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Geethanjali

Geethanjali College of Pharmacy

Approved by AICTE, PCI New Delhi, Permanently Affiliated to JNTUH & B. Pharmacy Accredited by NBA
Recognized Under UGC Section 2F & 12B of UGC Act, 1956, by DSIR-SIRO & HI/BI of MSME, Certified by ISO 9001:2015
Cheeryal (V), Keesara (M), Medchal-Malkajgiri Dist, Telangana State- 501301.

PROGRAM: BACHELOR OF PHARMACY (R17)

BATCH (2017–21) REGULATION R17

COURSE OUTCOMES WITH KNOWLEDGE LEVEL & ITSRELEVANCE TO PROGRAM OUTCOMES

PROGRAM: BACHELOR OF PHARMACY/ FIRST YEAR/ I SEMESTER					
Course Name	**Code**	**Course Outcome No.**	**CO Statement**	**Knowledge Level**	**Relevance to PO's**
HUMAN ANATOMY AND PHYSIOLOGY – I	C111	C111.1	Explain levels of structural organization and gross morphology anatomical terminologies and describe the various homeostatic mechanisms and their imbalances.	K2	PO1 PO2 PO3 PO4 PO5 PO6 PO7 PO8 PO9 PO10 PO11
		C111.2	Outline the structure and functions of Integumentary system skeletal and joints.	K2	
		C111.3	Explain about anatomical features and functioning of central nervous system.	K2	
		C111.4	Explain the structure and functions of peripheral nervous system and special senses.	K2	
		C111.5	Outline the structure and functions of endocrine system.	K2	
		C112.1	Explain the principles of different techniques of analysis & develop analytical skills	K2	PO1 PO3
		C112.2	Explain the concepts of acid base titration and non-aqueous titration and estimate various compounds by these volumetric analysis techniques.	K3	

PHARMACEUTICAL ANALYSIS – I	C112	C112.3	Explain the concepts of Precipitation, Complexometric titration & Gravimetry and also can estimate various compounds by these volumetric analysis techniques.	K3	PO4 PO6 PO7 PO9 PO10 PO11
		C112.4	Discuss the concept of different types of redox titrations. Apply the knowledge of redox system to determine various oxidisable & reducible substances.	K3	
		C112.5	Explain the principles of conductometry, potentiometry& polarography. Also carryout various electrochemical titrations.	K3	

PHARMACEUTICS – I	C113	C113.1	Summarize various dosage forms and analyze various errors belongs to prescription; calculate the dose according to patient related factors	K2	PO1 PO2 PO3 PO4 PO5 PO6 PO7 PO8 PO9 PO10 PO11
		C113.2	Explain various percentage solutions calculations and isotonic solutions; classify and compound various powders and liquid dosage forms	K2	
		C113.3	Develop monophonic and biphasic liquid dosage forms	K2	
		C113.4	Summarize pharmaceutical incompatibilities and formulate various types of suppositories	K2	
		C113.5	Develop various types of semi solid dosage forms and evaluate	K2	
PHARMACEUTICAL INORGANIC CHEMISTRY – I	C114	C114.1	Apply the knowledge of organizational structure and management of hospitaland community pharmacy.	K1	PO1 PO3 PO4 PO6 PO7 PO9 PO10 PO11
		C114.2	Represent drug distribution methods in hospital, therapeutic drug monitoring, and community pharmacy management.	K2	
		C114.3	Summarize about Drug information services, Patient counseling, Education and training program in the hospital.	K2	
		C114.4	Illustrate about OTC sales and drug therapy monitoring.	K2	
		C114.5	Apply the knowledge of drug store management and inventory control.	K2	
COMMUNICATION SKILLS	C115	C115.1	Describe communication process, barriers and its perspectives.	K1	PO1 PO2 PO3 PO4 PO5 PO6 PO7 PO8 PO9 PO10
		C115.2	Outline various elements of communication and its styles.	K2	
		C115.3	Explain the active listening and good writing skills.	K3	
		C115.4	Show confidence in interviews and making presentations.	K3	
		C115.5	Prepare for various group discussions confidently.	K3	

					PO11
REMEDIAL BIOLOGY	C116	C116.1	Outline the introductory course in biology which gives detailed study on living world and natural sources such as plant and animal origin.	K2	PO1 PO3 PO4 PO6 PO7 PO9 PO10 PO11
		C116.2	Summarize the body fluids and circulation of blood to different organs, digestion and Absorption, breathing and respiration**.**	K2	
		C116.3	Explain & classify the nervous system, endocrine glands and their secretions &human reproduction.	K2	
		C116.4	Outline the plant mineral nutrition**,** nitrogen metabolism, nitrogen cycle, biological nitrogen fixation and photosynthesis.	K2	
		C116.5	Summarize the plant respiration, glycolysis, fermentation, plant growth and development and types of tissues, location and functions.	K2	
REMEDIAL MATHEMATICS	C117	C117.1	Solve problems using partial fraction, logarithms, function, limits and continuity	K3	PO3 PO4 PO9 PO11
		C117.2	Solve problems related to matrices & determinants	K3	
		C117.3	Solve calculus and differentiation problems	K3	
		C117.4	Understand the concepts of analytical geometry in problem solving	K3	
		C117.5	Understand differential equation , Laplace transform and apply in solving chemical kinetics and pharmacokinetics problems	K3	
HUMAN ANATOMY AND PHYSIOLOGY – I LAB	C118	C118.1	Explain various tissues of different systems of human body.	K2	PO1 PO3 PO4 PO5 PO7 PO8 PO9 PO10 PO11
		C118.2	Explain and identify different types ofbones in human body.	K2	
		C118.3	Describe various systems in coordination with importance of various organs.	K2	
		C118.4	Explain and demonstrate general neurological examinination, olfactory nerve,taste,visual acuity, and reflex	K2	

			activity.		
		C118.5	Explain aware of body temperature, positive and negative feedback mechanisms.	K2	
PHARMACEUTICAL ANALYSIS – I LAB	C119	C119.1	Carry out preparation and standardization of various drugs	K3	PO1 PO3 PO4 PO5 PO6 PO7 PO9 PO10 PO11
		C119.2	Execute acid base and ceriometry titrations	K3	
		C119.3	Execute iodometry titration and Precipitation titrations	K3	
		C119.4	Execute non aqueous titration and precipitation titrations	K3	
		C119.5	Identify various elements by potentiometry and conductometry	K1	
PHARMACEUTICS – I LAB	C1110	C1110.1	Prepare liquid dosage forms using various formulation ingredients and report with label	K3	PO1 PO2 PO3 PO4 PO5 PO6 PO7 PO8 PO9 PO10 PO11
		C1110.2	Formulate various biphasic liquid preparations using given ingredients and report with label	K2	
		C1110.3	Conduct the formulation of solid powder preparations using given ingredients, label and pack appropriately.	K2	
		C1110.4	Prepare various formulation ingredients for semisolid formulations and report with label	K2	
		C1110.5	Label various types of dosage forms with auxiliary statements	K1	
PHARMACEUTICAL INORGANIC CHEMISTRY – I LAB	C1111	C1111.1	Carryout the limit test for chlorides, sulphates, heavy metals and Iron as per procedure given in IP 1996.	K3	PO1 PO3 PO4 PO6 PO7 PO9 PO10 PO11
		C1111.2	Identify magnesium hydroxide, ferrous sulphate and sodium bicarbonate by using suitable identification tests as per IP.	K3	
		C1111.3	Identify calcium gluconate and copper sulphate by using suitable identification tests as per IP.	K3	
		C1111.4	Report the purity of bentonite, aluminum hydroxide gel, potassium iodate and iodine in potassium iodide as per test procedures given in IP.	K3	

		C1111.5	Prepare boric acid, potash alum and ferrous sulphate.	K3	
COMMUNICATION SKILLS LAB	C1112	C1112.1	Use various examples for developing social skills.	K2	PO2 PO3 PO4 PO5 PO6 PO7 PO8 PO9 PO10 PO11
		C1112.2	Demonstrate good pronunciation skills in their day to day activities	K3	
		C1112.3	Explain active listening skills and demonstrate good writing skills	K3	
		C1112.4	Perform confidently in interviews andmake presentations	K3	
		C1112.5	Perform in group discussions confidently.	K3	
REMEDIAL BIOLOGY LAB	C1113	C1113.1	Summarize the experiments in biology, microscope, and section cutting techniques, permanent slide preparation, mounting and staining.	K2	PO1 PO3 PO4 PO6 PO7 PO9 PO10 PO11
		C1113.2	Explain the cell and its inclusions and Study of stem, root, leaf and its modifications	K2	
		C1113.3	Outline the anatomy of frog by using computer models.	K2	
		C1113.4	List out the tissues and bones.	K2	
		C1113.5	Explain the blood group, blood pressure and determination of tidal volume.	K2	
BACHELOR OF PHARMACY/ I YEAR/ II SEMESTER					
HUMAN ANATOMY AND PHYSIOLOGY – II	C121	C121.1	Explain various physiological aspects of body fluids and blood.	K2	PO1 PO2 PO3 PO4 PO5 PO6 PO7 PO8 PO9 PO10 PO11
		C121.2	Outlinethestructureandfunctionsofcardiovascularsystemandbloodphysiology.	K2	
		C121.3	Explainaboutanatomicalfeaturesandfunctioningofdigestivesystemandrespiratorysystem.	K2	
		C121.4	Explainthestructureandfunctionsofurinarysystemandreproductivesystem.	K2	
		C121.5	Outline the structure and functions of chromosomes and genes.	K2	
PHARMACEUTICAL ORGANIC CHEMISTRY I	C122	C122.1	Describe the classification, nomenclature and isomerism of organic compounds.	K1	PO1 PO3 PO4 PO6 PO7
		C122.2	Explain the structure, nomenclature, preparation, uses and chemical reaction mechanisms of alkanes, alkenes and	K2	

			conjugateddienes.		PO9 PO10 PO11
		C122.3	Express the structure, nomenclature, preparation, uses and chemical reaction mechanisms of alkyl halides and alcohols.	K2	
		C122.4	Summarize the structure, nomenclature, preparation, uses and chemical reaction mechanisms of carbonyl compounds.	K2	
		C122.5	Discuss the structure, nomenclature, preparation, uses and chemical reaction mechanisms of carboxylic acids and aliphatic amines.	K2	
BIOCHEMISTRY	C123	C123.1	Explain about biochemistry and metabolism of carbohydrates and biological oxidation of cell.	K2	PO1 PO3 PO4 PO6 PO7 PO8 PO9 PO10 PO11
		C123.2	Explain about biochemistry and metabolism of amino acids and lipids.	K2	
		C123.3	Explain about biochemistry and metabolism of nucleic acids and transferof genetic information .	K2	
		C123.4	Summarise about the classification,chemical nature and biological role of bio molecules and bioenergetics.	K2	
		C123.5	Summarise about the classification and nomenclature,properties, m.o.a, and kinetics of enzymes,co enzymes and isoenzymes.	K2	
PATHOPHYSIOLOGY	C124	C124.1	Outline the basic principles of cell injury, Inflammation and cellular adaptations.	K2	PO1 PO2 PO3 PO4 PO5 PO6 PO7 PO8 PO9 PO10 PO11
		C124.2	Explain the pathophysiology of diseases affecting CVS, Respiratory and renal systems.	K2	
		C124.3	Express the pathophysiological basis of hematological, endocrine, nervous and gastrointestinal diseases.	K2	
		C124.4	Discuss the basic principles of cancer and pathophysiology of diseases affecting bones and joints.	K2	
		C124.5	Summarize the pathophysiology of infectious, sexually transmitted diseases.	K2	
COMPUTER APPLICATIONS IN PHARMACY	C125	C125.1	Define Number System, List out Number System and Summarized information System and Software.	K2	PO1 PO3 PO4 PO6 PO7
		C125.2	Define Web Technology, Explain aboutHTML, XML, CSS and Databases**.**	K2	

		C125.3	Explain about Computer Applications in Pharmacy.	K2	PO9 PO10 PO11
		C125.4	Summarize bioinformatics.	K2	
		C125.5	Summarize data Analysis and preclinical development.	K2	
HUMAN ANATOMY AND PHYSIOLOGY – II LAB	C127	C127.1	Explain various complete blood picture parameters and mechanisms involved in blood experiments.	K2	PO1 PO3 PO4 PO6 PO7 PO8 PO9 PO10 PO11
		C127.2	Explain aware of blood pressure, heart rate, pulse rate and respiratory volumes.	K2	
		C127.3	Describe various systems in coordinationwith importance of various organs and tissues.	K2	
		C127.4	Explain about various family planning devices and diagnostic test of pregnancy	K2	
		C127.5	Explain different slides of vital organs and gonads.	K2	
PHARMACEUTICAL ORGANIC CHEMISTRYI LAB	C128	C128.1	Determine the melting point, boiling point of various organic compounds & construct the molecular models for organic compounds.	K1	PO1 PO3 PO4 PO6 PO7 PO9 PO10 PO11
		C128.2	Demonstrate recrystallization and drying of organic compounds.	K2	
		C128.3	Prepare different organic compounds by using oxidation, reduction, acetylation and esterification.	K3	
		C128.4	Prepare different organic compounds by using nitration, etherification, sulfonation and halogenation.	K3	
		C128.5	Identify and report the functional group present in given organic sample.	K3	
BIOCHEMISTRY LAB	C129	C129.1	Perform the identification tests for carbohydrates, proteins.	K3	PO1 PO3 PO4 PO6 PO7 PO8 PO9 PO10 PO11
		C129.2	Perform the estimation of glucose, creatinine in blood and urine .	K3	
		C129.3	Perform the estimation of total cholesterol in serum.	K3	
		C129.4	Perform the preparation and **pH** measurement of standard buffers.	K3	
		C129.	Perform the study of enzymatic hydrolysis	K3	

		5	of starch and effect of temperature, substrate concentration on salivary amylase activity.		
COMPUTER APPLICATIONS IN PHARMACY LAB	C1210	C1210.1	Outline about Particular Disease Using MS Word	K2	PO1 PO3 PO4 PO9 PO11
		C1210.2	Demonstrate HTML	K3	
		C1210.3	Demonstrate online package software's.	K3	
		C1210.4	Develop MS-Access(database)	K2	
		C1210.5	Illustrate XML,CSS	K3	
BACHELOR OF PHARMACY/ II YEAR/ I SEMESTER					
PHARMACEUTICAL ORGANIC CHEMISTRY – II	C211	C211.1	Explain the structure, nomenclature, characteristic reactions of benzene and its derivatives.	K2	PO1 PO3 PO4 PO6 PO7 PO9 PO10 PO11
		C211.2	Summarize the acidity and basicity of different types of phenols, aromatic amines and aromatic acids.	K2	
		C211.3	Distinguish oils and fats based on structure, nomenclature, chemical reactions and analytical constants.	K2	
		C211.4	Classify polynuclear hydrocarbons.	K2	
		C211.5	Explain stability theories of cycloalkanes.	K2	
PHYSICAL PHARMACEUTICS – I	C212	C212.1	Distinguish physical properties of molecules.	K2	PO1 PO2 PO3 PO4 PO5 PO6 PO7 PO8 PO9 PO10 PO11
		C212.2	Describe the solubility, dissolution and diffusion studies of drugs.	K1	
		C212.3	Generalize the particle size and particle size distribution.	K2	
		C212.4	Explain about complexation and protein binding.	K2	
		C212.5	Summarize the buffers and buffer isotonic solutions.	K2	
PHARMACEUTICAL MICROBIOLOGY	C213	C213.1	Explain identification, isolation, cultivation, maintenance and preservation techniques of microorganisms.	K2	PO1 PO2 PO3 PO4 PO5 PO6 PO7
		C213.2	Summarize the sterilization techniques of equipment, culture media and pharmaceutical products.	K2	
		C213.3	Outline the methods used for sterility	K2	

			testing of products and methods of disinfectants.		PO8 PO9 PO10 PO11
		C213.4	Demonstrate microbiological assays andstudy sources of contamination in aseptic area.	K3	
		C213.5	Explain about preservation of pharmaceutical products and animal cell culture.	K2	
PHARMACEUTICAL ENGINEERING	C214	C214.1	List out size reduction, size separation and mixing equipments.	K2	PO1 PO2 PO3 PO4 PO5 PO6 PO7 PO8 PO9 PO10 PO11
		C214.2	Explain the fundamental principles and equipments of evaporation and crystallization.	K2	
		C214.3	Discuss the objectives, applications and equipments used in drying and distillation techniques.	K2	
		C214.4	Express filtration and centrifugation equipments.	K2	
		C214.5	Outline the industrial hazards, plant location, and plant safety, materials of construction, corrosion and material handling system.	K2	
PHARMACEUTICAL ORGANIC CHEMISTRY – II LAB	C215	C215.1	Demonstrate the laboratory techniques of recrystallization and steam distillation.	K3	PO1 PO3 PO4 PO6 PO7 PO9 PO10 PO11
		C215.2	Determine the acid value, Saponification value, and iodine value of given oil sample.	K2	
		C215.3	Prepare Acetanilide from Aniline and 2, 4, 6- tribromo aniline and P-bromo aniline.	K2	
		C215.4	Prepare 5-nitro salicylic acid, Meta dinitro benzene and 1-phenyl azo-2-napthol.	K2	
		C215.5	Illustrate Perkin reaction and Claison-Schmidt reaction.	K2	
PHYSICAL PHARMACEUTICS – I LAB	C216	C216.1	Determine the pKa value by half neutralization method.	K2	PO1 PO2 PO3 PO4 PO5 PO6 PO7 PO8 PO9 PO10 PO11
		C216.2	Demonstrate the calibration of pH meter.	K1	
		C216.3	Estimate partition coefficient of benzoic acid in benzene and water.	K2	
		C216.4	Illustrate derived properties of powders.	K2	
		C216.5	Distinguish buffers and buffer isotonic solutions.	K2	

PHARMACEUTICAL MICROBIOLOGY LAB	C217	C217.1	Demonstrate the preparation, sterilization and aseptic transfer of pure cultures into various culture media.	K2	PO1 PO2 PO3 PO4 PO5 PO6 PO7 PO8 PO9 PO10 PO11
		C217.2	Isolate pure cultures of bacteria.	K3	
		C217.3	Identify microorganisms using staining and biochemical techniques.	K3	
		C217.4	Perform sterility testing of pharmaceutical products.	K3	
		C217.5	Determine the concentration and potency of antibiotics using microbiological assays and disinfectants using phenol-coefficient technique.	K3	
PHARMACEUTICAL ENGINEERING LAB	C218	C218.1	Determine the factors affecting rate of filtration and evaporation.	K3	PO1 PO2 PO3 PO4 PO5 PO6 PO7 PO8 PO9 PO10 PO11
		C218.2	Analyze particle size using sieve shaker machine.	K3	
		C218.3	Carry out the size reduction using ball mill.	K3	
		C218.4	Estimate the rate of drying of the given samples.	K3	
		C218.5	Determine humidity of air using dew point and psychrometric methods.	K3	
BACHELOR OF PHARMACY-II/II SEMESTER					
PHARMACEUTICAL ORGANIC CHEMISTRY-III	C221	C221.1	Summarize the nomenclature, optical activity and chirality of optical isomers.	K2	PO1 PO3 PO4 PO6 PO7 PO8 PO9 PO10 PO11
		C221.2	Explain the nomenclature, configuration of geometrical isomers and conformational isomerism in Ethane, n-Butane and Cyclohexane.	K2	
		C221.3	Outline the structure, synthesis and reactions of five member rings with one hetero atom.	K2	
		C221.4	Discuss the structure, synthesis and reactions of five and six membered rings with two hetero atoms.	K2	
		C221.5	Explain the reaction mechanisms and applications of named reactions.	K2	
MEDICINAL CHEMISTRY-I	C222	C222.1	Explain the physiochemical properties in relation to biological action and drug metabolism principles.	K2	PO1 PO3 PO4 PO6 PO7
		C222.2	Summarize the mechanism of action, structure activity, therapeutic value and	K2	

			adverse effects of adrenergic agonists and antagonists.		PO9 PO10 PO11
		C222.3	Discuss the mechanism of action, structure activity, therapeutic value and adverse effects of cholinergic agonists and antagonists.	K2	
		C222.4	Explain the mechanism of action, structure activity, therapeutic value and adverse effects of sedatives, hypnotics, antipsychotics and anticonvulsants.	K2	
		C222.5	Discuss the mechanism of action, structure activity, therapeutic value and adverse effects of general anesthetics, dissociative anesthetics, narcotic analgesics and anti-inflammatory agents.	K2	
PHYSICAL PHARMACEUTICS-II	C223	C223.1	Know the principles of chemical kinetics &to use them in assigning expiry date for formulation.	K1	PO1 PO3 PO4 PO6 PO7 PO9 PO10 PO11
		C223.2	Understand various physicochemical properties of drug molecules in the designing the dosage form.	K2	
		C223.3	Demonstrate use of physicochemical properties in evaluation of dosage forms.	K2	
		C223.4	Appreciate physicochemical properties of drug molecules in formulation research and Development.	K3	
		C223.5	Understand the colloidal dispersions and highlight its applications.	K2	
PHARMACOLOGY-I	C224	C224.1	Discuss the sources of drugs, dosage forms and general principles of pharmacology and pharmacokinetics of drugs.	K2	PO1 PO2 PO3 PO4 PO5 PO6 PO7 PO8 PO9 PO10 PO11
		C224.2	Explain pharmacodynamics, receptor families and theories, adverse drug reactions, drug interactions, drug discovery and clinical evaluation of new drugs.	K2	
		C224.3	Generalize the pharmacology of drugs acting on Peripheral Nervous system.	K2	
		C224.4	Explain the pharmacology of drugs actingon Central Nervous system.	K2	
		C224.5	Summarize psychopharmacological agents, anti-parkinsonian drugs, CNS stimulants, opioid analgesics and drug addiction, abuse, tolerance, dependence.	K2	

PHARMACOGNOSY AND PHYTOCHEMISTRY-I	C225	C225.1	Introduction to pharmacognosy, classification of crude drugs & evaluation of drugs of natural origin.	K1	PO1 PO3 PO4 PO6 PO7 PO9 PO10 PO11
		C225.2	Explain the techniques involves in cultivation, collection, processing & storage of drugs of natural origin.	K2	
		C225.3	Discuss about plant tissue culture & edible vaccines.	K2	
		C225.4	Summarize the role of pharmacognosy in various systems of medicine & introductionto secondary metabolites.	K2	
		C225.5	Generalize plant products, primary metabolites & marine drugs.	K2	
MEDICINAL CHEMISTRY-I LAB	C226	C226.1	Prepare 1, 3-pyrazole, Benzimidazole, Benztriazole and 2, 3- diphenyl quinoline.	K2	PO1 PO3 PO4 PO6 PO7 PO9 PO10 PO11
		C226.2	Prepare Benzocaine, phenytoin, phenothiazine and Barbiturate.	K2	
		C226.3	Perform the assay of chlorpromazine, phenobarbitone and atropine.	K2	
		C226.4	Identify the percentage purity of ibuprofen, aspirin and furosemide.	K2	
		C226.5	Determine the partition coefficient of any two drugs.	K2	
PHYSICAL PHARMACEUTICS-II LAB	C227	C227.1	Estimate the HLB value and critical micellar concentration of surfactants	K5	PO1 PO3 PO4 PO6 PO7 PO9 PO10 PO11
		C227.2	Study and relate the accelerated stability testing of tablet formulations.	K2	
		C227.3	Examine the viscosity of different liquids using Ostwald's viscometer.	K4	
		C227.4	Determine the sedimentation volume with effect of different suspending agents.	K2	
		C227.5	Determine the first order rate constant associated with decomposition of pharmaceuticals.	K2	
PHARMACOLOGY-I LAB	C228	C228.1	Explain the various instruments and common laboratory techniques used in pharmacology lab.	K2	PO1 PO2 PO3 PO4 PO5 PO6
		C228.2	Outline the maintenance of laboratory animals as per CPCSEA guidelines	K2	
		C228.3	Demonstrate the administration of drugs through various routes and effects of drugs	K3	

			on rabbit eye and study of local anaesthetics.		PO7 PO8 PO9 PO10 PO11
		C228.4	Illustrate the effect of the hepatic microsomal enzyme inducers on the phenobarbitone sleeping time in mice and ciliary motility of frog oesophagus.	K3	
		C228.5	Summarize the skeletal muscle relaxant activity, locomotor activity, anticonvulsant effect, anticatatonic activity and anxiolytic activity of drugs.	K2	
PHARMACOGNOSY AND PHYTOCHEMISTRY-I/LAB	C229	C229	Perform the Analysis of crude drugs by chemical tests: (i)Tragaccanth (ii) Acacia (iii)Agar (iv) Gelatin (v) starch (vi) Honey (vii) Castor oil	K3	PO1 PO3 PO4 PO6 PO7 PO9 PO10 PO11
		C229	Summarize the determination of stomatal number and index, vein islet number, vein islet termination and paliside ratio of crude drugs.	K3	
		C229	Apply methods determination of size of starch grains, calcium oxalate crystals by eye piece micrometer and Determination of Fiber length and width of crude drugs	K3	
		C229	Demonstrate the determination of numberof starch grains by Lycopodium spore method	K3	
		C229	Perform the determination of Ash value, Extractive values, moisture content, swelling index and foaming index of crude drugs	K3	
GENDER SENSITIZATION LAB	C2210	C2210.1	Explain the importance of gender sensitization, gender issues and relationships.	K2	PO1 PO3 PO4 PO6 PO7 PO8 PO9 PO10 PO11
		C2210.2	Describe the demographic consequences due to declining sex ratio and understand gender spectrum.	K2	
		C2210.3	Discuss the concept of sharing the load and role of women in economics and politics.	K2	
		C2210.4	Summarize the laws that protect women from sexual harassment and domestic violence at work place.	K2	
		C2210.5	Explain the concept of co-existence.	K2	

BACHELOR OF PHARMACY-III/I SEMESTER					
MEDICINAL CHEMISTRY -II	C 311	C311.1	Explain the synthesis, MOA, SAR and usesof antihistamines and anti-neoplastic agents with examples.	K2	PO1 PO3 PO4 PO6 PO7 PO8 PO9 PO10 PO11
		C311.2	Discuss the synthesis, MOA, SAR and usesof anti-anginal agents, diuretics and anti-hypertensive agents with examples.	K2	
		C311.3	Summarize on classification, Synthesis, MOA, SAR and uses of anti-arrhythmic drugs, anti-hyperlipidemic agents, coagulants & anticoagulants and drugs used in congestive heart failure.	K2	
		C311.4	Generalize the nomenclature, Stereochemistry, metabolism and uses of steroids, thyroid and anti-thyroid agents.	K2	
		C311.5	Summarize on classification, Synthesis, MOA, SAR and uses of anti-diabetic agents and local anesthetics.	K2	
INDUSTRIAL PHARMACY -I	C 312	C312.1	Describe the different types of pre-formulation studies.	K2	PO1 PO2 PO3 PO4 PO5 PO6 PO7 PO8 PO9 PO10 PO11
		C312.2	Explain about tablets and tablet coating methods.	K4	
		C312.3	Discuss the hard and soft gelatin capsules.	K2	
		C312.4	Outline the parenteral products and ophthalmic preparations.	K2	
		C312.5	Explain about manufacturing of aerosols, cosmetics and packing materials.	K4	
PHARMACOLOGY-II	C 313	C313.1	Discuss the pharmacology of different cardiovascular drugs.	K2	PO1 PO2 PO3 PO4 PO5 PO6 PO7 PO8 PO9 PO10 PO11
		C313.2	Explain the pharmacology of drugs acting on hematopoietic system and urinary system.	K2	
		C313.3	Discuss different autocoids and related drugs.	K2	
		C313.4	Generalize the basic concepts of endocrine pharmacology.	K2	
		C313.5	Summarize the basic principles, methods and applications of bioassays.	K2	
PHARMACOGNOSY AND PHYTOCHE	C 314	C314.1	To understand how secondary metabolites are formed from primary metabolites, metabolic pathways & study of utilization	K3	PO1 PO3 PO4

MISTRY-II			of radioactive isotopes in the investigation biogenetic studies		PO6 PO7 PO9 PO10 PO11
		C314.2	To know the modern methods of extraction, characterization & identification of the herbal drugs and phytoconstituents	K3	
		C314.3	To understand the preparation & development of herbal formulations.	K3	
		C314.4	To understand the herbal drug interactions	K3	
		C314.5	To carryout isolation & identification of phytoconstituents	K3	
GENERIC PRODUCT DEVELOPMENT	C315	C315.1	Describe the generic drug product development and its amendments.	K1	PO1 PO2 PO3 PO4 PO5 PO6 PO7 PO8 PO9 PO10 PO11
		C315.2	Summarize the dosage forms design, product development steps, formulae optimization and process optimization.	K2	
		C315.3	Outline various analytical techniques for verification and validation of active ingredients.	K2	
		C315.4	Explain about the stability studies of active ingredient, finished dosage forms and scale up techniques.	K2	
		C315.5	Discuss the Bioequivalence studies, designs, electronic Common Technical Documents and Drug product approval process.	K2	
INDUSTRIAL PHARMACY-I/LAB	C316	C316.1	Identify the role of pharmacist in pharma industry.	K2	PO1 PO2 PO3 PO4 PO5 PO6 PO7 PO8 PO9 PO10 PO11
		C316.2	Describe pre-formulation studies for prepared granules.	K2	
		C316.3	Evaluate prepared tetracycline capsules.	K4	
		C316.4	Evaluate preapared paracetamol tablets.	K4	
		C316.5	Explain concept of preparation of creams.	K4	
PHARMACOLOGY-II/LAB	C317	C317.1	Demonstrate the effect of various drugs on isolated tissue preparations.	K2	PO1 PO2 PO3 PO4 PO5 PO6
		C317.2	Interpret the effect of physostigmine and atropine on DRC of acetylcholine.	K2	
		C317.3	Calculate PA2 and PD2 values of various drugs.	K3	

		C311.4	Infer the results from bioassays of different drugs by following different methods.	K2	PO7 PO8 PO9 PO10 PO11
		C311.5	Apply various *in vitro* methods to evaluate anti inflammatory and analgesic activity.	K3	
PHARMACOGNOSY AND PHYTOCHEMISTRY-II/LAB	C318	C318.1	Carryout the morphology, histology & powder characteristic & extraction & identification of some crude drugs	K2	PO1 PO3 PO4 PO6 PO7 PO9 PO10 PO11
		C318.2	Perform exercise involving in isolation & identification & detection of active principles from crude drugs.	K2	
		C318.3	To understand the separation of sugars by paper chromatography & TLC of herbal extract	K2	
		C318.4	Carryout the distillation of volatile oils & detection of phytoconstituents by TLC.	K2	
		C318.5	Analyze some crude drugs by different chemical tests	K2	
ENVIRONMENTAL SCIENCES	C319	C319.1	Summarize about Ecosystem and its functions.	K2	PO1 PO2 PO3 PO4 PO5 PO6 PO7 PO8 PO9 PO10 PO11
		C319.2	Summarize about the natural resources	K2	
		C319.3	Summarize about Biodiversity and Biotic resources	K2	
		C319.4	Explain about Environmental pollution and control technologies.	K3	
		C319.5	List out the Environmental policy, Legislation& EIA	K2	
BACHELOR OF PHARMACY-III/II SEMESTER					
MEDICINAL CHEMISTRY-III	C321	C321.1	Summarize about basic consideration of Beta-Lactam antibiotics Aminoglycosidesand Tetracyclines	K2	PO1 PO3 PO4 PO6 PO7 PO9 PO10 PO11
		C321.2	Explain structure, classification and MOA and synthesis of drugs acting on Macrolide, Antimalarials and Quinolines	K2	
		C321.3	Explain structure, classification, MOA and synthesis of drugs acting on Anti- tubercular Agents, Antiviral agents and Quinolones	K2	
		C321.4	Explain structure, classification, MOA and synthesis of drugs acting on Antifungal agents, Anthelmintics and Sulphonamides	K2	

		C321.5	Summarize about basic consideration of drug design and Combinatorial Chemistry	K2	
PHARMACOLOGY-III	C322	C322.1	Illustrate the pharmacology of drugs acting on Respiratory system and Gastrointestinal Tract.	K4	PO1 PO2 PO3 PO4 PO5 PO6 PO7 PO8 PO9 PO10 PO11
		C322.2	Explain general principles of chemotherapy and chemotherapy of various antibiotics	K4	
		C322.3	Outline the chemotherapy used in the treatment of various diseases.	K4	
		C322.4	Write the chemotherapy preferred in UTIs, STDs and malignancy, immunopharmacology and Protein drugs, monoclonal antibodies, target drugs to antigen, biosimilars.	K3	
		C322.5	Demonstrate various toxicities, principles of treatment, Clinical symptoms and management of various poisonings.	K3	
HERBAL DRUG TECHNOLOGY	C323	C323.1	To carry out preliminary phytochemical screening of crude drugs and evaluate excepients of natural origin	K3	PO1 PO3 PO4 PO6 PO7 PO9 PO10 PO11
		C323.2	To prepare and standardize the extract used in cosmetics formulation like creams, lotions, syrups, mixtures and evaluate as per pharmacopoeia requirements.	K3	
		C323.3	To report the monograph analysis of herbal drugs from recent pharmacopoeias and determination of aldehyde content	K3	
		C323.4	To estimate the phenolic content in the given sample.	K3	
		C323.5	To determine total alkaloids in the givensample	K3	
BIOPHARMACEUTICS AND PHARMACOKINETICS	C324	C324.1	Explain the fundamental principles of absorption and distribution of drugs.	K2	PO1 PO2 PO3 PO4 PO5 PO6 PO7 PO8 PO9 PO10 PO11
		C324.2	Summarize the principle involved in elimination of drugs. Explain objectives and various methods used in bioavailability and bioequivalence studies.	K2	
		C324.3	Explain pharmacokinetics models and summarize the equations for one compartment open model	K2	
		C324.4	Explain the principles involved in multi compartment model	K2	
		C324.5	Explain fundamental principles of non	K2	

			linear pharmacokinetics and biotranformation of drugs		
PHARMACEUTICAL BIOTECHNOLOGY	C325	C325.1	Explain about the basics of biotechnology, enzyme immobilization, biosensors, production of enzymes, protein engineering and genetic engineering.	K2	PO1 PO2 PO3 PO4 PO5 PO6 PO7 PO8 PO9 PO10 PO11
		C325.2	Summarize the rDNA technology, interferon, vaccines, hormones and types of immunity.	K2	
		C325.3	Outline various structures of immunoglobulins, MHC, hypersensitivity reactions and hybridoma technology.	K2	
		C325.4	Explain the concept of immunoblotting techniques, genetic organization of eukaryotes, prokaryote, microbial genetics and microbial biotransformation.	K2	
		C325.5	Discuss about the mutations, fermentation methods, design and large scale production, Production of antibiotics and vitamins.	K2	
MEDICINAL CHEMISTRY-III/LAB	C326	C326.1	The synthesis of Chlorobutanol , Triphenyl imidazole, Tolbutamide and Hexamine	K3	PO1 PO3 PO4 PO6 PO7 PO9 PO10 PO11
		C326.2	The qualitative estimations of sonicotinic acid hydrazide,Chloroquine, Metronidazole, Dapsone,Chlorpheniraminemaleate,Benzyl penicillin	K3	
		C326.3	The synthesis of Paracetamol and Sulphanilamide by using Microwave irradiation technique.	K3	
		C326.4	Interpret structures and reactions using chem draw	K3	
		C326.5	Interpret 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	K3	
PHARMACOLOGY-III/LAB	C327	C327.1	Report Dose calculation, Anti-allergic activity, anti-ulcer activity, effect of drugs on gastrointestinal motility.	K3	PO1 PO2 PO3 PO4 PO5 PO6 PO7
		C327.2	Estimate serum biochemical parameters and effect of drugs on guinea pig ileum.	K4	
		C327.3	Analyse acute oral toxicity (LD50), acute eye, skin irritation / corrosion of a test	K4	

			substance		PO8
		C327.4	Appraise saline purgative effect, Insulin hypoglycaemic effect and Test for pyrogens	K4	PO9 PO10 PO11
		C327.5	Compute various pharmacokinetic parameters and Biostatistics methods in experimental pharmacology	K3	
HERBAL DRUG TECHNOLOGY/LAB	C328	C328.1	To carry out preliminary phytochemical screening of crude drugs and evaluate excepients of natural origin	K3	PO1 PO3 PO4 PO6 PO7 PO9 PO10 PO11
		C328.2	To prepare and standardize the extract used in cosmetics formulation like creams, lotions, syrups, mixtures and evaluate as per pharmacopoeia requirements.	K3	
		C328.3	To report the monograph analysis of herbal drugs from recent pharmacopoeias and determination of aldehyde content	K3	
		C328.3	To estimate the phenolic content in the given sample.	K3	
		C328.4	To determine total alkaloids in the given sample	K3	
HUMAN VALUES AND PROFESSIONAL ETHICS	C329	C329.1	Analyze to understand the need, basic content and process of Value Education, self- exploration and satisfaction.	K3	PO1 PO2 PO3 PO4 PO5 PO6 PO7 PO8 PO9 PO10 PO11
		C329.2	To identify the appropriate ethical principles and moral developments of physical needs.	K4	
		C329.3	Ability to identify the foundational values in relationship to Trust and Respect in pharmacy profession.	K4	
		C329.4	Enables a strategy to identify work place rightsand responsibilities for Research and commission bodies.	K3	
		C329.5	To identify the scope and characteristics of global issues in professional ethics for people friendly and ecofriendly production systems	K3	
BACHELOR OF PHARMACY-IV/I SEMESTER					
INSTRUMENTAL METHODS OF ANALYSIS	C411	C411.1	Explain theory principle instrumentation and applications of UV & Visible Spectrophotometer and Flourimetry.	K2	PO1 PO3 PO4 PO6 PO7 PO8 PO9 PO10
		C411.2	Explain theory principle instrumentationand applications of IR Spectrophotometer and AAS.	K2	
		C411.3	Explain theory principle instrumentation and applications of NMR.	K2	

					PO11
		C411.4	Explain theory principle instrumentation and applications of Mass Spectrometry.	K2	
		C411.5	Outline the principle involved in GC, HPLC, HPTLC, Electrophoresis, ORD Curves, RIA and ELISA.	K2	
INDUSTRIAL PHARMACY -II	C412	C412.1	Understand general and dosage form related pilot plant scale up considerations along with SUPAC guidelines and would be able to solve the problems related to pilot plant.	K3	PO1 PO2 PO3 PO4 PO6 PO7 PO9 PO10 PO11
		C412.2	To know various terminologies and WHO guidelines for technology transfer and understand technology transfer from lab scale to commercial scale	K3	
		C412.3	To understand different laws and acts that regulate pharmaceutical industry in India and US and Understand the approval process and regulatory requirements for drug products	K3	
		C412.4	Know the basic concepts of Quality management along with quality management tools and their influence, and how to apply them at the work place	K2	
		C412.5	To understand the regulatory requirements of new drug approval procedures and know the structure of CDSCO, SDCO along with central and state regulatory authorities.	K3	
PHARMACY PRACTICE	C413	C413.1	Apply the knowledge of organizational structure and management of hospital and community pharmacy.	K3	PO1 PO2 PO3 PO4 PO5 PO6 PO7 PO8 PO9 PO10 PO11
		C413.2	Represent drug distribution methods in hospital, therapeutic drug monitoring, community pharmacy management.	K3	
		C413.3	Summarize about Drug information services, Patient counseling, Education and training program in the hospital.	K3	
		C413.4	Illustrate about OTC sales and drug therapy monitoring.	K3	
		C413.5	Apply the knowledge of drug strore management and inventory control.	K3	
NOVEL DRUG	C41	C414.1	Explain designs of controlled release dosage forms, Discuss various designs of controlled	K2	PO1 PO2

DELIVERY SYSTEMS	4		release formulation, classify polymers, and understand criteria for selection of drugs and polymers.		PO3 PO4 PO5 PO6 PO7 PO8 PO9 PO10 PO11
		C414.2	Explain methods of microencapsulation, concept of mucoadhesion, explain permeability and formulation consideration of buccal delivery system.	K2	
		C414.3	Explain permeation through skin, understanding approaches for GRDDS, Explain nasal and pulmonary routes of drug delivery.	K2	
		C414.4	Concept approaches for targeted drug delivery systems, explain about liposomes, niosomes, nanoparticles, monoclonal antibody.	K2	
		C414.5	Explain intraocular barriers, preliminary studies, ocular formulations and occuserts, IUT development and application	K2	
PHARMACO VIGILANCE	C 415	C415.1	Discuss the basic establishing principles of pharmacovigilance and classification, assessment of ADR'S	K2	PO1 PO2 PO3 PO4 PO5 PO6 PO7 PO8 PO9 PO10 PO11
		C415.2	Distinguish various classes and resources of drugs and diseases	K4	
		C415.3	Illustrate various surveillance and reporting methods in pharmacovigilance	K3	
		C415.4	-Explain the ICH regulatory guidelines of Pharmacovigilance and discuss new drug development process	K2	
		C415.5	Identify individualized therapeutic plans and drug safety in special population	K3	
INSTRUMENTAL METHODS OF ANALYSIS/LAB	C 416	C416	Students would be able to know about absorption maxima and effects of solvents on absorption maxima of organic compounds, estimation of dextrose by colorimetry and also estimation of sulfanilamide by colorimetry	K4	PO1 PO2 PO3 PO4 PO5 PO6 PO7 PO8 PO9 PO10 PO11
		C416	Students would be able to learn estimation of ibuprofen and paracetamol by UV-spectroscopy, Assay of paracetamol by UV-spectroscopy, estimation of quinine sulfate by Fluorimetry.	K4	
		C416	Students would able to learn about quenching of fluorescence, determination of sodium and potassium by flame	K4	

			photometry.		
		C416	To know about determination of chlorides and sulphates by nephelo turbidometry, separation of amino acids by paper chromatography and separation of sugars by thin layer chromatography.	K4	
		C416	Students would be able to know the separation of plant pigments by column chromatography, demonstration experiment on HPLC and Gas chromatography.	K4	
BACHELOR OF PHARMACY-IV/II SEMESTER					
BIOSATISTICS AND RESEARCH METHODOLOGY	C421	C421.1	Compute and interpret the Karl Pearson's correlation coefficient and test the significance	K3	PO3 PO4 PO9 PO11
		C421.2	Solve the fundamentals of the most parametric techniques for statistical inference	K3	
		C421.3	Create a frequency table, histogram, pie chart to represent a data set	K5	
		C421.4	Execute and interpret different software using Excel, SPSS, MINITAB, DOE and R-online software	K3	
		C421.5	Design and Analysis of Experiments-Factorial design, Response surface Methodology and central composite design	K5	
SOCIAL AND PREVENTIVE PHARMACY	C422	C422.1	Practice the Balanced diet and maintain Personal Hygiene	K3	PO6 PO7 PO9
		C422.2	How we can Prevent and control the diseases	K1	
		C422.3	Explain the National Health Programmes, Its objective ,functions ,outcomes	K2	
		C422.4	To Build Awareness in the National Health Programmes	K3	
		C422.5	Explain the Community Services in Rural, Urban and School health	K2	
PHARMACEUTICAL JURISPRUDENCE	C423	C423.1	Summarize the schedules, act and rules, import of drugs, conditions for the grant of different licences.	K2	PO1 PO2 PO3 PO4 PO5 PO6 PO7 PO8
		C423.2	Explain the schedules, sale of drugs, and administration bodies to the act.	K2	
		C423.3	Sketch on the objectives of pharmacy act, MATP act, NDPS act, and explain the pharmacy act, MATP act, NDPS act	K3	

		C423.4	Explain the objectives, offences and penalities of magic remedies act, prevention of cruelty to animal act, and about DPCO act, NLEM	K2	PO9 PO10 PO11
		C423.5	Discuss about the study of pharmaceutical legislations and ethics, medical termination of pregnancy act, right to information act, IPR	K2	
NANO TECHNOLOGY	C 424	C424.1	Define nano technology and list out sizes of nano materials	K1	PO1 PO2 PO3 PO4 PO5 PO6 PO7 PO8 PO9 PO10 PO11
		C424.2	Discuss the synthesis of nano materials	K2	
		C424.3	Describe the applications of nano technology	K2	
		C424.4	Explain the nano materials for drug delivery systems	K2	
		C424.5	Write the characterization ,drug release and stability of nano materials	K3	