



VIGNAN

INSTITUTE OF PHARMACEUTICAL TECHNOLOGY

(Approved By AICTE, PCI New Delhi & Affiliated to JNTUK - Kakinada)

An ISO 9001:2015, ISO 14001:2015 & OHSAS 18001:2007 Certified Institution

Program Outcomes:

Program outcomes are statements conveying the intent of a program of study. Specifically, program outcomes refer to what a student should know or be able to do at the end of a program. They are often seen as the knowledge and skills students will have obtained by the time, they have received their intended degree.

Program Outcomes for Bachelor of Pharmacy (B.Pharmacy) Program

- 1. Pharmacy Knowledge:** Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioural, social, and administrative pharmacy sciences; and manufacturing practices.
- 2. Planning Abilities:** Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.
- 3. Problem analysis:** Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate and apply information systematically and shall make defensible decisions.
- 4. Modern tool usage:** Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.
- 5. Leadership skills:** Understand and consider the human reaction to change, motivation issues, leadership and team-building when planning changes required for fulfilment of practice, professional and societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and wellbeing.
- 6. Professional Identity:** Understand, analyze and communicate the value of their professional roles in society (e.g. health care professionals, promoters of health, educators, managers, employers, employees).
- 7. Pharmaceutical Ethics:** Honour personal values and apply ethical principles in professional and social contexts. Demonstrate behaviour that recognizes cultural and personal variability in values, communication and lifestyles. Use ethical frameworks; apply ethical principles while making decisions and take responsibility for the outcomes associated with the decisions.
- 8. Communication:** Communicate effectively with the pharmacy community and with society at large, such as, being able to comprehend and write effective reports, make effective presentations and documentation, and give and receive clear instructions.
- 9. The Pharmacist and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety and legal issues and the consequent responsibilities relevant to the professional pharmacy practice.
- 10. Environment and sustainability:** Understand the impact of the professional pharmacy solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
- 11. Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self-assess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis.

Course Outcomes:

Course Outcomes are narrower statements that describe what students are expected to know, and be able to do at the end of each course. These relate to the skills, knowledge, and behaviour that students acquire in their enrolment through the course.

COURSE OUTCOMES OF B.PHARMACY PROGRAM	
I B. PHARMACY I SEMESTER	
HUMAN ANATOMY AND PHYSIOLOGY-I	
C101.1	Explain the gross morphology, structure and functions of various organs of the human body.
C101.2	Summarize the various homeostatic mechanisms and their imbalances
C101.3	Distinguish various tissues and organs of different systems of human body
C101.4	Illustrate coordinated working pattern of different organs of each system
PHARMACEUTICAL ANALYSIS- I	
C102.1	Understand the concept of standardization by volumetric methods.
C102.2	Understand the analysis of some compounds by gravimetric method.
C102.3	Explain the concept of standardization and assays using oxidation – reduction titrations.
C102.4	Summarize the principles of electro chemical methods
PHARMACEUTICS-I	
C103.1	Recognise and interpret various parts of prescription
C103.2	Summarize the basics of compounding and dispensing of Solid, liquid and semisolid dosage forms.
C103.3	Understand the pharmaceutical incompatibilities and pharmaceutical calculations
C103.4	Know the history of profession of pharmacy and development of pharmacy in India
PHARMACEUTICAL INORGANIC CHEMISTRY	
C104.1	Recognize the sources of impurities and Methods to control and determine the impurities in inorganic drugs and pharmaceuticals.
C104.2	Classify and enlist inorganic pharmaceuticals based on their use.
C104.3	Know the properties and assay methods for inorganic compounds with medicinal uses.
C104.4	Understand the preparation, safe, effective usage and handling of pharmaceutical important inorganic compounds and radioactive pharmaceuticals.
COMMUNICATION SKILLS	
C105.1	Illustrate the life of eminent personalities for developing the skill of vocabulary and grammar
C105.2	Examine the technological advancements with major emphasis on biographical details
C105.3	Discuss the art of thinking and writing clearly and logically
C105.4	Correlate the importance of environment and sustainability with an emphasis on language skills
C105.5	Review the relevance of cultures and traditions for enhancing writing skills through literature
REMEDIAL BIOLOGY/ REMEDIAL MATHEMATICS	
C106.1	Apply mathematical concepts and principles to perform computations for pharmaceutical sciences

C106.2	Create, use and analyze mathematical representations and mathematical relationships.
C106.3	Communicate mathematical knowledge and understanding to help in the field of Pharmacy.
C106.4	Summarize the classification and salient features of five kingdoms of life
C106.5	Discuss the basic components of anatomy & physiology of plant
C106.6	Explain the basic components of anatomy & physiology animal with special reference to human
HUMAN ANATOMY AND PHYSIOLOGY-I PRACTICAL	
C107.1	Outline the microscopic characteristics of various tissues.
C107.2	Identify the skeletal structure of human body
C107.3	Estimate the various haematological parameters such as WBC,RBC, BT,CT, Hb, ESR and Blood group
C107.4	Determine the various physical parameters such as BP, Pulse, Heart rate
PHARMACEUTICAL ANALYSIS-I PRACTICAL	
C108.1	Perform Limit tests
C108.2	Carryout electrochemical titrations
C108.3	Develop analytical skills
C108.4	Perform Quantitative analysis of various drugs by volumetric analysis
PHARMACEUTICS I PRACTICAL	
C109.1	Review basic requirements in the compounding and dispensing of pharmaceutical products
C109.2	Demonstrate skill in the operation of common pharmaceutical measuring, weighing and compounding devices.
C109.3	Identify and differentiate between various solid and liquid dosage forms for oral and topical use.
C109.4	Describe the advantages and disadvantages of various solid, liquid and semisolid dosage forms.
PHARMACEUTICAL INORGANIC CHEMISTRY PRACTICAL	
C110.1	Identify and control the impurities like Chlorides, sulphates, iron, heavy metals and arsenic in pharmaceuticals
C110.2	Plan the preparation of inorganic pharmaceuticals mentioned in syllabus
C110.3	Test for the presence of few anions and cations present in inorganic pharmaceuticals
C110.4	Perform the tests for purity for pharmaceuticals as per procedure mentioned in Indian Pharmacopoeia
COMMUNICATION SKILLS PRACTICAL	
C111.1	Dramatize the roles with proper body language
C111.2	Interact with others by using proper functions
C111.3	Disseminate the relevant skills while performing GDs, interviews and proper body language
C111.4	Organize proper skills for their employability
C111.5	Practice life skills in their day to day living environment
I B.PHARMACY II SEMESTER	
HUMAN ANATOMY AND PHYSIOLOGY-II	
C112.1	Explain the gross anatomy and physiology of Central Nervous System
C112.2	Illustrate the different structure and function of digestive, endocrine, urinary, respiratory, reproductive systems.
C112.3	Judge the various disorders of human body
C112.4	Discuss the structure & importance of genetic materials.

PHARMACEUTICAL ORGANIC CHEMISTRY I	
C113.1	Understand the nomenclature, classification, structure, preparation and uses of organic compounds
C113.2	Explain the reaction, mechanism and applications of reactions
C113.3	Apply knowledge on identification of organic compounds
C113.4	Explain the acidity and basicity of organic compounds
BIOCHEMISTRY	
C114.1	Outline the concepts of biological oxidation, bioenergetics and Biomolecule.
C114.2	Acquire chemistry and biological importance of biological macromolecules (Carbohydrates & Lipids).
C114.3	Understand the importance of Metabolism of nucleic acids and protein biosynthesis.
C114.4	Explain the application of enzyme inhibition in pharmaceutical industry.
PATHOPHYSIOLOGY	
C115.1	Explain the basic principles and mechanism involved in the Cell injury, Adaptation, inflammation and repair.
C115.2	Identify the etiology and pathogenesis of the human infectious diseases and cancer.
C115.3	Judge the various possible treatments for the pathogenic diseases.
C115.4	Discuss the signs, symptoms and complications of the diseases
COMPUTER APPLICATIONS IN PHARMACY	
C116.1	Apply the knowledge of web technologies for comparative analysis of results in pharmaceutical and clinical studies
C116.2	Design and develop solutions to analyze pharmaceutical problems using computers.
C116.3	Apply the knowledge of MS office, Excel, Power point and Access for pharmaceutical and clinical studies
C116.4	Solve and work with a professional context pertaining to ethics, social, cultural and regulations with regard to Pharmacy .
ENVIRONMENTAL SCIENCES	
C117.1	Acquire knowledge about the environment and its allied problems.
C117.2	Develop an attitude of concern for the environment.
C117.3	Explain about environmental problems.
C117.4	Identify and solve environmental problems.
HUMAN ANATOMY AND PHYSIOLOGY-II PRACTICAL	
C118.1	Explain the human organ systems, pregnancy diagnosis test & family planning devices with the help of models, charts and specimens.
C118.2	Demonstrate the function of olfactory nerve, visual acuity, reflex activity, positive and negative feedback mechanism.
C118.3	Examine the Permanent slides of vital organs and gonads.
C118.4	Determine the basal mass index, body temperature, tidal volume, vital capacity & blood count
PHARMACEUTICAL ORGANIC CHEMISTRY I PRACTICAL	
C119.1	Identify the functional group and extra elements of unknown organic compound by using systematic qualitative analysis
C119.2	Prepare and characterize the derivatives of organic compound
C119.3	Analyse the unknown organic compound by determining their melting point / boiling point

BIOCHEMISTRY PRACTICAL	
C120.1	Detect and identify proteins, amino acids and carbohydrates by various qualitative as well as quantitative tests.
C120.2	Determine the blood creatinine, sugar & serum total cholesterol
C120.3	Prepare the buffer solution and measurement of Ph
C120.4	Demonstrate action of salivary amylase on starch
COMPUTER APPLICATIONS IN PHARMACY PRACTICAL	
C121.1	Apply the knowledge of statistical tools for comparative analysis of results in pharmaceutical and clinical studies
C121.2	Design and develop solutions to analyze pharmaceutical problems using computers.
C121.3	Apply the knowledge of MS office, Excel, Power point and Access for pharmaceutical and clinical studies
C121.4	Solve and work with a professional context pertaining to ethics, social, cultural and regulations with regard to Pharmacy.
II B.PHARMACY I SEMESTER	
PHARMACEUTICAL ORGANIC CHEMISTRY II	
C201.1	Summarize the rules of aromaticity, preparation, reactivity, orientation and reactions of benzene and polynuclear hydrocarbons
C201.2	Explain the structure and medicinal uses of pharmaceutical organic compounds
C201.3	Identify the purity of fats and oils by acid value, saponification value and iodine value
C201.4	Understand the concept of Baeyer's strain theory and Sachse Mohr theory
PHYSICAL PHARMACEUTICS I	
C202.1	Understand various physicochemical properties of drug molecules in designing the dosage form
C202.2	Describe different states of matter and the concept of interfacial phenomena with their properties
C202.3	Explain complexation with drugs based on their physicochemical properties for showing its action
C202.4	Understand the importance of PH, buffers and buffer system in pharmaceutical and biological system
PHARMACEUTICAL MICROBIOLOGY	
C203.1	Understand diversity of microorganisms with relevance to their nutritional and physical growth requirements for culturing
C203.2	Identify bacteria by staining and biochemical reactions and apply controlling methods
C203.3	Categorize disinfecting agents and analyze concentration of disinfectants, antibiotics, vitamins etc., using microorganisms
C203.4	Classify types of spoilage and assess source of contamination in pharmaceutical products
PHARMACEUTICAL ENGINEERING	
C204.1	Demonstrate basic concepts in unit operations used in pharmaceutical industries.
C204.2	Enumerate the principles, construction, working, mechanisms and applications of equipment used in laboratory and industry.
C204.3	Sort out the suitable equipment, environmental condition and material for the plant construction for manufacturing of bulk drugs and formulations.
C204.4	Appreciate various preventive methods used for corrosion; analyze problems occurring in the preparation of bulk drugs and formulations.

PHARMACEUTICAL ORGANIC CHEMISTRY II PRACTICAL	
C205.1	Demonstrate the different recrystallization and steam distillation techniques used in pharmaceutical chemistry
C205.2	Estimate the analytical constants of fats and oils
C205.3	Plan and perform the synthesis of organic compounds by using named reactions
PHYSICAL PHARMACEUTICS I PRACTICAL	
C206.1	Understand the physical properties of drug substances
C206.2	Determine the solubility, pka
C206.3	Estimate the surface tension, HLB value, CMC and adsorption constant
C206.4	Analyse complexation between donor and acceptor
PHARMACEUTICAL MICROBIOLOGY PRACTICAL	
C207.1	Prepare and sterilize the different culture media
C207.2	Isolate the pure cultures of microorganisms and identify the microorganisms by staining and biochemical tests
C207.3	Determine the concentration of antibiotics by microbiological assay
C207.4	Assess the quality of pharmaceuticals by sterility testing
PHARMACEUTICAL ENGINEERING PRACTICAL	
C208.1	Perform basic unit operations used in Pharmaceutical industries.
C208.2	Demonstrate of the equipment used laboratory and industry.
C208.3	Determine specific constants of materials used in industry.
C208.4	Select the suitable equipment and environmental condition for manufacturing of bulk drugs and formulations.
II B.PHARMACY II SEMESTER	
PHARMACEUTICAL ORGANIC CHEMISTRY III	
C209.1	Explain the stereochemical aspects of organic compounds and stereochemical reactions
C209.2	Assign the relative, absolute and geometrical configurations to stereoisomers
C209.3	Outline on nomenclature, aromaticity, reactivity, methods of preparation reactions and uses of heterocyclic compounds
C209.4	Elaborate on the reaction and synthetic importance of metal hydrides (NaBH ₄ & LiAlH ₄), Clemmensen reduction, Oppenauer oxidation and Beckmann rearrangement
MEDICINAL CHEMISTRY I	
C210.1	Categorize the importance of Physicochemical properties and metabolism of significant drugs
C210.2	Explain the mechanism of action of drugs and their therapeutic uses
C210.3	Differentiate rational uses, side effects of drugs acting on Autonomic and Central nervous system
C210.4	Identify the SAR and Synthesis of various therapeutic agents
PHYSICAL PHARMACEUTICS II	
C211.1	Understand various physicochemical properties of drug molecules in the designing the dosage form
C211.2	Describe the chemical kinetics and to use them for stability testing and determination of expiry date of formulations
C211.3	Demonstrate use of physicochemical properties in the formulation development and evaluation of dosage forms
C211.4	Outline the properties and evaluation of coarse and colloidal dispersions
PHARMACOLOGY I	
C212.1	Explain the pharmacological & molecular mechanism of actions of different categories of drugs

C212.2	Apply the basic pharmacological knowledge in the prevention and treatment of various diseases
C212.3	Relate the use, adverse reaction, contraindication, drug interaction of various drugs
C212.4	Summarize the importance of pharmacology, pharmacovigilance and drug discovery process
PHARMACOGNOSY AND PHYTOCHEMISTRY I	
C213.1	Explain the scope and evolution of Pharmacognosy and rephrase role of herbal drugs in traditional systems of medicine
C213.2	Summarize the chemical nature, uses and evaluation of crude drugs
C213.3	Plan on cultivation, collection and processing of drugs of natural origin
C213.4	List the medicinal uses of marine drugs and compare the morphological characteristics of market samples with the authentic drugs
MEDICINAL CHEMISTRY I PRACTICAL	
C214.1	Describe the importance of laboratory reagents, their quality and biohazardous nature, green chemicals for the protection of environment
C214.2	Categorize the type of assays and apparatus used
C214.3	Establish the use of chemicals in different quantities for a synthetic reaction with safety precautions and eco-friendly nature
C214.4	Demonstrate the synthetic protocol and purification techniques with good laboratory skills and analyse the yield, results.
PHYSICAL PHARMACEUTICS II PRACTICAL	
C215.1	Analyse of micromeritic properties
C215.2	Estimate of viscosity by Ostwald's viscometer and Brookfield viscometer
C215.3	Determine sedimentation volume of suspension
C215.4	Perform kinetic studies
PHARMACOLOGY I PRACTICAL	
C216.1	Explain the instruments, route of administration, sampling techniques in experimental pharmacology
C216.2	Demonstrate the effect of hepatic microsomal enzyme inducers on the phenobarbitone sleeping time in mice.
C216.3	Determine the effect of drugs on animals by simulated experiments
C216.4	Discuss the importance of anaesthesia, euthanasia and maintenance of laboratory animals as per CPCSEA guidelines
PHARMACOGNOSY AND PHYTOCHEMISTRY I PRACTICAL	
C217.1	Identify unorganized crude drugs by chemical tests.
C217.2	Evaluate the quality and purity of crude drugs
C217.3	Perform linear measurements for crude drug identification
C217.4	Develop quality control methods for standardisation of herbal drugs.
III B.PHARMACY I SEMESTER	
MEDICINAL CHEMISTRY II	
C301.1	Understand the chemistry of drugs with respect to their pharmacological activity
C301.2	Outline the drug metabolic pathways, adverse effect and therapeutic value of drugs
C301.3	Explain the Structural Activity Relationship of different class of drugs
C301.4	Describe the chemical synthesis of selected drugs
INDUSTRIAL PHARMACY I	
C302.1	Understand preformulation parameters of drug and excipients on the stability and bioavailability of formulations
C302.2	Outline various excipients, methods used in the preparation of various dosage forms and its evaluation

C302.3	Apply preformulation considerations in development of various dosage forms
C302.4	Analyze the formulation and packaging of various cosmetics preparations and packaging materials used in pharmacy
PHARMACOLOGY II	
C303.1	Recognize Appropriate drugs for effective treatment of various hormone related complications.
C303.2	Identify the relative pros and cons in the use of drugs for various cardiac complications.
C303.3	Identify major classes of drugs currently used in medical practice for treatment of allergic reactions
C303.4	Summarize the theoretical considerations and principle of biological assays
C303.5	Recognize various urine forming agents in treatment of urinary disorders
PHARMACOGNOSY & PHYTOCHEMISTRY-II	
C304.1	Outline techniques employed in the elucidation of biosynthetic pathway and formation of different secondary metabolites through these pathways.
C304.2	Summarize the source, chemistry and therapeutic/commercial applications of secondary metabolites
C304.3	Choose the suitable method of isolation and identification for various phytoconstituents
C304.4	Compare and contrast the techniques used in the isolation, identification and analysis of crude drugs
PHARMACEUTICAL JURISPRUDENCE	
C305.1	Understand Indian pharmaceutical laws
C305.2	Explain various regulatory authorities governing the manufacture and sale of pharmaceuticals
C305.3	Explain offenses and penalties related to various acts
C305.4	Understand various schedules related to the profession of pharmacy in India
INDUSTRIAL PHARMACY-I PRACTICAL	
C306.1	Plan preformulation studies for API
C306.2	Prepare and evaluate tablets, capsules.
C306.3	Prepare Parenteral, ophthalmic and Cosmetic products
C306.4	Evaluate marketed tablets, capsules, glass containers
PHARMACOLOGY II PRACTICAL	
C307.1	Understand the pharmacological actions of different categories of drugs.
C307.2	Explain the mechanism of drug action at organ system/sub cellular/macromolecular levels.
C307.3	Apply the basic pharmacological knowledge in the prevention and treatment of various diseases.
C307.4	Appreciate correlation of pharmacology with other bio medical sciences.
C307.5	Observe the effect of drugs on animals by simulated experiments.
PHARMACOGNOSY AND PHYTOCHEMISTRY II PRACTICAL	
C308.1	Identify crude drugs by morphological and microscopical characteristics
C308.2	Isolate phytoconstituents from crude drug and Experiment with Paper and Thin Layer Chromatography
C308.3	Analyze volatile oils isolated by distillation.
C308.4	Evaluate unorganized crude drugs by chemical tests.
II B. PHARMACY II SEMESTER	
MEDICINAL CHEMISTRY III	
C309.1	Understand the importance of drug design and different techniques of drug design

C309.2	Understand the mechanism of action and chemistry of drugs with respect to their biological activity
C309.3	Explain the synthesis, metabolism, adverse effects and therapeutic value of drugs
C309.4	Outline classification and SAR of drugs
PHARMACOLOGY III	
C310.1	Predict the basic principles of toxicology and clinically manage the poisoned patient.
C310.2	Analyze the mechanism of action of chemotherapeutic agents and their role in the treatment of various infectious diseases.
C310.3	Analyze biological clocks and circadian rhythms in symptom intensity of chronic diseases
C310.4	Identify the relative pros and cons in the use of drugs for various respiratory and gastrointestinal diseases
HERBAL DRUG TECHNOLOGY	
C311.1	Explain WHO guidelines for Good agricultural and collection practices of herbal raw materials
C311.2	Categorize various nutraceuticals, herbal cosmetics, herbal excipients, herbal formulations and herb drug interactions
C311.3	Compare and contrast WHO & ICH guidelines for the assessment of herbal drugs
C311.4	Outline patents, regulatory issues of natural products and herbal drug industry.
BIOPHARMACEUTICS AND PHARMACOKINETICS	
C312.1	Enumerate the concept of absorption, Distribution & Elimination and their significance in drug kinetics in the body
C312.2	Summarise various regulations related to the developing BA-BE studies for the new drug molecule
C312.3	Estimate various pharmacokinetic parameters of drug by using one or multi compartment models
C312.4	Outline the factors causing non linearity and measure non linear kinetics
PHARMACEUTICAL BIOTECHNOLOGY	
C313.1	Understand the design, working and applications of an industrial fermenter
C313.2	Make use of various advanced biotechnology procedure for medical and pharmaceutical applications
C313.3	Summarize the principles of immunity, immunological reactions and production of vaccines
C313.4	Understand the genetic organization of eukaryotes and prokaryotes
QUALITY ASSURANCE	
C314.1	Understand the cGMP aspects in a pharmaceutical industry
C314.2	Appreciate the importance of documentation
C314.3	Explain the scope of quality certifications applicable to pharmaceutical industries
C314.4	Outline the responsibilities of QA and QC departments
MEDICINAL CHEMISTRY III PRACTICAL	
C315.1	Describe the importance of laboratory reagents, their quality and bio hazardous nature, green chemicals for the protection of environment
C315.2	Categorize the type of assays and apparatus used
C315.3	Organize the synthesis of few intermediates using Microwave irradiation protocol
C315.4	Demonstrate the synthetic protocol and purification techniques with good laboratory skills and analyse the yield, results
C315.5	Determine the physicochemical properties and Drawing structures using chemistry software

PHARMACOLOGY III PRACTICAL	
C316.1	Appreciate correlation of pharmacology with related medical sciences.
C316.2	Comprehend the principles of toxicology and treatment of various poisonings.
C316.3	Understand the drug action and its relevance in the treatment of different infectious diseases.
C316.4	Identifying the appropriate cause of disorders by computational methods
C316.5	Comprehend the Biostatistical principles in experimental pharmacology
HERBAL DRUG TECHNOLOGY PRACTICAL	
C317.1	Perform phytochemical screening of the extracts
C317.2	Formulate herbal preparations and herbal cosmetics using standardised extracts
C317.3	Evaluate excipients of natural origin
C317.4	Carryout monograph analysis of herbal drugs
IV B.PHARMACY I SEMESTER	
INSTRUMENTAL METHODS OF ANALYSIS	
C401.1	Understand the interaction of matter with electromagnetic radiations and its applications in drug analysis
C401.2	Understand the chromatographic separation and analysis of drugs
C401.3	Discuss quantitative & qualitative analysis of drugs by using various analytical instruments
C401.4	Outline principles, instrumentations and applications of Electrophoresis
INDUSTRIAL PHARMACY-II	
C402.1	Outline the process of pilot plant and scale up of pharmaceutical dosage forms
C402.2	Understand the process of technology transfer from lab scale to commercial batch
C402.3	Summarize different laws and acts that regulate pharmaceutical industry
C402.4	Explain the approval process and regulatory requirements for drug products
PHARMACY PRACTICE	
C403.1	Explain Organization of Hospital, Pharmacy therapeutic Committee and Pros and cons of drug distribution system, Contents of Hospital formulary
C403.2	Classify drug interactions and adverse drug reactions and conduct therapeutic drug monitoring
C403.3	Enumerate the steps involved in Patient Counselling by obtaining medication history interview and performing medication chart review
C403.4	Illustrate the role of Pharmacist in interdepartmental communication and community health education, Interpretation of Clinical laboratory results
NOVEL DRUG DELIVERY SYSTEM	
C404.1	Understand various approaches for development of Novel drug delivery system
C404.2	Outline the criteria for selection of drugs and polymers for development of Microencapsulation, Mucosal, Implantable drug delivery systems
C404.3	Summarize Basic components used, methods and types of formulation in transdermal, Gastroretentive and Nasopulmonary and Targeted drug delivery systems
C404.4	Explain the concepts of Intrauterine systems with its applications , intraocular barriers and formulations
INSTRUMENTAL METHODS OF ANALYSIS PRACTICAL	
C405.1	Perform quantitative & qualitative analysis of drugs using various analytical instruments.
C405.2	Understand the principles and Perform Chromatographic Separations
C405.3	Demonstrate HPLC
C405.4	Handle analytical instruments

IV B.PHARMACY II SEMESTER	
BIostatistics and Research Methodology	
C407.1	Explain qualitative and quantitative design of research methodology
C407.2	Interpret the various statistical methods to solve statistical problems
C407.3	Analyze the experiments by using factorial design and design of experiments
C407.4	Determine the measures of central tendency and dispersion, correlation, regression, probability and hypothesis
Social and Preventive Pharmacy	
C408.1	Acquire high consciousness/realization of current issues related to health and pharmaceutical problems within the country and worldwide.
C408.2	Create awareness on prevention and control of various diseases
C408.3	Have a critical way of thinking based on current healthcare development
C408.4	Evaluate alternative ways of solving problems related to health and pharmaceutical issues
Pharma Marketing Management	
C409.1	Understand the quantitative and qualitative aspects of market
C409.2	Explain the principles of product life cycle and product management in pharmaceutical industry
C409.3	Develop the concepts in organization, distribution, and marketing
C409.4	Contract Pharma industry distribution management and tasks.
Pharmaceutical Regulatory Science	
C410.1	Understand the process of drug discovery and development
C410.2	Outline the regulatory authorities and agencies governing the manufacture and sale of pharmaceuticals
C410.3	Describe the clinical trials, monitoring, GCP, pharmacovigilance
C410.4	Explain the regulatory approval process and their registration in Indian and international markets
Pharmacovigilance	
C411.1	Establish pharmacovigilance centres in hospitals
C411.2	Appreciate drug evaluation, ICH guidelines CIOMS requirements for ADR reporting
C411.3	Aware on drug safety monitoring, history and development of Pharmacovigilance
C411.4	Describe dictionaries used in pharmacovigilance and ICD classification of diseases
Quality Control and Standardization of Herbals	
C412.1	Recall the basic tests and quality control tests as per WHO guidelines for evaluating commercial herbal medicines
C412.2	Explain CGMP, GLP, GAP and GACP for quality assurance in herbal industry as per WHO
C412.3	Outline research methods as per EU or ICH guidelines for assessing safety, efficacy and QC of herbal medicines
C412.4	Assess and improve the safety of herbal medicines by markers, pharmacovigilance, herbal pharmacopoeias and other regulatory guidelines.
Computer Aided Drug Design	
C413.1	Apply the CADD techniques in various stages of drug discovery
C413.2	Examine the role of CADD techniques in drug discovery
C413.3	Analyze the physicochemical properties and the techniques involved in QSAR

C413.4	Execute the various structure based drug design methods (Molecular docking, de novo drug design)
CELL AND MOLECULAR BIOLOGY	
C414.1	Make use of microbial or mammalian cellular properties in drug discovery
C414.2	Apply molecular information in genetic engineering
C414.3	Categorize regulatory proteins that regulate genes.
C414.4	Choose an appropriate molecular genetics mechanism in the development of transgenics.
COSMETIC SCIENCE	
C415.1	Understand the concepts of various classes of cosmetics and cosmeceuticals
C415.2	Apply the formulation principles in building various skin care, hair care and oral care products
C415.3	Distinguish the role of herbs in formulating various skin care, hair care and oral care products.
C415.4	Evaluate various skin care, hair care and oral care cosmetic products.
EXPERIMENTAL PHARMACOLOGY	
C416.1	Outline various preclinical screening models for diuretics, nootropics, anti-asthmatics and drugs acting on CNS
C416.2	Construct preclinical screening models for drugs acting on ANS, eye and local anaesthetics
C416.3	Analyze the preclinical screening models for drug acting on CVS
C416.4	Compile research methodology and biostatistics.
ADVANCED INSTRUMENTATION TECHNIQUES	
C417.1	Understand the advanced instruments used and its applications in drug analysis
C417.2	Apply principles of chromatographic separation in the analysis of drugs
C417.3	Outline the calibration of various analytical instruments
C417.4	Explain the analysis of drugs using various analytical instruments
PROJECT WORK *	
C418.1	Select and plan a concept in pharmaceutical sciences for the project.
C418.2	Adapt appropriate research methodology in developing a project.
C418.3	Demonstrate the skill of present, exhibit and document project work
C418.4	Appraise the value of team work to meet societal needs.