3 | Organise the selected papers by looking for patterns and by developing sub topics |
| CO4 | Analyse critically a segment of published body of knowledge through summary |
| **M.PHARMACY (PHARMACEUTICS) II YEAR II SEMESTER** | |
| **COURSE CODE: DISSERTATION** | **DISSERTATION WORK REVIEW III** |
| CO1 | Apply knowledge and understanding in relation to the agreed area of study |
| CO2 | Communicate in written form by integrating, analysing and applying key texts and practices |
| CO3 | Demonstrate advanced critical research skills in relation to career development |
| CO4 | Integrate the theory and practice in evaluation |
| **COURSE CODE: DISSERTATION** | **DISSERTATION VIVA VOCE** |
| CO1 | Demonstrate knowledge in the program domain |
| CO2 | Presenting views cogently and precisely |
| CO3 | Exhibit professional etiquette suitable for career progression |
| CO4 | Exhibit sustained curiosity and have an attitude of attention in detailing of the project |

# SRI INDU INSTITUTE OF PHARMACY

**Sponsored by New Loyola Model Educational Society, Hyderabad.**
**(Approved by PCI – New Delhi, Affiliated to JNTUH- Hyderabad.)**
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## COURSE OUTCOMES OF M.PHARM (PHARMACEUTICAL ANALYSIS) R19 REGULATIONS

| M.PHARMACY (PHARMACEUTICAL ANALYSIS) I YEAR I SEMESTER | |
|---|---|
| **COURSE CODE: PC I** | **MODERN PHARMACEUTICAL ANALYTICAL TECHNIQUES** |
| CO1 | Gain insight towards modern pharmaceutical analysis. |
| CO2 | Apply knowledge in developing new methods for determination and validate procedures. |
| CO3 | Imply theories in the analysis of various bulk drugs and their formulations. |
| CO4 | Elaboration of knowledge in various instrumentation techniques. |
| **COURSE CODE: PC II** | **PHARMACEUTICAL FOOD ANALYSIS** |
| CO1 | Application of various analytical techniques in determination of various food constituents and finished food products. |
| CO2 | Able to apply analytical techniques in analyzing food additives. |
| CO3 | Possess awareness on food regulations and legislations. |
| CO4 | To analyze biomolecules in various food products. |
| **COURSE CODE: PE I** | **ADVANCED PHARMACEUTICAL ANALYSIS** |
| CO1 | Perception on qualitative determination of various organic compounds |
| CO2 | Accomplished with spectral analysis, dissolution parameters and microbial assays. |
| CO3 | Knowledge on principles and procedures involved in determination of organic functional groups. |
| CO4 | Performing different tests on excipients such as bulk density, particle size distribution etc. |

| PE I | DRUG REGULATORY AFFAIRS |
|---|---|
| CO1 | Mind full of technical aspects pertaining to the marketing authorization application. |
| CO2 | Detailed study of regulatory aspects that effect drug product design and pharmaceutical and bulk drug manufacture. |
| CO3 | Appraised of different competent regulatory authorities globally. |
| CO4 | Well versed with quality, safety and legislation for cosmetic products and herbal products. |
| **PE I** | **PHYTO CHEMISTRY** |
| CO1 | Comprehension on various types of phytoconstituents present in plants |
| CO2 | Detailed study of isotropic tracer techniques. |
| CO3 | Lead structure selection process and optimization. |
| CO4 | Separation of phytoconstituents by vaccum and flash column chromatography. |
| **COURSE CODE: PE II** | **QUALITY CONTROL AND QUALITY ASSURANCE** |
| CO1 | Understand the cGMP aspects in pharmaceutical industry. |
| CO2 | To appreciate the importance of documentation in pharmaceutical industry. |
| CO3 | To comprehend with the scope of quality certifications. |
| CO4 | Proficiency and responsibilities of QA and QC. |
| **PE II** | **COSMETICS AND COSMECEUTICALS** |
| CO1 | To know regarding regulatory biological aspects of cosmetics, excipients used for various formulations. |
| CO2 | Designing of cosmeceuticals and herbal products. |
| CO3 | Factors affecting microbial preservatives efficacy. |
| CO4 | Sunscreen’s classifications and regulatory aspects. |
| **PE II** | **STABILITY OF DRUGS AND DOSAGE FORMS** |
| CO1 | Describe the evaluation of stability of solutions, solids and formulations against adverse conditions. |
| CO2 | Be able to suggest retain stability and storage conditions for retaining the efficacy of the dosage forms. |
| CO3 | Have overview on physical stability of novel drug carriers, liposomes, |

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| | niosomes and nano particles. |
| C04 | Quantitative determination of preservatives, antioxidants, colouring materials, emulsifiers and stabilizers used in pharmaceutical formulations. |
| **COURSE CODE: MC** | **RESEARCH METHODOLOGY AND INTELLECTUAL PROPERTY RIGHTS** |
| CO1 | To scrutinize the research related information. |
| CO2 | To accentuate the need of information about intellectual property rights among students. |
| CO3 | Inspect out research problems and formulations. |
| CO4 | Investigations of solutions, research problems, data collection, analysis and interpretation of data. |
| **COURSE CODE: Lab I** | **MODERN PHARMACEUTICAL ANALYTICAL TECHNIQUES LAB** |
| CO1 | To study Incompatibility studies |
| CO2 | Identification of functional groups and determination by FTIR |
| CO3 | Separation and calculation of Rf values by using paper chromatography, TLC, HPTLC |
| CO4 | Estimation of multi component containing formulations by UV Spectrophotometry. |
| **COURSE CODE: Lab II** | **PHARMACEUTICAL AND FOOD ANALYSIS LAB** |
| CO1 | Determination of fat content and rancidity in food products |
| CO2 | Determination of pesticide residue in food products |
| CO3 | Assay of analgesics and antipyretic drugs(API dosage forms) official in IP |
| CO4 | Determination of saponification value, iodine value, peroxide value, acid value in food products. |
| **COURSE CODE: AUDIT COURSE I** | **ENGLISH FOR RESEARCH PAPER WRITING** |
| CO1 | To know how to improve writing skills and level of readability. |
| CO2 | Comprehend the skills needed when writing Title Ensure the good quality of paper at very first submission. |
| CO3 | Ascertain about what to write in each section. |

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| CO4 | Flourish with skills needed when writing methods, results, conclusions etc. |
| **AUDIT COURSE I** | **DISASTER MANAGEMENT** |
| CO1 | Learn to demonstrate and critical understanding of key concepts in disaster risk reduction and humanitarian response. |
| CO2 | Critically evaluate disaster risk reduction and humanitarian response policy and practice from multiple perspectives. |
| CO3 | Planning and programming in different countries, particularly their home country or the countries they work in. |
| CO4 | Critically understand the strengths and weakness of disaster management approaches. |
| **AUDIT COURSE I** | **SANSKRIT FOR TECHNICAL KNOWLEDGE** |
| CO1 | To obtain working knowledge in illustrious Sanskrit, the scientific language in the world. |
| CO2 | Learning of Sanskrit to improve brain functioning. |
| CO3 | The engineering scholars equipped with Sanskrit will be able to explore the huge knowledge from ancient literature. |
| CO4 | Learning of Sanskrit to develop the logic in mathematics, science, and other subjects enhancing the memory power. |
| **AUDIT COURSE I** | **VALUE EDUCATION** |
| CO1 | Sympathise value of education and self development |
| CO2 | Imbibe good values in students. |
| CO3 | Developing the overall personality. |
| CO4 | learn the importance of character and competence. |
| **M.PHARMACY (PHARMACEUTICAL ANALYSIS)<br>I YEAR II SEMESTER** | |
| **COURSE CODE:<br>PC III** | **ADVANCED INSTRUMENTAL ANALYSIS I** |
| CO1 | Thorough knowledge on various spectral aspects of X ray, IR, SEM |
| CO2 | Be familiar with principles, instrumentation of ORD |
| CO3 | Overview on CE in pharmaceutical analysis |
| CO4 | Principles, instrumentation, pharmaceutical application of supercritical fluid chromatography |
| **COURSE CODE:** | **MODERN BIOANALYTICAL TECHNIQUES** |

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| **PC IV** | |
| CO1 | Able to understand extraction of drugs from biological sources |
| CO2 | Familiar with separation of drugs using different techniques |
| CO3 | Know the guidelines for BA & BE studies |
| CO4 | Well versed with automation and computer aided analysis in sampling |
| **COURSE CODE: PE III** | **PHARMACEUTICAL VALIDATION** |
| CO1 | Be acquainted with the knowledge of validation of instruments and equipment's. |
| CO2 | Carry out validation of manufacturing processes |
| CO3 | Interpretation of various methods of validation. |
| CO4 | Application of various methodologies in pharmaceutical validation. |
| **PE III** | **HERBAL COSMETICS** |
| CO1 | Gain knowledge on classification, economic aspects and regulatory provisions related to manufacture of cosmetics. |
| CO2 | Get exposed to processes involved in manufacturing of herbal cosmetics related to skin. |
| CO3 | Brief account on herbal extracts and herbal products of cosmetic importance. |
| CO4 | Elaborative study of formulations related to hair care with regard to their composition and claims for various herbs used in them. |
| **PE III** | **PHARMACOEPIDEMIOLOGY AND PHARMACOECONOMICS** |
| CO1 | Perceive various epidemiological methods and their applications. |
| CO2 | Be able to understand fundamental principles of Pharmacoeconomics. |
| CO3 | Should perform the key Pharmacoeconomics analysis methods. |
| CO4 | Understand Pharmacoeconomics decision analysis methods and their applications. |
| **PE IV** | **ADVANCED INSTRUMENTAL ANALYSIS II** |
| CO1 | Thorough knowledge on various electrochemical methods like fluorimetry, ELISA, RIA, etc. |
| CO2 | Introduction and applications of conductometry |
| CO3 | Methods of potentiometric titration to determine the end point |
| CO4 | Working and applications of dropping mercury and rotating platinum electrodes |

| PE IV | NUTRACEUTICALS |
|---|---|
| CO1 | Recognise the occurrence and characteristic features of phytochemicals as nutraceuticals. |
| CO2 | Know the importance of nutraceuticals in various common problems with the concept of free radicals. |
| CO3 | Acknowledge the role of antioxidants in free radical induced disease conditions. |
| CO4 | Expose to various food laws and regulations, health claims and dietary supplement claims. |
| **PE IV** | **CLINICAL RESEARCH AND PHARMACOVIGILANCE** |
| CO1 | **To explain the regulatory requirements for conducting clinical trials** |
| CO2 | To demonstrate the types of clinical trial designs |
| CO3 | Execute safety monitoring, reporting and close out activities |
| CO4 | Detect new adverse drug reactions and their assessment |
| **COURSE CODE: LAB III** | **ADVANCED INSTRUMENTAL ANALYSIS I LAB** |
| CO1 | To determine chlorides and sulphates by nephloturbidometry |
| CO2 | To estimate riboflavin by flourimetry |
| CO3 | To perform assay of official compounds by potentiometry and conductometric titrations |
| CO4 | To determine phosphate interference on absorption of calcium |
| **COURSE CODE: LAB IV** | **MODERN BIOANALYTICAL TECHNIQUES LAB** |
| CO1 | To analyse biomolecules quantitatively by gel electrophoresis |
| CO2 | Isolation of analgesics from biological fluids |
| CO3 | Protocol preparation and performance of bioanalytical method validation |
| CO4 | Indicate the stability development by HPLC of API’s |
| | **MINI PROJECT WITH SEMINAR** |
| CO1 | Allows the students to study, do research and act by themselves using their abilities. |
| CO2 | Improves communication skills and networking with others. |
| CO3 | Helps in gaining expert knowledge and renewing motivational confidence. |
| CO4 | Provides latest information in the field of science and technology. |

| COURSE CODE: AUDIT COURSE II | CONSTITUTION OF INDIA |
|---|---|
| CO1 | Understandinge the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics. |
| CO2 | Confer the intellectual origins of the frame work of argument that informed the conceptualization of social reforms leading to revolution in India. |
| CO3 | Dissertate the circumstances surrounding the foundation of the congress socialist party under the leadership of Jawaharlal Nehru and eventual failure of the proposal of direct elections through adult suffrage in the Indian constitution. |
| CO4 | Discuss the passage of the Hindu Code Bill of 1956. |
| **AUDIT COURSE II** | **PEDAGOGY STUDIES** |
| CO1 | Figure out what pedagogical practices are being used by teachers in formal and informal class rooms in developing countries. |
| CO2 | The evidence on the effectiveness of these pedagogical practices, in what conditions and with what population of learners. |
| CO3 | How can teacher education, school curriculum and guidance materials best support effective pedagogy? |
| CO4 | Identify critical evidence gaps to guide the development. |
| **AUDIT COURSE II** | **STRESS MANAGEMENT BY YOGA** |
| CO1 | Develop healthy mind in a healthy body thus improving social health. |
| CO2 | Improve efficiency |
| CO3 | overcome stress. |
| CO4 | To get well acquinted with types of pranayama. |
| **AUDIT COURSE II** | **PERSONALITY DEVELOPMENT THROUGH LIFE ENLIGHTENMENT SKILLS** |
| CO1 | Study of Shrimad-Bhagwad-Geeta help the student in developing his personality and achieve the highest goal in life. |
| CO2 | Study of neethishatakam will help in developing versatile personality of students. |
| CO3 | To awaken wisdom in students. |
| CO4 | To became a person with stable mind, pleasing personality and determination. |

| M.PHARMACY (PHARMACEUTICAL ANALYSIS)<br>II YEAR I SEMESTER | |
|---|---|
| **COURSE CODE:<br>PE V** | **BIOSTATISTICS** |
| CO1 | Discuss the basic concept and importance of statistical analysis. |
| CO2 | Explain various methods of testing hypothesis. |
| CO3 | Dissert the methods of collection of data, analysis and interpretation. |
| CO4 | To understand the basic aspects of statistics such as central tendency, dispersion and correlation. |
| **PE V** | **SCALE UP AND TECHNOLOGY TRANSFER** |
| CO1 | Manage the scale up process in pharmaceutical industry. |
| CO2 | Assist in technology transfer. |
| CO3 | To establish safety guidelines which prevent industrial hazards. |
| CO4 | Be aware of process validation. |
| **PE V** | **PRODUCTION AREA DESIGN AND PACKAGING DEVELOPMENT** |
| CO1 | To elaborate the current good manufacturing practices. |
| CO2 | To maximise knowledge on pharmaceutical packaging and design. |
| CO3 | To familiarise the packaging of solids, semisolids, parenterals, ophthalmic and aerosols. |
| CO4 | To be acquainted with components of packaging and packaging materials. |
| **COURSE CODE:<br>OE** | **SCREENING METHODS IN PHARMACOLOGY** |
| CO1 | Know various techniques for screening of drugs for different pharmacological activities. |
| CO2 | Aware of guidelines and regulations for screening new drug molecules on animals. |
| CO3 | Notice the guidelines for handling animals and animal ethics for screening of drugs. |
| CO4 | Care handling and breeding techniques of laboratory animals. |
| **OE** | **ENTREPRENEURSHIP MANAGEMENT** |
| CO1 | Be able to involve in the role of enterprise in national and global economy. |

| | |
|---|---|
| CO2 | Able to handle entrepreneurship concepts |
| CO3 | Should meet the demands and challenges of growth strategies and networking. |
| CO4 | Be able to launch and organise an enterprise. |
| **OE** | **COSMETIC SCIENCE** |
| CO1 | Know various cosmetics their preparation, properties, MOA and uses. |
| CO2 | Understanding the properties and evaluation of cosmetics by analytical methods. |
| CO3 | Should be able to suggest proper usage of cosmetics. |
| CO4 | Application of skin care products in the formulation of cosmeceuticals. |
| **OE** | **HAZARDS AND SAFETY MANAGEMENT** |
| CO1 | Should disclose environmental problems among learners. |
| CO2 | Develop an attitude of concern for the industrial environment. |
| CO3 | Ensure safety standards in pharmaceutical industry. |
| CO4 | Empower ideas to clear mechanism and management in different kinds of hazard management system. |
| **OE** | **AUDITS AND REGULATORY COMPLIANCE** |
| CO1 | Capable of understanding the importance of auditing. |
| CO2 | Have sound knowledge on methodology of auditing. |
| CO3 | Understand the process of auditing in pharmaceutical industries. |
| CO4 | Be competent with the planning process, responsibilities and administration**.** |
| **COURSE CODE: DISSERTATION** | **DISSERTATION WORK REVIEW II** |
| CO1 | Search and evaluate the available literature in your given subject or chosen topic area |
| CO2 | Read the selected articles thoroughly and evaluate them |
| CO3 | Organise the selected papers by looking for patterns and by developing subtopics |
| CO4 | Analyse critically a segment of published body of knowledge through summary |
| **M.PHARMACY (PHARMACEUTICAL ANALYSIS) II YEAR II SEMESTER** | |
| **COURSE CODE:** | **DISSERTATION WORK REVIEW III** |

| DISSERTATION | |
|---|---|
| CO1 | Apply knowledge and understanding in relation to the agreed area of study |
| CO2 | Communicate in written form by integrating, analysing and applying key texts and practices |
| CO3 | Demonstrate advanced critical research skills in relation to career development |
| CO4 | Integrate the theory and practice in evaluation |
| **COURSE CODE: DISSERTATION** | **DISSERTATION VIVA VOCE** |
| CO1 | Demonstrate knowledge in the program domain |
| CO2 | Presenting views cogently and precisely |
| CO3 | Exhibit professional etiquette suitable for career progression |
| CO4 | Exhibit sustained curiosity and have an attitude of attention in detailing of the project |

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## COURSE OUTCOMES OF M.PHARM
## (PHARMACEUTICAL QUALITY ASSURANCE
## R19 REGULATIONS

| M.PHARMACY (PHARMACEUTICAL QUALITY ASSURANCE) I YEAR I SEMESTER | |
|---|---|
| **COURSE CODE: PC I** | **MODERN PHARMACEUTICAL ANALYTICAL TECHNIQUES** |
| CO1 | Gain insight towards modern pharmaceutical analysis. |
| CO2 | Apply knowledge in developing new methods for determination and validate procedures |
| CO3 | Imply theories in the analysis of various bulk drugs and their formulations |
| CO4 | Elaboration of knowledge in various instrumentation techniques |
| **COURSE CODE: PC II** | **QUALITY CONTROL AND QUALITY ASSURANCE** |
| CO1 | Understand the CGMP aspects in pharmaceutical industry |
| CO2 | To appreciate the importance of documentation in pharmaceutical industry |
| CO3 | To comprehend with the scope of quality certifications |
| CO4 | Proficiency and responsibilities of QA and QC. |
| **COURSE CODE: PE I** | **QUALITY MANAGEMENT SYSTEMS** |
| CO1 | To impart fundamental knowledge and concepts about various quality management principles |
| CO2 | To encompass six system inspection model and concept of IPQC |
| CO3 | Look through ICH guidelines for stability testing of drug substances and drug products, risk management tools and HACCP |
| CO4 | To study the tools for quality improvement and statistical approaches for quality. |

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| **PE I** | **PHARMACEUTICALS AND FOOD ANALYSIS** |
| CO1 | Application of various analytical techniques in determination of various food constituents and finished food products. |
| CO2 | Able to apply analytical techniques in analysing food additives |
| CO3 | Possess awareness on food regulations and legislations. |
| CO4 | To analyse biomolecules in various food products |
| **PE I** | **DRUG REGULATORY AFFAIRS** |
| CO1 | Mind full of technical aspects pertaining to the marketing authorization application. |
| CO2 | Detail study of regulatory aspects that effect drug product design and pharmaceutical and bulk drug manufacture |
| CO3 | Appraised of different competent regulatory authorities globally. |
| CO4 | Well versed with quality, safety and legislation for cosmetic products and herbal products. |
| **COURSE CODE: PE II** | **PRODUCT DEVELPOMENT AND TECHNOLOGY TRANSFER** |
| CO1 | To elucidate necessary information to transfer technology of existing products between various manufacturing places |
| CO2 | To be familiar with development and informational content for IND, NDA, ANDA, and SNDA. |
| CO3 | To know the concept, significance, design and layout of pilot plant scale up studies. |
| CO4 | To be aware of pharmaceutical dosage form and their packaging requirements |
| **PE II** | **ADVANCED PHARMACEUTICAL ANALYSIS** |
| CO1 | Perception on qualitative determination of various organic compounds |
| CO2 | Knowledge on principles and procedures involved in determination of organic functional groups. |
| CO3 | Accomplished with spectral analysis, dissolution parameters and microbial assays. |
| CO4 | Performing different tests on excipients such as bulk density, particle size distribution etc. |
| **PE II** | **PHARMACEUTICAL MANAGEMENT** |

| | |
|---|---|
| CO1 | Help students to know how to manage a pharma industry and its various departments. |
| CO2 | Aids the students to develop leadership qualities, communication and interpersonal skills, decision making and motivation. |
| CO3 | Management helps to understand the concept of managerial control, its levels and role , importance in pharma industry. |
| CO4 | Allows the students to develop various managerial functional and professional skills required for a dynamic professional |
| **COURSE CODE: MC** | **RESEARCH METHODOLOGY AND IPR** |
| CO1 | To analyse the research related information. |
| CO2 | To emphasise the need of information about intellectual property rights among students. |
| CO3 | Figure out research problems and formulations. |
| CO4 | Investigation of solutions, research problems, data collection, analysis and interpretation of data. |
| **COURSE CODE: LAB I** | **MODERN PHARMACEUTICAL ANALYTICAL TECHNIQUES LAB** |
| CO1 | Separation and calculation of Rf values by using paper chromatography, TLC, HPTLC techniques |
| CO2 | To identify different functional groups and incompatibilities by FTIR |
| CO3 | To perform simultaneous estimation of multicomponent containing formulations by UV spectrophotometry |
| CO4 | To calibrate glass ware, pH meter, UV visible spectrophotometer, FTIR Spectrophotometry, HPLC |
| **COURSE CODE: LAB II** | **QUALITY CONTROL AND QUALITY ASSURANCE LAB** |
| CO1 | Conduct solubility studies of weekly acidic and weekly basic drugs. |
| CO2 | Interpret spectra's by IR, NMR and MASS . |
| CO3 | Perform QC test for tablets, capsules, oral liquids and parenterals. |
| CO4 | Demonstration of functional groups of the given samples by IR spectrophotometer**.** |
| **COURSE CODE: AUDIT COURSE I** | **ENGLISH FOR RESEARCH PAPER WRITING** |

| | |
|---|---|
| CO1 | To know how to improve writing skills and level of readability. |
| CO2 | Fathom the skills needed when writing Title Ensure the good quality of paper at very first submission. |
| CO3 | Ascertain about what to write in each section. |
| CO4 | Flourishwith skills needed when writing methods, results, conclusions etc. |
| **AUDIT COURSE I** | **DISASTER MANAGEMENT** |
| CO1 | Learn to demonstrate and critical understanding of key concepts in disaster risk reduction and humanitarian response. |
| CO2 | Critically evaluate disaster risk reduction and humanitarian response policy and practice from multiple perspectives. |
| CO3 | Planning and programming in different countries, particularly their home country or the countries they work in. |
| CO4 | Critically understand the strengths and weakness of disaster management approaches. |
| **AUDIT COURSE I** | **SANSKRIT FOR TECHNICAL KNOWLEDGE** |
| CO1 | To obtain working knowledge in illustrious Sanskrit,the scientific language in the world. |
| CO2 | Learning of Sanskrit to improve brain functioning. |
| CO3 | The engineering scholars equipped with Sanskrit will be able to explore the huge knowledge from ancient literature. |
| CO4 | Learning of Sanskrit to develop the logic in mathematics, science, and other subjects enhancing the memory power. |
| **AUDIT COURSE I** | **VALUE EDUCATION** |
| CO1 | Sympathise value of education and self development |
| CO2 | Imbibe good values in students. |
| CO3 | Developing the overall personality. |
| CO4 | learn the importance of character and competence. |
| **M.PHARMACY (PHARMACEUTICAL QUALITY ASSURANCE) I YEAR II SEMESTER** | |
| **COURSE CODE: PC III** | **PHARMACEUTICAL VALIDATION** |
| CO1 | Able to explain the concept of validation. |
| CO2 | Carry out validation of manufacturing process. |
| CO3 | Apply the knowledge of validation to instruments and equipment’s. |

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| CO4 | Acquainted with cleaning validation and analytical method validation. |
| **COURSE CODE: PC IV** | **PHARMACEUTICAL MANUFACTURING TECHNOLOGY** |
| CO1 | Impart knowledge and skills necessary to train the students with industrial activities during pharmaceutical manufacturing. |
| CO2 | Will be familiar with the principles and practices of aseptic process technology. |
| CO3 | Have a better understanding of principles and instrumentation of quality by design and process analytical technology in pharmaceutical manufacturing. |
| CO4 | Able to understand the common practice in pharmaceutical industry developments, plant layout and production planning. |
| **COURSE CODE: PE III** | **HAZARDS AND SAFETY MANAGEMENT** |
| CO1 | Should disclose environmental problems among learners. |
| CO2 | Develop an attitude of concern for the industrial environment. |
| CO3 | Ensure safety standards in pharmaceutical industry. |
| CO4 | Empower ideas to clear mechanism and management in different kinds of hazard management system. |
| **PE III** | **SPECTRAL ANALYSIS** |
| CO1 | Acquire the knowledge about various aspects of X-Ray diffraction methods. |
| CO2 | Knowledge on various spectral aspects of IR and ATR. |
| CO3 | Familiar with principles , instrumentation and applications of potentiometer. |
| CO4 | Principles, interference and applications of flame emission spectroscopy. |
| **PE III** | **SCREENING METHODS IN PHARMACOLOGY** |
| CO1 | Know various techniques for screening of drugs for different pharmacological activities. |
| CO2 | Aware of guidelines and regulations for screening new drug molecules on animals. |
| CO3 | Notice the guidelines for handling animals and animal ethics for screening of drugs. |
| CO4 | Care handling and breeding techniques of laboratory animals. |

| COURSE CODE: PE IV | AUDITS AND REGULATORY COMPLIANCE. |
|---|---|
| CO1 | Capable of understanding the importance of auditing. |
| CO2 | Have sound knowledge on methodology of auditing. |
| CO3 | Understand the process of auditing in pharmaceutical industries. |
| CO4 | Be competent with the planning process, responsibilities and administration**.** |
| **PE IV** | **HERBAL DRUG TECHNOLOGY** |
| CO1 | Acquire knowledge on the preparation and standardization of herbal preparations. |
| CO2 | Expose to various research institutions of natural products. |
| CO3 | Acquinted with method of extraction, preparation and purification of herbal extracts. |
| CO4 | Aware of colorants and sweeteners of natural origin. |
| **PE IV** | **STABILITY OF DRUGS AND DOSAGE FORMS** |
| CO1 | Describe the evaluation of stability of solutions, solids, and formulations against adverse conditions. |
| CO2 | Able to suggest the measures to retain stability and storage conditions for reataining the efficacy of drug products. |
| CO3 | To know various drug decomposition mechanisms and stabilization of pharmaceuticals. |
| CO4 | To understand the method of analysis in determination of quality of cosmetics in the finished forms and legislation of cosmetic products. |
| **COURSE CODE: LAB III** | **PHARMACEUTICAL VALIDATION LAB III** |
| CO1 | Calibration of electronic balance and PH metre. |
| CO2 | Qualification of pharmaceutical testing equipment like dissolution, disintegration and friability apparatus. |
| CO3 | Preparation of batch manufacturing and master formula records. |
| CO4 | Validation of analytical methods in processing area. |
| **COURSE CODE: LAB IV** | **PHARMACEUTICAL MANUFACTURING TECHNOLOGY LAB** |
| CO1 | To study the design of sterile and non sterile plant layouts. |
| CO2 | To prepare checklist for water for injection and sterile production area. |

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| CO3 | To perform stability study of tablet dosage forms. |
| CO4 | To formulate and evaluate enteric coated pellets. |
| **COURSE CODE: AUDIT COURSE II** | **CONSTITUTION OF INDIA** |
| CO1 | Understanding the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics. |
| CO2 | Confer the intellectual origins of the frame work of argument that informed the conceptualization of social reforms leading to revolution in India. |
| CO3 | Dissertate the circumstances surrounding the foundation of the congress socialist party under the leadership of Jawaharlal Nehru and eventual failure of the proposal of direct elections through adult suffrage in the Indian constitution. |
| CO4 | Discuss the passage of the Hindu Code Bill of 1956. |
| **AUDIT COURSE II** | **PEDAGOGY STUDIES** |
| CO1 | Figure out what pedagogical practices are being used by teachers in formal and informal class rooms in developing countries. |
| CO2 | The evidence on the effectiveness of these pedagogical practices, in what conditions and with what population of learners. |
| CO3 | How can teacher education, school curriculum and guidance materials best support effective pedagogy. |
| CO4 | Identify critical evidence gaps to guide the development. |
| **AUDIT COURSE II** | **STRESS MANAGEMENT BY YOGA** |
| CO1 | Develop healthy mind in a healthy body thus improving social health. |
| CO2 | Improve efficiency |
| CO3 | Overcome stress. |
| CO4 | To get well acquainted with types of pranayama. |
| **AUDIT COURSE II** | **PERSONALITY DEVELOPMENT THROUGH LIFE ENLIGHTENMENT SKILLS** |
| CO1 | Study of Shrimad-Bhagwad-Geeta help the student in developing his personality and achieve the highest goal in life. |

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| CO2 | Study of neethishatakam will help in developing versatile personality of students. |
| CO3 | To awaken wisdom in students. |
| CO4 | To became a person with stable mind, pleasing personality and determination. |

| **M.PHARMACY (PHARMACEUTICAL QUALITY ASSURANCE) II YEAR I SEMESTER** | |
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| **COURSE CODE: PE V** | **BIOSTATISTICS** |
| CO1 | Discuss the basic concept and importance of statistical analysis. |
| CO2 | Explain various methods of testing hypothesis. |
| CO3 | Dissert the methods of collection of data, analysis and interpretation. |
| CO4 | To understand the basic aspects of statistics such as central tendency, dispersion and correlation. |
| **PE V** | **SCALE UP AND TECHNOLOGY TRANSFER** |
| CO1 | Manage the scale up process in pharmaceutical industry. |
| CO2 | Assist in technology transfer. |
| CO3 | To establish safety guidelines which prevent industrial hazards. |
| CO4 | Be aware of process validation. |
| **PE V** | **PRODUCTION AREA DESIGN AND PACKAGING DEVELOPMENT** |
| CO1 | To elaborate the current good manufacturing practices. |
| CO2 | To maximise knowledge on pharmaceutical packaging and design. |
| CO3 | To familiarise the packaging of solids, semisolids, parenterals, ophthalmic and aerosols. |
| CO4 | To be acquainted with components of packaging and packaging materials. |
| **COURSE CODE: OE** | **ENTREPRENEURSHIP MANAGEMENT** |
| CO1 | Be able to involve in the role of enterprise in national and global economy. |
| CO2 | Able to handle entrepreneurship concepts |

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| CO3 | Should meet the demands and challenges of growth strategies and networking. |
| CO4 | Be able to launch and organise an enterprise. |
| **OE** | **COSMETIC SCIENCE** |
| CO1 | Know various cosmetics their preparation, properties, MOA and uses. |
| CO2 | Understanding the properties and evaluation of cosmetics by analytical methods. |
| CO3 | Should be able to suggest proper usage of cosmetics. |
| CO4 | Application of skin care products in the formulation of cosmeceuticals. |
| **OE** | **NANO BASED DRUG DELIVERY SYSTEMS** |
| CO1 | Able to apply the properties related to the fabrication of nano pharmaceuticals. |
| CO2 | Be aware of molecular formulations based on nano technology and science behind them. |
| CO3 | Be able to select the right kind of materials and evaluate the product. |
| CO4 | Improvements to medical or molecular imaging using nano technology. |
| **OE** | **NUTRACEUTICALS** |
| CO1 | Recognise the occurrence and characteristic features of phytochemicals as nutraceuticals. |
| CO2 | Know the importance of nutraceuticals in various common problems with the concept of free radicals. |
| CO3 | Acknowledge the role of antioxidants in free radical induced disease conditions. |
| CO4 | Expose to various food laws and regulations, health claims and dietary supplement claims. |
| **OE** | **PHARMACOEPIDEMIOLOGY AND PHARMACOECONOMICS** |
| CO1 | Perceive various epidemiological methods and their applications. |
| CO2 | Be able to understand fundamental principles of pharmacoeconomics. |

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| CO3 | Should perform the key pharmacoeconomics analysis methods. |
| CO4 | Understand pharmacoeconomics decision analysis methods and their applications. |
| **COURSE CODE: DISSERTATION** | **DISSERTATION WORK REVIEW II** |
| CO1 | Search and evaluate the available literature in your given subject or chosen topic area |
| CO2 | Read the selected articles thoroughly and evaluate them |
| CO3 | Organise the selected papers by looking for patterns and by developing subtopics |
| CO4 | Analyse critically a segment of published body of knowledge through summary |
| **M.PHARMACY (PHARMACEUTICAL QUALITY ASSURANCE) II YEAR II SEMESTER** | |
| **COURSE CODE: DISSERTATION** | **DISSERTATION WORK REVIEW III** |
| CO1 | Apply knowledge and understanding in relation to the agreed area of study |
| CO2 | Communicate in written form by integrating, analysing and applying key texts and practices |
| CO3 | Demonstrate advanced critical research skills in relation to career development |
| CO4 | Integrate the theory and practice in evaluation |
| **COURSE CODE: DISSERTATION** | **DISSERTATION VIVA VOCE** |
| CO1 | Demonstrate knowledge in the program domain |
| CO2 | Presenting views cogently and precisely |
| CO3 | Exhibit professional etiquette suitable for career progression |
| CO4 | Exhibit sustained curiosity and have an attitude of attention in detailing of the project |

# SRI INDU INSTITUTE OF PHARMACY

**Sponsored by New Loyola Model Educational Society, Hyderabad.**
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## COURSE OUTCOMES OF M.PHARM (PHARMACEUTICAL REGULATORY AFFAIRS)

## R19 REGULATIONS

| M.PHARMACY (PHARMACEUTICAL REGULATORY AFFAIRS) I YEAR I SEMESTER | |
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| **COURSE CODE: PC I** | **GOOD REGULATORY PRACTICE** |
| CO1 | Design and implement the checklist and SOP's for various drug regulatory practices |
| CO2 | For the readiness in the conduct of audits and inspections |
| CO3 | Implement good regulatory practices in the healthcare and related industries |
| CO4 | Compliance elements with respect to GMP, GLP, GALP and GDP |
| **COURSE CODE: PC II** | **DRUG REGULATORY AFFAIRS** |
| CO1 | Mind full of technical aspects pertaining to the marketing authorization application. |
| CO2 | Detailed study of regulatory aspects that effect drug product design and pharmaceutical and bulk drug manufacture. |
| CO3 | Appraised of different competent regulatory authorities globally. |
| CO4 | Well versed with quality, safety and legislation for cosmetic products and herbal products. |
| **COURSE CODE: PE I** | **INTELLECTUAL PROPERTY RIGHTS** |
| CO1 | Information regarding patent laws, IPR and drug regulation in India |
| CO2 | To know patent filing procedures under PCT |
| CO3 | Understand various types of IPR, Patentable subject, history of Indian patent protection |
| CO4 | Gain knowledge on salient features and impact of international |

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| | treaties or conventions like WTO, WIPO, TRIPS and PCT |
| **PE I** | **TOTAL QUALITY MANAGEMENT** |
| CO1 | Establish regular guidelines in GMP, GCP, GLP, USFDA, WHO, ISO etc. |
| CO2 | Acquire vast knowledge regarding the quality control aspects of different regulatory bodies. |
| CO3 | Regulatory requirements of single dose and repeat dose toxicity studies |
| CO4 | To escalate the knowledge of students in various quality control and regulatory aspects. |
| **PE I** | **PHARMACEUTICAL VALIDATION** |
| CO1 | Be acquainted with the knowledge of validation of instruments and equipment's. |
| CO2 | Carry out validation of manufacturing processes |
| CO3 | Interpretation of various methods of validation. |
| CO4 | Application of various methodologies in pharmaceutical validation. |
| **COURSE CODE: PE II** | **STABILITY OF DRUGS AND DOSAGE FORMS** |
| CO1 | To epitomise the evaluation of stability of solutions, solids and formulations against adverse conditions. |
| CO2 | Competency of students to retain stability and storage conditions. |
| CO3 | Proficiency of students in retaining the efficacy of the pharmaceutical products. |
| CO4 | Knowledge on methods of sampling and tests for various cosmetics according to bureau of Indian standards. |
| **PE II** | **PHARMACEUTICAL FORMULATION TECHNOLOGY** |
| CO1 | Shall explain the pre formulation parameters |
| CO2 | Apply ICH guidelines and evaluate drug, drug excipients compatibility |
| CO3 | Explain about formulation and development, use of excipients in tablets, powders, capsules, microencapsules and coating techniques |
| CO4 | To learn and apply the statistical design in different formulations |
| **PE II** | **DOCUMENTATION AND REGULATORY WRITING** |

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| CO1 | To know the various documents pertaining to drugs in pharmaceutical industry |
| CO2 | Understand the basics of regulatory compilation |
| CO3 | Create and assemble the regulation submission as per the requirements of agencies |
| CO4 | Follow up the submissions and post approval document requirements |
| **COURSE CODE: MC** | **RESEARCH METHODOLOGY AND INTELLECTUAL PROPERTY RIGHTS** |
| CO1 | To scrutinize the research related information. |
| CO2 | To accentuate the need of information about intellectual property rights among students. |
| CO3 | Inspect out research problems and formulations. |
| CO4 | Investigations of solution, research problems, data collection, analysis and interpretation of data. |
| **COURSE CODE: Lab I** | **REGULATORY PRACTICE AND DOCUMENTATION LAB** |
| CO1 | Case studies of each of good pharmaceutical practices |
| CO2 | Documentation of in process and finished products, quality control tests for solid, liquid, semisolid and sterile preparations |
| CO3 | Preparation of SOP's, analytical reports included in stability and validation |
| CO4 | Protocol preparation for documentation of various types of records like BMR, MFR, DR |
| **COURSE CODE: Lab II** | **DRUG REGULATION AND REGISTRATION LAB** |
| CO1 | Includes case studies on change management, deviations and correctives and preventive actions |
| CO2 | Deals with import of drugs for research and developmental activities |
| CO3 | Preparation of regulatory submission using eCTD software |
| CO4 | Documentation of raw materials, analysis as per official monographs |
| **COURSE CODE: AUDIT COURSE I** | **ENGLISH FOR RESEARCH PAPER WRITING** |
| CO1 | To know how to improve writing skills and level of readability. |

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| CO2 | Fathom the skills needed when writing Title Ensure the good quality of paper at very first submission. |
| CO3 | Ascertain about what to write in each section. |
| CO4 | Flourish with skills needed when writing methods, results, conclusions etc. |
| **AUDIT COURSE I** | **DISASTER MANAGEMENT** |
| CO1 | Learn to demonstrate and critical understanding of key concepts in disaster risk reduction and humanitarian response. |
| CO2 | Critically evaluate disaster risk reduction and humanitarian response policy and practice from multiple perspectives. |
| CO3 | Planning and programming in different countries, particularly their home country or the countries they work in. |
| CO4 | Critically understand the strengths and weakness of disaster management approaches. |
| **AUDIT COURSE I** | **SANSKRIT FOR TECHNICAL KNOWLEDGE** |
| CO1 | To obtain working knowledge in illustrious Sanskrit, the scientific language in the world. |
| CO2 | Learning of Sanskrit to improve brain functioning. |
| CO3 | The engineering scholars equipped with Sanskrit will be able to explore the huge knowledge from ancient literature. |
| CO4 | Learning of Sanskrit to develop the logic in mathematics, science, and other subjects enhancing the memory power. |
| **AUDIT COURSE I** | **VALUE EDUCATION** |
| CO1 | Sympathise value of education and self development |
| CO2 | Imbibe good values in students. |
| CO3 | Developing the overall personality. |
| CO4 | Learn the importance of character and competence. |
| **M.PHARMACY (PHARMACEUTICAL REGULATORY AFFAIRS) I YEAR II SEMESTER** | |
| **COURSE CODE:** | **REGULATORY ASPECTS OF MEDICAL DEVICES** |

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| **PC III** | |
| CO1 | Harmonization initiatives for approval and marketing of medical devices and IVDS. |
| CO2 | Clinical evaluation and investigation of medical devices and IVDS. |
| CO3 | Basics of medical devices and IVDs, process of development, ethical and quality considerations |
| CO4 | Regulatory approval process for medical devices and IVD's in India, US, Canada |
| **COURSE CODE: PC IV** | **REGULATORY ASPECTS OF HERBALS AND BIOLOGICALS** |
| CO1 | Know the regulatory requirements for biologics and vaccines. |
| CO2 | Perceive the regulation for newly developed biologics and biosimilars. |
| CO3 | Interpret the regulatory requirements of blood and /or its components including blood products and label requirements. |
| CO4 | Well versed with preclinical and clinical development considerations of biologics |
| **COURSE CODE: PE III** | **REGULATORY ASPECTS OF FOOD AND NUTRACEUTICALS** |
| CO1 | Know the regulatory requirements for nutraceuticals. |
| CO2 | Understanding the regulation for registration and labelling of nutraceuticals and Europe |
| CO3 | Understanding the global aspects of WHO guidelines on nutrition. |
| CO4 | Involves the study of USFDA, Food safety modernization act |
| **PE III** | **BIOSTATISTICS AND RESEARCH METHODOLOGY** |
| CO1 | Know the biostatistics arrangement, presentation, and formation of tables and charts. |
| CO2 | Know the correlation and regression and application of different methods, analysis of data. |
| CO3 | Know how to write dissertation, thesis and present paper |
| CO4 | Application of different methods in analysis of data |
| **PE III** | **NANO BASED DRUG DELIVERY SYSTEMS** |
| CO1 | Able to apply the properties related to the fabrication of nano pharmaceuticals. |

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| CO2 | Be aware of molecular formulations based on nano technology and science behind them. |
| CO3 | Be able to select the right kind of materials and evaluate the product. |
| CO4 | Improvements to medical or molecular imaging using nano technology. |
| **COURSE CODE: PE IV** | **NUTRACEUTICALS** |
| CO1 | Recognise the occurrence and characteristic features of phytochemicals as nutraceuticals. |
| CO2 | Know the importance of nutraceuticals in various common problems with the concept of free radicals. |
| CO3 | Acknowledge the role of antioxidants in free radical induced disease conditions. |
| CO4 | Expose to various food laws and regulations, health claims and dietery supplement claims. |
| **PE IV** | **CLINICAL RESEARCH AND PHARMACOVIGILANCE** |
| CO1 | Demonstrate the types of clinical trial designs |
| CO2 | Execute safety monitoring, reporting, and close out activities |
| CO3 | Detect new adverse drug reactions and their assessment |
| CO4 | Perform the adverse drug reaction reporting system and communication in pharmacovigilance. |
| **PE IV** | **ADVANCED DRUG DELIVERY SYSTEMS** |
| CO1 | Selection of the drugs for CDDS design of the formulation |
| CO2 | Fabrication of systems of above drug delivery systems with relevant applications. |
| CO3 | Biochemical and molecular biology approaches to controlled drug delivery ofBioadhesive drug delivery systems |
| CO4 | Drug targeting to particular organs, lungs , brain. |
| **COURSE CODE: LAB III** | **REGULATORY ASPECTS OF HERBALS AND BIOLOGICALS LAB** |
| CO1 | Comparison of clinical trail application requirements of US, EU, INDIA or Biologics |
| CO2 | Understanding preparation of documents required for the approval of herbal products of diverse dosage forms as per regulation |

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| | requirements. |
| CO3 | To understand preparation of Biologics License Application. |
| CO4 | Preparation of documents required for the approval of vaccine products |
| **COURSE CODE: LAB IV** | **REGULATORY ASPECTS OF MEDICAL DEVICES LAB** |
| CO1 | Understand Audit checklist for Medical Device facility. |
| CO2 | Understanding GMP of manufacturing of medical devices of diverse nature. |
| CO3 | Preparation and submission of medical devices for approval. |
| CO4 | Preparation and submission of nutraceuticals, devices for approval |
| | **MINI PROJECT WITH SEMINAR** |
| CO1 | Allows the students to study, do research and act by themselves using their abilities. |
| CO2 | Improves communication skills and networking with others. |
| CO3 | Helps in gaining expert knowledge and renewing motivational confidence. |
| CO4 | Provides latest information in the field of science and technology. |
| **COURSE CODE: AUDIT COURSE II** | **CONSTITUTION OF INDIA** |
| CO1 | Understanding the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics. |
| CO2 | Confer the intellectual origins of the frame work of argument that informed the conceptualization of social reforms leading to revolution in India. |
| CO3 | Dissertate the circumstances surrounding the foundation of the congress socialist party under the leadership of Jawaharlal Nehru and eventual failure of the proposal of direct elections through adult suffrage in the Indian constitution. |
| CO4 | Discuss the passage of the Hindu Code Bill of 1956. |
| **AUDIT COURSE II** | **PEDAGOGY STUDIES** |
| CO1 | Figure out what pedagogical practices are being used by teachers in |

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| | formal and informal class rooms in developing countries. |
| CO2 | The evidence on the effectiveness of these pedagogical practices, in what conditions and with what population of learners. |
| CO3 | How can teacher education, school curriculum and guidance materials best support effective pedagogy? |
| CO4 | Identify critical evidence gaps to guide the development. |
| **AUDIT COURSE II** | **STRESS MANAGEMENT BY YOGA** |
| CO1 | Develop healthy mind in a healthy body thus improving social health. |
| CO2 | Improve efficiency |
| CO3 | overcome stress. |
| CO4 | To get well acquinted with types of pranayama. |
| **AUDIT COURSE II** | **PERSONALITY DEVELOPMENT THROUGH LIFE ENLIGHTENMENT SKILLS** |
| CO1 | Study of Shrimad-Bhagwad-Geeta help the student in developing his personality and achieve the highest goal in life. |
| CO2 | Study of neethishatakam will help in developing versatile personality of students. |
| CO3 | To awaken wisdom in students. |
| CO4 | To became a person with stable mind, pleasing personality and determination. |
| **M.PHARMACY (PHARMACEUTICAL REGULATORY AFFAIRS) II YEAR I SEMESTER** | |
| **COURSE CODE: PE V** | **ANALYTICAL METHOD VALIDATION** |
| CO1 | Know about importance of validation, its parameters along with ICH limits |
| CO2 | Validation of analytical instruments |
| CO3 | Well versed with demonstration of specificity by accuracy and chromatographic resolution |
| CO4 | Quantitation of analytical detector responses in pharmaceutical impurity determination |
| **PE V** | **PHARMACEUTICAL INDUSTRY MANAGEMENT** |

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| CO1 | Aims at validation of different process, equipment methods |
| CO2 | Understand the effective management of waste materials |
| CO3 | Knowledge on total quality management, organizational and personnel maintenance |
| CO4 | To know effluent treatments in synthetic drug industry |
| **PE V** | **PHARMACEUTICAL PRODUCTION TECHNOLOGY** |
| CO1 | **Know about the scaleup and pilot plant techniques used for all dosage forms** |
| CO2 | Know about the formulation approaches, preparation and methods of manufacturing, labelling and QC of antiaging products |
| CO3 | Well versed with aseptic processing validation |
| CO4 | Should know about filling of capsules, compression machines and sterilizers used formulation of parenteral |
| **COURSE CODE: OE** | **SCREENING METHODS IN PHARMACOLOGY** |
| CO1 | Know various techniques for screening of drugs for different pharmacological activities. |
| CO2 | Aware of guidelines and regulations for screening new drug molecules on animals. |
| CO3 | Notice the guidelines for handling animals and animal ethics for screening of drugs. |
| CO4 | Care handling and breeding techniques of laboratory animals. |
| **OE** | **ENTREPRENEURSHIP MANAGEMENT** |
| CO1 | Be able to involve in the role of enterprise in national and global economy. |
| CO2 | Able to handle entrepreneurship concepts |
| CO3 | Should meet the demands and challenges of growth strategies and networking. |
| CO4 | Be able to launch and organise an enterprise. |
| **OE** | **COSMETIC SCIENCE** |
| CO1 | Know various cosmetics their preparation, properties, MOA and uses. |
| CO2 | Understanding the properties and evaluation of cosmetics by analytical methods. |

| | |
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| CO3 | Should be able to suggest proper usage of cosmetics. |
| CO4 | Application of skin care products in the formulation of cosmeceuticals. |
| **OE** | **HAZARDS AND SAFETY MANAGEMENT** |
| CO1 | should disclose environmental problems among learners. |
| CO2 | Develop an attitude of concern for the industrial environment. |
| CO3 | Ensure safety standards in pharmaceutical industry. |
| CO4 | Empower ideas to clear mechanism and management in different kinds of hazard management system. |
| **OE** | **AUDITS AND REGULATORY COMPLIANCE** |
| CO1 | Capable of understanding the importance of auditing. |
| CO2 | Have sound knowledge on methodology of auditing. |
| CO3 | Understand the process of auditing in pharmaceutical industries. |
| CO4 | Be competent with the planning process, responsibilities andadministration**.** |
| **COURSE CODE: DISSERTATION** | **DISSERTATION WORK REVIEW II** |
| CO1 | Search and evaluate the available literature in your given subject or chosen topic area |
| CO2 | Read the selected articles thoroughly and evaluate them |
| CO3 | Organise the selected papers by looking for patterns and by developing subtopics |
| CO4 | Analyse critically a segment of published body of knowledge through summary |
| **M.PHARMACY (PHARMACEUTICAL REGULATORY AFFAIRS) II YEAR II SEMESTER** | |
| **COURSE CODE: DISSERTATION** | **DISSERTATION WORK REVIEW III** |
| CO1 | Apply knowledge and understanding in relation to the agreed area of study |
| CO2 | Communicate in written form by integrating, analysing and applying key texts and practices |
| CO3 | Demonstrate advanced critical research skills in relation to career |

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| | development |
| **CO4** | Integrate the theory and practice in evaluation |
| **COURSE CODE: DISSERTATION** | **DISSERTATION VIVA VOCE** |
| CO1 | Demonstrate knowledge in the program domain |
| CO2 | Presenting views cogently and precisely |
| CO3 | Exhibit professional etiquette suitable for career progression |
| CO4 | Exhibit sustained curiosity and have an attitude of attention in detailing of the project |

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## COURSE OUTCOMES OF M.PHARM (PHARMACY PRACTICE)

## R19 REGULATIONS

| M.PHARMACY (PHARMACY PRACTICE) I YEAR I SEMESTER | |
|---|---|
| **COURSE CODE: PC I** | **PHARMACOTHERAPEUTICS I** |
| CO1 | Summarise the therapeutic approach for management of various diseases conditions including reference to the latest available evidence. |
| CO2 | Discuss the clinical controversies in drug therapy and evidence based medicine |
| CO3 | Prepare individualised therapeutic plans based on diagnosis |
| CO4 | Describe and explain the rationale for drug therapy. |
| **COURSE CODE: PC II** | **CLINICAL PHARMACY PRACTICE** |
| CO1 | Provide integrated, critically analysed medicine and poison information. |
| CO2 | Interpret the laboratory results to aid the clinical diagnosis of various disorders. |
| CO3 | Understand the elements of pharmaceutical care and to provide comprehensive patient care services. |
| CO4 | Provide systematic approach in answering medicine information queries. |
| **COURSE CODE: PE I** | **CLINICAL TOXICOLOGY** |
| **CO1** | Discuss clinical symptoms and management of acute poisoning for given compounds. |

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| **CO2** | Dissertate clinical symptoms and Management of chronic poisoning for given compounds. |
| **CO3** | Detect signs and symptoms of drug abuse and suggest suitable remedial methods. |
| **CO4** | Thorough knowledge on principles involved in management of poisoning, antidotes and clinical applications. |
| **PE I** | **HOSPITAL AND COMMUNITY PHARMACY** |
| CO1 | Command on organisation structure of hospital pharmacy. |
| CO2 | To know about procurement and drug distribution practices. |
| CO3 | Be aware of drug policy and drug committees. |
| CO4 | To be acquainted with the value-added services in community pharmacies. |
| **PE I** | **CLINICAL RESEARCH AND PHARMACOVIGILANCE** |
| CO1 | Demonstrate the types of clinical trial designs |
| CO2 | Execute safety monitoring, reporting, and close out activities |
| CO3 | Detect new adverse drug reactions and their assessment |
| CO4 | Perform the adverse drug reaction reporting system and communication in pharmacovigilance. |
| **COURSE CODE: PE II** | **MOLECULAR BIOLOGY** |
| CO1 | Recall, introduction to molecular biology regarding the structure and functions of DNA and RNA and different experiments pertaining to it. |
| CO2 | Thorough knowledge on DNA topology and organization of DNA into chromosomes |
| CO3 | Well acquittance with transport of RNA with in eukaryotic cell and regulatory elements of genes promoters. |
| CO4 | Provide integrated knowledge on translation, synthesis and processing of proteome, regulation of gene expression in prokaryotes and eukaryotes. |
| **COURSE CODE: PE II** | **ADVANCES IN PRECLINICAL EVALUATION** |
| CO1 | Appreciate the care and handling experimental animals |
| CO2 | Conversant about preclinical and clinical studies of different ANS drugs and their models. |

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| **CO3** | Aware of drug rules and regulations for conducting animal studies |
| **CO4** | Well versed with principles of toxicological evaluations and strategies used in drug discovery |
| **PE II** | **DRUG REGULATORY AFFAIRS** |
| CO1 | Mind full of technical aspects pertaining to the marketing authorization application. |
| CO2 | Detail study of regulatory aspects that effect drug product design and pharmaceutical and bulk drug manufacture |
| CO3 | Appraised of different competent regulatory authorities globally. |
| CO4 | Well versed with quality, safety and legislation for cosmetic products and herbal products. |
| **COURSE CODE: MC** | **RESEARCH METHODOLOGY AND IPR** |
| CO1 | To analyse the research related information. |
| CO2 | To emphasise the need of information about intellectual property rights among students. |
| CO3 | Figure out research problems and formulations. |
| CO4 | Investigations of solutions research problems, data collection, analysis and interpretation of data. |
| **COURSE CODE: LAB 1** | **PHARAMCOTHERAPEUTICS** |
| CO1 | Student are required to be posted to various clinical wards for their exposure with therapeutic managements and other clinical aspects. |
| CO2 | Expected to have experience and do a tutorial as well as case presentation in certain clinical conditions. |
| CO3 | Interpretation of therapeutic drug monitoring reports of a given patient. |
| CO4 | Calculation of various pharmacoeconomic outcome analysis for the given data from the mentioned assignments |
| **COURSE CODE: LAB 2** | **CLINICAL PHARMACY PRACTICE** |
| CO1 | Presentation of clinical cases of various disease conditions adapting pharmaceutical care plan model |
| CO2 | Preparation of content of a medicine with proper justification, for the |

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| | inclusion in the hospital formulary. |
| CO2 | Preparation of patient information leaflet, study protocol and informed consent form |
| CO3 | Formulation and dispensing of IV admixtures |
| **COURSE CODE: AUDIT COURSE I** | **ENGLISH FOR RESEARCH PAPER WRITING** |
| CO1 | To know how to improve writing skills and level of readability. |
| CO2 | Knowing the skills needed when writing Title Ensure the good quality of paper at very first submission. |
| CO3 | Ascertain about what to write in each section. |
| CO4 | Flourishwith skills needed when writing methods, results, conclusions etc. |
| **AUDIT COURSE I** | **DISASTER MANAGEMENT** |
| CO1 | Learn to demonstrate and critical understanding of key concepts in disaster risk reductionand humanitarian response. |
| CO2 | Critically evaluate disaster risk reduction and humanitarian response policy and practice from multiple perspectives. |
| CO3 | Planning and programming in different countries, particularly their home country or the countries they work in. |
| CO4 | Critically understand the strengths and weakness of disaster management approaches. |
| **AUDIT COURSE I** | **SANSKRIT FOR TECHNICAL KNOWLEDGE** |
| CO1 | To obtain working knowledge in illustrious Sanskrit,the scientific language in the world. |
| CO2 | Learning of Sanskrit to improve brain functioning. |
| CO3 | The engineering scholars equipped with Sanskrit will be able to explore the huge knowledge from ancient literature. |
| CO4 | Learning of Sanskrit to develop the logic in mathematics, science, and other subjects enhancing the memory power. |
| **AUDIT COURSE I** | **VALUE EDUCATION** |
| CO1 | Sympathise value of education and self-development. |
| CO2 | Imbibe good values in students. |
| CO3 | Developing the overall personality. |
| CO4 | learn the importance of character and competence. |

| M.PHARMACY (PHARMACY PRACTICE)<br>I YEAR II SEMESTER | |
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| **COURSE CODE:<br>PC II** | **PHARMACOTHERAPEUTICS II** |
| CO1 | Discuss the clinical controversies in drug therapy and evidence-based medicine |
| CO2 | Able to explain rationale for drug therapy |
| CO3 | Summarize the therapeutic approach for management of various diseases |
| CO4 | Identify the patient specific parameters relevant in initiating drug therapy and monitoring therapy |
| **COURSE CODE:<br>PC II** | **CLINICAL PHARMACOKINETICS AND DRUG MONITORING** |
| CO1 | Design the drug dosage regimen for individual patients |
| CO2 | Manage pharmacokinetic drug interactions |
| CO3 | Interpret the impact of genetic polymorphisms of individuals on pharmacokinetics and or pharmacodynamics of drugs |
| CO4 | Do pharmacokinetic modelling for the given data using the principles of pharmacometrics |
| **COURSE CODE:<br>PE III** | **BIOPHARMACEUTICS AND PHARMACOKINETICS** |
| CO1 | Critically evaluate biopharmaceutic studies involving drug product equivalency |
| CO2 | Use plasma data and derive the pharmacokinetic parameters to describe the process of drug absorption, distribution, metabolism and elimination. |
| CO3 | Impart basic knowledge about biopharmaceutics |
| CO4 | Discuss bioavailability and bioequivalence and methods to improve bioavailability |
| **PE III** | **CLINICAL RESEARCH** |
| CO1 | Discuss the pharmacological and toxicological consideration in process of drug development |
| CO2 | Discuss the principles and phases in clinical trials of drug |
| CO3 | Recognize different roles and obligations of the principal investigator, |

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| | sponsor and Contract basis organization |
| **CO4** | Explain the guidelines GCP and methods of post marketing surveillance |
| **PE III** | **QUALITY USE OF MEDICINES** |
| CO1 | Understand the principles of quality use of medicines |
| CO2 | Know the benefits and risks associated with use of medicines |
| CO3 | Promote quality use of medicines |
| CO4 | Practice evidence-based medicine |
| **COURSE CODE: PE IV** | **PRINCIPLES OF DRUG DISCOVERY** |
| CO1 | Explain the various stages of drug discovery |
| CO2 | Appreciate the importance of the role of computer aided drug design in drug discovery |
| CO3 | Explain various lead seeking method and lead optimization |
| CO4 | Know the importance of role of genomics, proteomics and bioinformatics |
| **PE IV** | **CELLULAR AND MOLECULAR PHARMACOLOGY** |
| CO1 | Be able to explain the receptor signal transduction processes |
| CO2 | Explain the molecular pathways affected by drugs |
| CO3 | Appreciate the applicability of molecular pharmacology and biomarkers in drug discovery process |
| CO4 | Demonstrate molecular biology techniques as applicable for pharmacology |
| **PE IV** | **NUTRACEUTICALS** |
| CO1 | Understand the importance of nutraceuticals in various common problems |
| CO2 | Well acquainted with the concept of free radicals and measurement of free radicals |
| CO3 | Expose to various food laws and regulations, health claims and dietary supplement claims |
| CO4 | Know the occurrence and characteristic features of various phytochemicals |
| **COURSE CODE: LAB III** | **PHARMACOTHERAPEUTICS II** |

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| CO1 | Required to be posted to various clinical wards for their exposure with therapeutic management and other clinical aspects |
| CO2 | Expected to have experience and do a tutorial as well as case presentation in certain clinical conditions |
| CO3 | Interpret therapeutic drug monitoring reports of a patient |
| CO4 | Calculate various pharmacoeconomic outcome analysis for the given data |
| **COURSE CODE: LAB IV** | **CLINICAL PHARMACOKINETICS AND DRUG MONITORING LAB** |
| CO1 | Causality assessment of various adverse drug reactions |
| CO2 | Detection and management of medication errors |
| CO3 | Development of hospital formulary for a teaching hospital |
| CO4 | Study of design and management of hospital pharmacy department of a hospital |
| | **MINI PROJECT WITH SEMINAR** |
| CO1 | Allows the students to study, do research and act by themselves using their abilities. |
| CO2 | Improves communication skills and networking with others. |
| CO3 | Helps in gaining expert knowledge and renewing motivational confidence. |
| CO4 | Provides latest information in the field of science and technology. |
| **COURSE CODE: AUDIT COURSE II** | **CONSTITUTION OF INDIA** |
| CO1 | Understanding the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics. |
| CO2 | Confer the intellectual origins of the frame work of argument that informed the conceptualization of social reforms leading to revolution in India. |
| CO3 | Dissertate the circumstances surrounding the foundation of the congress socialist party under the leadership of Jawaharlal Nehru and eventual failure of the proposal of direct elections through adult suffrage in the Indian constitution. |

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| **CO4** | Discuss the passage of the Hindu Code Bill of 1956. |
| **AUDIT COURSE II** | **PEDAGOGY STUDIES** |
| CO1 | Figure out what pedagogical practices are being used by teachers in formal and informal class rooms in developing countries. |
| CO2 | The evidence on the effectiveness of these pedagogical practices, in what conditions and with what population of learners. |
| CO3 | How can teacher education, school curriculum and guidance materials best support effective pedagogy? |
| CO4 | Identify critical evidence gaps to guide the development. |
| **AUDIT COURSE II** | **STRESS MANAGEMENT BY YOGA** |
| CO1 | Develop healthy mind in a healthy body thus improving social health. |
| CO2 | Improve efficiency |
| CO3 | To overcome stress. |
| CO4 | To get well acquainted with types of pranayama. |
| **AUDIT COURSE II** | **PERSONALITY DEVELOPMENT THROUGH LIFE ENLIGHTENMENT SKILLS** |
| CO1 | Study of Shrimad-Bhagwad-Geeta help the student in developing his personality and achieve the highest goal in life. |
| CO2 | Study of neethishatakam will help in developing versatile personality of students. |
| CO3 | To awaken wisdom in students. |
| CO4 | To became a person with stable mind, pleasing personality and determination. |
| **M.PHARMACY (PHARMACY PRACTICE) II YEAR I SEMESTER** | |
| **COURSE CODE: PE V** | **BIOSTATISTICS** |
| CO1 | Discuss the basic concept and importance of statistical analysis. |
| CO2 | Explain various methods of testing hypothesis. |
| CO3 | Dissert the methods of collection of data, analysis and interpretation. |
| CO4 | To understand the basic aspects of statistics such as central tendency, dispersion and correlation. |

| COURSE CODE: PE V | PHARMACOEPIDEMIOLOGY AND PHARMACOECONOMICS |
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| CO1 | Perceive various epidemiological methods and their applications. |
| CO2 | Be able to understand fundamental principles of Pharmacoeconomics. |
| CO3 | Should perform the key Pharmacoeconomics analysis methods. |
| CO4 | Understand Pharmacoeconomics decision analysis methods and their applications. |
| **PE V** | **PHYTOPHARMACEUTICALS** |
| CO1 | Should be able to explain the sources of phytoconstituents |
| CO2 | Capable of isolating and study the characterization of various chemical constituents |
| CO3 | Detect chemical entity by different spectra's |
| CO4 | Isolation and characterization of phytoconstituents |
| **COURSE CODE: OE** | **COSMETICOLOGY** |
| CO1 | Be able to explain physiological structures of skin, hair, nail and eye. |
| CO2 | Have knowledge about rheology property determination. |
| CO3 | Analyse the principles involve in liposomes, multiple emulsions and creams. |
| CO4 | Define the evaluation process, safety use of cosmetics and new technology developments. |
| **COURSE CODE: OE** | **PHARMACEUTICAL ADMINISTRATION.** |
| CO1 | Describe the Indian pharmaceutical industry development. |
| CO2 | Have knowledge about pharmaxil and its involvement. |
| CO3 | Explain the books of accounting, journals, ledger, cashbook and balance sheets. |
| CO4 | Have a good knowledge on principles of pharmaceutical industrial management. |
| **COURSE CODE: OE** | **HAZARDS AND SAFETY MANAGEMENT** |
| CO1 | should disclose environmental problems among learners. |
| CO2 | Develop an attitude of concern for the industrial environment. |
| CO3 | Ensure safety standards in pharmaceutical industry. |

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| **CO4** | Empower ideas to clear mechanism and management in different kinds of hazard management system. |
| **COURSE CODE: OE** | **PROJECT MANGEMENT** |
| CO1 | Involves in different duties as project manager, clients and customers. |
| CO2 | Execute project as project leaders and should handle team responsibilities. |
| CO3 | Should focus on project planning process and execution. |
| CO4 | Have good managerial performance skills. |
| **COURSE CODE: OE** | **AUDITS AND REGULATORY COMPLIANCE.** |
| CO1 | Capable of understanding the importance of auditing. |
| CO2 | Have sound knowledge on methodology of auditing. |
| CO3 | Understand the process of auditing in pharmaceutical industries. |
| CO4 | Be competent with the planning process, responsibilities and administration**.** |
| **COURSE CODE: DISSERTATION** | **DISSERTATION WORK REVIEW II** |
| CO1 | Search and evaluate the available literature in your given subject or chosen topic area |
| CO2 | Read the selected articles thoroughly and evaluate them |
| CO3 | Organise the selected papers by looking for patterns and by developing subtopics |
| CO4 | Analyse critically a segment of published body of knowledge through summary |
| **M.PHARMACY (PHARMACY PRACTICE) II YEAR II SEMESTER** | |
| **COURSE CODE: DISSERTATION** | **DISSERTATION WORK REVIEW III** |
| CO1 | Apply knowledge and understanding in relation to the agreed area of study |
| CO2 | Communicate in written form by integrating, analysing and applying key texts and practices |
| CO3 | Demonstrate advanced critical research skills in relation to career |

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| | development |
| CO4 | Integrate the theory and practice in evaluation |
| **COURSE CODE: DISSERTATION** | **DISSERTATION VIVA VOCE** |
| CO1 | Demonstrate knowledge in the program domain |
| CO2 | Presenting views cogently and precisely |
| CO3 | Exhibit professional etiquette suitable for career progression |
| CO4 | Exhibit sustained curiosity and have an attitude of attention in detailing of the project |