JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

Kakinada-533003, Andhra Pradesh, India

Bachelor of Pharmacy

Program Outcome (POs):-

PO1:Pharmaceutical Knowledge:- Students gain a deep knowledge regarding human body, its related diseases, analytical skills, drug molecules (Active Pharmaceutical Ingredients) along with excipients, natural drug resources, chemistry involved in API including synthesis of commonly used drugs, effect of drug on human body, toxicity and impurity profile, ADME studies of drugs (behavior of drug in human body), dosage form studies including novel approaches, designing and development of formulation stability studies, analysis etc

PO2: Research Analysis: Students could apply the knowledge in research field to make new discoveries.

PO3: Design & Development of dosage forms: Various dosage forms could be prepared by the a pharmacy students in the pharmaceutical companies for the ease of patients.

PO4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5: Modern methods usage: Create, select, and apply appropriate techniques, resources, and modern methods with an understanding of the limitations and its usage. The student also learns to handle many instruments related to their studies which would help them work in a Pharmaceutical Industry, pharmacovigilance, regulatory requirements, legal processes etc.

PO6: Pharmacy and society: Pharmacist provides complete health care data and practices to the people of the society and guides them to be healthy. The student also learns drug distribution system, patient counseling, industrial laws etc. Student gains expertise in storage and distribution of drugs with all precautions and in-depth knowledge of dose, adverse effect and other health related issues to deal with indoor and outdoor patients admitted in hospitals and also in public.

PO7: Environment and sustainability: Understand the impact of the professional pharmacist in society and environment and make an impact of it on the people of the society.

PO8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the pharmacy practice. Student is also trained in ethical behavior with physician, nurses and other paramedical staff for protecting patient's health.

PO9 : Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams acts as a multidisciplinary person in every context.

PO10 : Communication: Communicate effectively on pharmaceutical activities with the community and with society.

PO11: 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.

PO12 : Social Interaction: Being a public welfare job a pharmacist would be able to interact with the people in a better way to cure them and make them feel healthy.

PROGRAM SPECIFIC OUTCOMES (PSOs):

PSO1: Able to apply the knowledge gained during the course of the program from pharmacology, pharmaceutics, medicinal chemistry, Pharmacognosy, APHE, communication skills, pharmaceutical analysis, Biotechnology, biochemistry, cosmetology and environmental studies

PSO 2: Able to apply the knowledge of ethical and management principles required to work in a team as well as to lead a team.

PSO 3: Able to do multidisciplinary jobs in the pharmaceutical industries in various branches and would be able to write effective project reports in multidisciplinary environment in the context of changing technologies.

PSO4: Able to communicate easily and comfortably. Would be able to perform multitasks in multi fields including pharmaceutical & cosmetics. Research area would be strong.

COURSE OUTCOMES

I B.Pharmacy I Semester

Code	Course name	COS
BP101T	Human Anatomy and Physiology I– Theory	Upon completion of this course the student should be able to 1. Explain the gross morphology, structure and functions of various organs of the human body. 2. Describe the various homeostatic mechanisms and their imbalances. 3. Identify the various tissues and organs of different systems of human body. 4. Perform the various experiments related to special senses and nervous system. 5. Appreciate coordinated working pattern of different organs of each system
BP102T	Pharmaceutical Analysis I – Theory	Upon completion of the course student shall be able to 1. understand the principles of volumetric and electro chemical analysis 2. carryout various volumetric and electrochemical titrations 3. develop analytical skills
BP103T	Pharmaceutics I – Theory	Upon completion of this course the student should be able to: 1.Know the history of profession of pharmacy 2.Understand the basics of different dosage forms, pharmaceutical incompatibilities and

Code	Course name	COS
		pharmaceutical calculations 3.Understand the professional way of handling the prescription 4.Preparation of various conventional dosage forms
BP104T	Pharmaceutical Inorganic Chemistry –Theory	Upon completion of course student shall be able to 1.Know the sources of impurities and methods to determine the impurities in inorganic drugs and pharmaceuticals 2.Understand the medicinal and pharmaceutical importance of inorganic compounds
BP105T	Communication skills – Theory	Upon completion of the course the student shall be able to 1. Understand the behavioral needs for a Pharmacist to function effectively in the areas of pharmaceutical operation 2. Communicate effectively (Verbal and Non Verbal) 3. Effectively manage the team as a team player 4. Develop interview skills 5. Develop Leadership qualities and essentials
BP106RBT BP106RMT	Remedial Biology/ Remedial Mathematics – Theory	Upon completion of the course, the student shall be able to 1.know the classification and salient features of five kingdoms of life 2. understand the basic components of anatomy & physiology ofplant 3. know understand the basic components of anatomy & physiology animalwith special reference to human Upon completion of the course the student shall be able to:- 1. Know the theory and their application in Pharmacy 2. Solve the different types of problems by applying theory 3. Appreciate the important application of mathematics in Pharmacy
BP107P	Human Anatomy and Physiology –Practical	Practical physiology is complimentary to the theoretical discussions in physiology. Practicals allow the verification of physiological processes discussed in theory classes through experiments on living tissue, intact animals or normal human beings. This is helpful for developing an insight on the subject 1. Microscopic study of different tissues like epithelial ,connective, muscular and nervous tissue 2. Identification of axial and appendicular bones

Code	Course name	COS
		3. Enumeration of WBC,RBC 4. Study of Blood properties like bleeding time, clotting time, hemoglobin content, blood grouping and erythrocyte sedimentation rate 5. Determination and recording of heart rate, pulse rate and BP
BP108P	Pharmaceutical Analysis I – Practical	1. Performing of limit test for chlorides, sulphates, iron and arsenic 2. Preparation and standardization of compounds like sodium hydroxide , sulphuric acid, sodium thiosulphate, potassium permanganate and ceric ammonium sulphate 3. Assay of different compounds like ammonium chloride, ferrous sulphate, copper sulphate, calcium gluconate,h2o2, sodium benzoiate and nacl by respective methods 4. Determination of normality by electro analytical methods by conductometric , potentiometric titrations
BP109P	Pharmaceutics I – Practical	1. Preparation of syrups and elixirs 2. preparations of solutions and biphasic solutions like suspensions and emulsions 3. Preparation of powders and granuels 4. preparation of suppositories and semi solid ointments 5. preparation of gargles and mouth washes
BP110P	Pharmaceutical Inorganic Chemistry –Practical	1. Performing of limit test for chlorides, sulphates, iron and arsenic,heavy metals , lead and iron 2. Identification compounds like magnesium hydroxide, ferrous sulphate ,sodium bicarbonate and calcium gluconate 3. preparation of inorganic compounds like boric acid, potash alum and ferrous sulphate.
BP111P	Communication skills – Practical	1. basic communication covering topics like meeting people, asking questions and making friends
BP112RBP	Remedial Biology – Practical	1. Study of microscope, section cutting techniques, mounting and staining and permanent slide preparation 2. Study of cell and its inclusions 3. Microscopic studies and identification of tissues of stem, root, leaf, seed, fruit and flower 4. Identification of bones

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I B.Pharmacy II Semester

Code	Course name	COS
BP201T	Human Anatomy and Physiology II – Theory	Upon completion of this course the student should be able to: 1. Explain the gross morphology, structure and functions of various organs of the human body. 2. Describe the various homeostatic mechanisms and their imbalances. 3. Identify the various tissues and organs of different systems of human body. 4. Perform the hematological tests like blood cell counts, hemoglobin estimation, bleeding/clotting time etc. and also record blood pressure, heart rate, pulse and respiratory volume. 5. Appreciate coordinated working pattern of different organs of each system 6. Appreciate the interlinked mechanisms in the maintenance of normal functioning (homeostasis) of human body.
BP202T	Pharmaceutical Organic Chemistry I – Theory	Upon completion of the course the student shall be able to 1. write the structure, name and the type of isomerism of the organic compound 2. write the reaction, name the reaction and orientation of reactions 3. account for reactivity/stability of compounds, 4. identify/confirm the identification of organic compound
BP203T	Biochemistry – Theory	Upon completion of course student shell able to 1. Understand the catalytic role of enzymes, importance of enzyme inhibitors in design of new drugs, therapeutic and diagnostic applications of enzymes. 2. Understand the metabolism of nutrient molecules in physiological and pathological conditions. 3. Understand the genetic organization of mammalian genome and functions of DNA in the synthesis of RNAs and proteins.
BP204T	Pathophysiology – Theory	Upon completion of the subject student shall be able to – 1. Describe the etiology and pathogenesis of the selected disease states; 2. Name the signs and symptoms of the diseases 3. Mention the complications of the diseases.
BP205T	Computer Applications in Pharmacy – Theory	Upon completion of the course the student shall be able to 1. Know the various types of application of computers in pharmacy 2. Know the various types of databases 3. Know the various applications of databases in pharmacy

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Code	Course name	COS
BP206T	Environmental sciences – Theory	Upon completion of the course the student shall be able to: 1. Create the awareness about environmental problems among learners. 2. Impart basic knowledge about the environment and its allied problems. 3. Develop an attitude of concern for the environment. 4. Motivate learner to participate in environment protection and environment improvement. 5. Acquire skills to help the concerned individuals in identifying and solving environmental problems. 6. Strive to attain harmony with Nature.
BP207T	Human Anatomy and Physiology II –Practical	1. To study the integumentary and special senses using specimen, models 2. To demonstrate the general neurological examinations like olfactory nerve, taste, visual acuity and reflex activity 3. Recording of body temperature and basal mass index 4. Study of family planning devices and pregnancy diagnosis test 5. Demonstration of total blood count by cell analyser
BP208T	Pharmaceutical Organic Chemistry I– Practical	Systematic qualitative analysis of unknown organic compounds like 1. Preliminary test: Color, odour, aliphatic/aromatic compounds, saturation and unsaturation, etc. 2. Detection of elements like Nitrogen, Sulphur and Halogen by Lassaigne's test 3. To study the Functional group test like Phenols, Amides/ Urea, Carbohydrates, Amines, Carboxylic acids, Aldehydes and Ketones, Alcohols, Esters, Aromatic and Halogenated Hydrocarbons, Nitro compounds and Anilides 4. Identification of the unknown compound from the literature using melting point/ boiling point 5. Construction of molecular models
BP209T	Biochemistry – Practical	1. Qualitative analysis of carbohydrates of Glucose, Fructose, Lactose, Maltose, Sucrose and starch 2. Quantitative analysis of reducing sugars (DNSA method) and Proteins (Biuret method) 3. Determination of blood creatinine, blood sugar, Salivary amylase activity and serum total cholesterol

Code	Course name	COS
		4. Preparation of buffer solution and measurement of pH 5. Study the effect of Temperature on Salivary amylase activity
BP210T	Computer Applications in Pharmacy – Practical	1. Design a questionnaire using a word processing package to gather information about a particular disease 2. Create a HTML web page to show personal information 3. Creating mailing labels Using Label Wizard , generating label in MS WORD 4. Creating and working with queries in MS Access 5. Exporting Tables, Queries, Forms and Reports to web pages

II B.Pharmacy I Semester

Code	Course name	COS
BP301T	Pharmaceutical Organic Chemistry II – Theory	Upon completion of the course the student shall be able to 1. write the structure, name and the type of isomerism of the organic compound 2. write the reaction, name the reaction and orientation of reactions 3. account for reactivity/stability of compounds, 4. prepare organic compounds
BP302T	Physical Pharmaceutics I – Theory	Upon the completion of the course student shall be able to 1. Understand various physicochemical properties of drug molecules in the designing the dosage forms 2. Know the principles of chemical kinetics & to use them for stability testing and determination of expiry date of formulations 3. Demonstrate use of physicochemical properties in the formulation development and evaluation of dosage forms.
BP303T	Pharmaceutical Microbiology – Theory	Upon completion of the subject student shall be able to; 1. Understand methods of identification, cultivation and preservation of various microorganisms 2. To understand the importance and implementation of sterilization in pharmaceutical processing and industry. 3. Learn sterility testing of pharmaceutical products. 4. Carried out microbiological standardization of Pharmaceuticals.

Code	Course name	COS
		5. Understand the cell culture technology and its applications in pharmaceutical industries.
BP304T	Pharmaceutical Engineering – Theory	Upon completion of the course student shall be able: 1. To know various unit operations used in Pharmaceutical industries. 2. To understand the material handling techniques. 3. To perform various processes involved in pharmaceutical manufacturing process. 4. To carry out various tests to prevent environmental pollution. 5. To appreciate and comprehend significance of plant lay out design for optimum use of resources. 6. To appreciate the various preventive methods used for corrosion control in Pharmaceutical industries.
BP305T	Pharmaceutical Organic Chemistry II – Practical	Upon completion of the course student shall be able 1. Experiments involving laboratory techniques Recrystallization and Steam distillation 2. Determination of following oil values (including standardization of reagents) Acid value, Saponification value and Iodine value 3. Preparation of compounds like Benzanilide/Phenyl benzoate, Acetanilide by halogenation and Benzoic acid from Benzyl chloride by oxidation reaction
BP306T	Physical Pharmaceutics I – Practical	Upon completion of the course student shall be able 1. Determination the solubility of drug at room temperature, pKa value by Half Neutralization/ Henderson Hasselbalch equation, Partition co- efficient of benzoic acid in benzene and water and Partition co- efficient of Iodine in CCl4 and water 2. Determination of surface tension of given liquids by drop count and drop weight Method, HLB number of a surfactant by saponification method, Freundlich and Langmuir constants using activated char coal and critical micellar concentration of surfactants 3. Determination of stability constant and donor acceptor ratio of PABA-Caffeine complex by solubility method and stability constant and donor acceptor ratio of Cupric-Glycine complex by pH titration method
BP307T	Pharmaceutical Microbiology – Practical	Upon completion of the course student shall be able 1. study of different equipments and processing, e.g., B.O.D. incubator, laminar flow, aseptic hood, autoclave, hot air sterilizer, deep freezer, refrigerator, microscopes used in experimental

Code	Course name	COS
		microbiology 2. study the Sterilization of glassware, preparation and sterilization of media 3. Staining methods- Simple, Grams staining and acid fast staining (Demonstration with practical 4. Isolation of pure culture of micro-organisms by multiple streak plate technique and other techniques 5. Study of Microbiological assay of antibiotics by cup plate method and other methods
BP308T	Pharmaceutical Engineering –Practical	Upon completion of the course student shall be able 1. Determination of radiation constant of brass, iron, unpainted and painted glass 2. Determination of humidity of air – i) From wet and dry bulb temperatures –use of Dew point method 3. Description of Construction working and application of Pharmaceutical Machinery such as rotary tablet machine, fluidized bed coater, fluid energy mill, de humidifier 4. Size analysis by sieving – To evaluate size distribution of tablet granulations – Construction of various size frequency curves including arithmetic and logarithmic probability plots 5. To study the effect of time on the Rate of Crystallization

II B.Pharmacy II Semester

Code	Course name	COS
BP401T	Pharmaceutical Organic Chemistry III– Theory	At the end of the course, the student shall be able to 1. understand the methods of preparation and properties of organic compounds 2. explain the stereo chemical aspects of organic compounds and stereo chemical reactions 3. know the medicinal uses and other applications of organic compounds
BP402T	Medicinal Chemistry I – Theory	Upon completion of the course the student shall be able to 1. understand the chemistry of drugs with respect to their pharmacological activity 2. understand the drug metabolic pathways, adverse effect and therapeutic value of drugs 3. know the Structural Activity Relationship (SAR) of different class of drugs 4. write the chemical synthesis of some drugs
BP403T	Physical Pharmaceutics II – Theory	Upon the completion of the course student shall be able to 1. Understand various physicochemical properties of drug molecules in the designing the dosage

Code	Course name	COS
		forms 2. Know the principles of chemical kinetics & to use them for stability testing and determination of expiry date of formulations 3. Demonstrate use of physicochemical properties in the formulation development and evaluation of dosage forms.
BP404T	Pharmacology I – Theory	Upon completion of this course the student should be able to 1. Understand the pharmacological actions of different categories of drugs 2. Explain the mechanism of drug action at organ system/subcellular/ macromolecular levels. 3. Apply the basic pharmacological knowledge in the prevention and treatment of various diseases. 4. Observe the effect of drugs on animals by simulated experiments 5. Appreciate correlation of pharmacology with other bio medical sciences
BP405T	Pharmacognosy and Phytochemistry I– Theory	Upon completion of the course, the student shall be able 1. to know the techniques in the cultivation and production of crude drugs 2. to know the crude drugs, their uses and chemical nature 3. know the evaluation techniques for the herbal drugs 4. to carry out the microscopic and morphological evaluation of crude drugs
BP406T	Medicinal Chemistry I – Practical	Upon completion of the course, the student shall be able 1. Preparation of drugs/ intermediates like 1,3-pyrazole, 1,3-oxazole, Benzimidazole and Benztriazole 2. Assay of drugs like Chlorpromazine, Phenobarbitone, Atropine and Ibuprofen 3. Determination of Partition coefficient for any two drugs
BP407T	Physical Pharmaceutics II – Practical	1. Determination of particle size, particle size distribution using sieving method, bulk density, true density and porosity, angle of repose and influence of lubricant on angle of repose and particle size, particle size distribution using Microscopic method 2. Determination of viscosity of liquid using Ostwald's viscometer, sedimentation volume with effect of different suspending agent, sedimentation volume with effect of different concentration of single suspending agent 3. Determination of viscosity of semisolid by using Brookfield viscometer, reaction rate constant first order, reaction rate constant second order and Accelerated stability studies

Code	Course name	COS
BP408T	Pharmacology I – Practical	1. Study of common laboratory animals and Commonly used instruments in experimental pharmacology 2. Maintenance of laboratory animals as per CPCSEA guidelines 3. Common laboratory techniques. Blood withdrawal, serum and plasma separation, anesthetics and euthanasia used for animal studies 4. Effect of drugs on ciliary motility of frog oesophagus, drugs on rabbit eye, skeletal muscle relaxants using rota-rod apparatus, locomotor activity using actophotometer 5. Study of stereotype and anti-catatonic activity of drugs on rats/mice , anxiolytic activity of drugs using rats/mice and local anesthetics by different methods
BP409T	Pharmacognosy and Phytochemistry I – Practical	1. Analysis of crude drugs by chemical tests: **(**i)Tragaccanth (ii) Acacia (iii)Agar (iv) Gelatin (v) starch (vi) Honey (vii) Castor oil 2. Determination of stomatal number and index, vein islet number, vein islet termination and paliside ratio, size of starch grains, calcium oxalate crystals by eye piece micrometer and Fiber length and width 3. Determination of number of starch grains by Lycopodium spore method, Ash value, Extractive values of crude drugs, moisture content of crude drugs and swelling index and foaming

III B.Pharmacy I Semester

Code	Course name	COS
BP501T	Medicinal Chemistry II – Theory	Upon completion of the course the student shall be able to 1. Understand the chemistry of drugs with respect to their pharmacological activity 2. Understand the drug metabolic pathways, adverse effect and therapeutic value of drugs 3. Know the Structural Activity Relationship of different class of drugs 4. Study the chemical synthesis of selected drugs
BP502T	Industrial Pharmacy I– Theory	Upon completion of the course the student shall be able to 1. Know the various pharmaceutical dosage forms and their manufacturing techniques. 2. Know various considerations in development of pharmaceutical dosage forms 3. Formulate solid, liquid and semisolid dosage forms and evaluate them for their quality
BP503T	Pharmacology II – Theory	Upon completion of this course the student should be able to

Code	Course name	COS
		1. Understand the mechanism of drug action and its relevance in the treatment of different diseases 2. Demonstrate isolation of different organs/tissues from the laboratory animals by simulated experiments 3. Demonstrate the various receptor actions using isolated tissue preparation 4. Appreciate correlation of pharmacology with related medical sciences
BP504T	Pharmacognosy and Phytochemistry II– Theory	Upon completion of the course, the student shall be able 1. to know the modern extraction techniques, characterization and identification of the herbal drugs and phytoconstituents 2. to understand the preparation and development of herbal formulation. 3. to understand the herbal drug interactions 4. to carryout isolation and identification of phytoconstituents
BP505T	Pharmaceutical Jurisprudence – Theory	Upon completion of the course, the student shall be able to understand: 1. The Pharmaceutical legislations and their implications in the development and marketing of pharmaceuticals. 2. Various Indian pharmaceutical Acts and Laws 3. The regulatory authorities and agencies governing the manufacture and sale of pharmaceuticals 4. The code of ethics during the pharmaceutical practice
BP506T	Industrial Pharmacy I – Practical	Upon completion of the course, the student shall be able to understand 1. Preformulation studies on paracetamol/asparin/or any other drug 2. Preparation and evaluation of Paracetamol tablets and evaluation of Aspirin tablets 3. Preparation and evaluation of Tetracycline capsules, Ascorbic Acid injection and Calcium Gluconate injection 4. Quality control test of (as per IP) marketed tablets and capsules 5. Preparation of Eye drops/ and Eye ointments, Creams (cold / vanishing cream) and Glass containers
BP507T	Pharmacology II – Practical	Upon completion of the course, the student shall be able to understand 1. Effect of drugs on isolated frog heart, blood pressure and heart rate of dog. 2. Study of diuretic activity of drugs using rats/mice and DRC of acetylcholine using frog rectus abdominis muscle

Code	Course name	COS
		3. Effect of physostigmine and atropine on DRC of acetylcholine using frog rectus abdominis muscle and rat ileum respectively 4. Bioassay of matching method, interpolation method, three point bioassay and four point bioassay. 5. Determination of PA2 value of prazosin using rat anococcygeus muscle and PD2 value 6. Anti-inflammatory activity of drugs using carrageenan induced paw-edema model
BP508T	Pharmacognosy and Phytochemistry II –	Upon completion of the course, the student shall be able to understand 1. Study of Morphology, histology and powder characteristics & extraction & detection of: Cinchona, Cinnamon, Senna, Clove, Ephedra, Fennel and Coriander 2. Exercise involving isolation & detection of active principles Caffeine - from tea dust, Diosgenin from Dioscorea, Atropine from Belladonna and Sennosides from Senna 3. Separation of sugars by Paper chromatography 4. Analysis of crude drugs by chemical tests: (i) Asafoetida (ii) Benzoin (iii) Colophony (iv) Aloes (v) Myrrh

III B.Pharmacy II Semester

Code	Course name	COS
BP601T	Medicinal Chemistry III – Theory	Upon completion of the course student shall be able to 1. Understand the importance of drug design and different techniques of drug design. 2. Understand the chemistry of drugs with respect to their biological activity. 3. Know the metabolism, adverse effects and therapeutic value of drugs. 4. Know the importance of SAR of drugs.
BP602T	Pharmacology III – Theory	Upon completion of this course the student should be able to: 1. Understand the mechanism of drug action and its relevance in the treatment of different infectious diseases 2. Comprehend the principles of toxicology and treatment of various poisonings and 3. Appreciate correlation of pharmacology with related medical sciences.
BP603T	Herbal Drug Technology – Theory	Upon completion of this course the student should be able to: 1. understand raw material as source of herbal drugs from cultivation to herbal drug

Code	Course name	COS
		product 2. know the WHO and ICH guidelines for evaluation of herbal drugs 3. know the herbal cosmetics, natural sweeteners, nutraceuticals 4. appreciate patenting of herbal drugs, GMP .
BP604T	Biopharmaceutics and Pharmacokinetics –Theory	Upon completion of the course student shall be able to: 1. Understand the basic concepts in biopharmaceutics and pharmacokinetics and their significance. 2. Use of plasma drug concentration-time data to calculate the pharmacokinetic parameters to describe the kinetics of drug absorption, distribution, metabolism, excretion, elimination. 3. To understand the concepts of bioavailability and bioequivalence of drug products and their significance. 4. Understand various pharmacokinetic parameters, their significance & applications.
BP605T	Pharmaceutical Biotechnology – Theory	Upon completion of the subject student shall be able to; 1. Understanding the importance of Immobilized enzymes in Pharmaceutical Industries 2. Genetic engineering applications in relation to production of pharmaceuticals 3. Importance of Monoclonal antibodies in Industries 4. Appreciate the use of microorganisms in fermentation technology
BP606T	Quality Assurance – Theory	Upon completion of the course student shall be able to: 1. Understand the cGMP aspects in a pharmaceutical industry 2. Appreciate the importance of documentation 3. Understand the scope of quality certifications applicable to pharmaceutical industries 4. Understand the responsibilities of QA & QC departments
BP607T	Medicinal chemistry III – Practical	Upon completion of the subject student shall be able to; 1. Preparation of drugs and intermediates like Sulphanilamide, 2 7-Hydroxy, 4-methyl coumarin, Chlorobutanol, Triphenyl imidazole and Tolbutamide 2. Assay of drugs like Isonicotinic acid hydrazide, Chloroquine,Metronidazole, Dapsone and

Code	Course name	COS
		Chlorpheniramine maleate 3. Preparation of medicinally important compounds or intermediates by Microwave irradiation technique 4. Drawing structures and reactions using chem draw 5. Determination of physicochemical properties such as logP, clogP, MR, Molecular weight, Hydrogen bond donors and acceptors for class of drugs course content using drug design software Drug likeliness screening
BP608T	Pharmacology III – Practical	Upon completion of the subject student shall be able to 1. Study of Dose calculation in pharmacological experiments and Antiallergic activity by mast cell stabilization assay 2. Study of anti-ulcer activity of a drug using pylorus ligand (SHAY) rat model and NSAIDS induced ulcer model 3. Study of effect of drugs on gastrointestinal motility 4. Estimation of serum biochemical parameters by using semi- autoanalyser 5. Determination of acute oral toxicity (LD50) of a drug, acute skin irritation / corrosion of a test substance and acute eye irritation / corrosion of a test substance
BP609T	Herbal Drug Technology – Practical	Upon completion of the subject student shall be able to 1. To perform preliminary phytochemical screening of crude drugs 2. Determination of the alcohol content of Asava and Arista 3. Incorporation of prepared and standardized extract in cosmetic formulations like creams, lotions and shampoos and their evaluation. 4. Incorporation of prepared and standardized extract in formulations like syrups, mixtures and tablets and their evaluation as per Pharmacopoeial requirements. 5. Determination of Aldehyde content, Phenol content and total alkaloids

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IV B.Pharmacy I Semester

Code	Course name	COS
BP701T	Instrumental Methods of Analysis – Theory	Upon completion of the course the student shall be able to 1. Understand the interaction of matter with electromagnetic radiations and its applications in drug analysis 2. Understand the chromatographic separation and analysis of drugs. 3. Perform quantitative & qualitative analysis of drugs using various analytical instruments
BP702T	Industrial Pharmacy II – Theory	Upon completion of the course, the student shall be able to: 1. Know the process of pilot plant and scale up of pharmaceutical dosage forms 2. Understand the process of technology transfer from lab scale to commercial batch 3. Know different Laws and Acts that regulate pharmaceutical industry 4. Understand the approval process and regulatory requirements for drug products
BP703T	Pharmacy Practice – Theory	Upon completion of the course, the student shall be able to 1. Know various drug distribution methods in a hospital 2. Appreciate the pharmacy stores management and inventory control 3. Monitor drug therapy of patient through medication chart review and clinical review 4. Obtain medication history interview and counsel the patients 5. Identify drug related problems 6. Detect and assess adverse drug reactions 7. Interpret selected laboratory results (as monitoring parameters in therapeutics) of specific disease states 8. Know pharmaceutical care services 9. Do patient counseling in community pharmacy; 10. Appreciate the concept of Rational drug therapy.
BP704T	Novel Drug Delivery System – Theory	Upon completion of the course student shall be able 1. To understand various approaches for development of novel drug delivery systems. 2. To understand the criteria for selection of drugs and polymers for the development of Novel drug delivery systems, their formulation and evaluation
BP705T	Instrumental Methods of	Upon completion of the course student shall be able

Code	Course name	COS
	Analysis – Practical	1. Determination of absorption maxima and effect of solvents on absorption maxima of organic compounds 2. Estimation of dextrose by colorimetry and sulfanilamide by colorimetry 3. Simultaneous estimation of ibuprofen and paracetamol by UV spectroscopy 4. Determination of sodium by flame photometry, potassium by flame photometry and chlorides and sulphates by nephelo turbidometry 5. Separation of amino acids by paper chromatography and thin layer chromatography 6. Demonstration experiment on HPLC and experiment on Gas Chromatography
BP706PS	Practice School	Upon completion of the course student shall be able 1. Enable students to acquire learning by applying the knowledge and skills they possess, in unfamiliar, open-ended real life situations and also the practice school will provide excellent in skill to put in the students main core. 2. Enables students to have a smoother transition from academics to professional world. 3. Enhances interpersonal skills, communication skills, leadership qualities etc. 4. Provides an opportunity to students to apply some of the ideas/skill sets in their careers, which also enhances their confidence levels. 5. Enables students to be aware of their personal strengths and limitations as professionals. 6. Increases marketability of students after graduation. 7. Provides link with potential future employers.

IV B.Pharmacy II Semester

Code	Course name	COS
BP801T	Biostatistics and Research Methodology	Upon completion of the course the student shall be able to 1. Know the operation of M.S. Excel, SPSS, R and MINITAB®, DoE (Design of Experiment) 2. Know the various statistical techniques to solve statistical problems 3. Appreciate statistical techniques in solving the problems.
BP802T	Social and Preventive Pharmacy	After the successful completion of this course, the student shall be able to: 1. Acquire high consciousness/realization of current issues related to health and pharmaceutical problems within the country and worldwide.

Code	Course name	COS
		2.Have a critical way of thinking based on current healthcare development. 3. Evaluate alternative ways of solving problems related to health and pharmaceutical issues
BP803T Elective	Pharma Marketing Management	1. The course aims to provide an understanding of marketing concepts and techniques and their applications in the pharmaceutical industry.
BP804T Elective	Pharmaceutical Regulatory Science	Upon completion of the subject student shall be able to; 1. Know about the process of drug discovery and development 2. Know the regulatory authorities and agencies governing the manufacture and sale of pharmaceuticals 3. Know the regulatory approval process and their registration in Indian and international markets
BP805T Elective	Pharmacovigilance	At completion of this paper it is expected that students will be able to (know, do, and appreciate): 1. Why drug safety monitoring is important? 2. History and development of pharmacovigilance 3. National and international scenario of pharmacovigilance 4. Dictionaries, coding and terminologies used in pharmacovigilance 5. Detection of new adverse drug reactions and their assessment 6. International standards for classification of diseases and drugs 7. Adverse drug reaction reporting systems and communication in pharmacovigilance 8. Methods to generate safety data during pre clinical, clinical and post approval phases of drugs' life cycle 9. Drug safety evaluation in paediatrics, geriatrics, pregnancy and lactation 10. Pharmacovigilance Program of India (PvPI) requirement for ADR reporting in India 11. ICH guidelines for ICSR, PSUR, expedited reporting, pharmacovigilance planning 12. CIOMS requirements for ADR reporting 13. Writing case narratives of adverse events and their quality.
BP806T Elective	Quality Control and Standardization of Herbals	Upon completion of the subject student shall be able to; 1. know WHO guidelines for quality control of herbal drugs

Code	Course name	COS
		2. know Quality assurance in herbal drug industry 3. know the regulatory approval process and their registration in Indian and international markets 4. appreciate EU and ICH guidelines for quality control of herbal drugs
BP807T Elective	Computer Aided Drug Design	Upon completion of the course, the student shall be able to understand 1.Design and discovery of lead molecules 2.The role of drug design in drug discovery process 3.The concept of QSAR and docking 4.Various strategies to develop new drug like molecules. 5.The design of new drug molecules using molecular modeling software
BP808T Elective	Cell and Molecular Biology	Upon completion of the subject student shall be ableto; 1. Summarize cell and molecular biology history. 2. Summarize cellular functioning and composition. 3. Describe the chemical foundations of cell biology. 4. Summarize the DNA properties of cell biology. 5. Describe protein structure and function. 6. Describe cellular membrane structure and function. 7. Describe basic molecular genetic mechanisms. 8. Summarize the Cell Cycle
BP809T Elective	Cosmetic Science	Upon completion of the course, the students shall be able to understand 1. Key ingredients used in cosmetics and cosmeceuticals. Key building blocks for various formulations. 2. Current technologies in the market 3. Various key ingredients and basic science to develop cosmetics and cosmeceuticals 4. Scientific knowledge to develop cosmetics and cosmeceuticals with desired Safety, stability, and efficacy.
BP810T Elective	pharmacological screening methods	Upon completion of the course the student shall be able to, 1. Appreciate the applications of various commonly used laboratory animals. 2. Appreciate and demonstrate the various screening methods used in preclinical

Code	Course name	COS
		Research 3. Appreciate and demonstrate the importance of biostatistics and research methodology 4. Design and execute a research hypothesis independently
BP811T Elective	Advanced Instrumentation Techniques	Upon completion of the course the student shall be able to 1. understand the advanced instruments used and its applications in drug analysis 2. understand the chromatographic separation and analysis of drugs. 3. understand the calibration of various analytical instruments 4. know analysis of drugs using various analytical instruments
BP812T Elective	Dietary Supplements and Nutraceuticals	This module aims to provide an understanding of the concepts behind the theoretical applications of dietary supplements. By the end of the course, students should be able to : 1. Understand the need of supplements by the different group of people to maintain healthy life. 2. Understand the outcome of deficiencies in dietary supplements. 3. Appreciate the components in dietary supplements and the application. 4. Appreciate the regulatory and commercial aspects of dietary supplements including health claims.
BP813T	Project Work	Upon completion of the course the student shall be able to Understand the basic design of experimentation on various models and result interpresentation.