



RATNAM INSTITUTE OF PHARMACY

(Approved by A.I.C.T.E. & P.C.I., New Delhi, Govt. of A.P., Affiliated to J.N.T. University, Anantapur.

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PROGRAM OUTCOMES (POs) FOR ALL PROGRAMMES

PO No.	PROGRAM OUTCOMES (POs)	
PO1	Pharmacy Knowledge	Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including medical sciences; pharmaceutical sciences; behavioural, social, and administrative pharmacy sciences; and manufacturing practices.
PO2	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.
PO3	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.
PO4	Modern tool usage	Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.
PO5	Leadership skills	Understand and consider the human reaction to change, motivation issues, leadership and team-building when planning changes required for fulfillment of practice, professional and societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and well-being.
PO6	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).
PO7	Pharmaceutical Ethics	Honour personal values and apply ethical principles in professional and social contexts. Demonstrate behavior that recognizes cultural and personal variability in values, communication and lifestyles. Use



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		ethical frameworks; apply ethical principles while making decisions and take responsibility for the outcomes associated with the decisions.
PO8	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.
PO9	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.
PO10	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.
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. Self-assess and use of feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis.



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PROGRAM: B PHARMACY (R19) (Batch 2019-2023)

COURSE OUTCOMES (COs)

I year I semester

Course/Subject name	Course Code	Course Outcome number	Course Outcome
Human Anatomy and Physiology I	BP101T	Upon completion of the course, student will be able to	
		CO1	Explain the gross morphology, structure, functions of various organs/ systems of the human body
		CO2	Describe various homeostatic mechanisms & their imbalances
		CO3	Identify various tissues and organs of different systems of human body
		CO4	Demonstrate various experiments related to systems & specific senses of body
		CO5	Interpret coordinated working pattern of different organs of each system
Pharmaceutical Analysis I	BP102T	Upon completion of the course, student will be able to	
		CO1	Prepare different concentrations of solutions
		CO2	Conduct various volumetric titrations
		CO3	Perform different analytical titrations
		CO4	Perform different electrochemical methods of analysis



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		CO5	Apply various procedures involved in titrations of electrochemical methods
Pharmaceutics - I	BP103T	Upon completion of the course, student will be able to	
		CO1	Illustrate the history of Profession of Pharmacy and Pharmacopoeias
		CO2	Explain different dosage forms, pharmaceutical incompatibilities and calculations
		CO3	Describe the parts of Prescription and handling of Prescription
		CO4	Prepare conventional dosage forms according to standard formula of IP
		CO5	Explain factors affecting Posology and Pediatric dose calculations
Pharmaceutical Inorganic Chemistry	BP104T	Upon completion of the course, student will be able to	
		CO1	Explain the importance of pharmacopoeia in medicines preparation and discuss the methods to determine & purification techniques of the impurities
		CO2	Describe in detail about the importance & applications of acid bases & buffers
		CO3	Explain in detail about gastrointestinal agents
		CO4	Discuss in detail about miscellaneous agents/ pharmaceutical agents
		CO5	Describe the applications of the radiopharmaceuticals
Communication skills	BP105T	Upon completion of the course, student will be able to	
		CO1	Summarize communication skills
		CO2	Evaluate elements and styles of communication (verbal & non-verbal)
		CO3	Develop basic listening skills and effective written communication
		CO4	Analyze interview skills (Do's and Dont's)and plan the presentations
		CO5	Develop and defend in Group Discussion for enhancing leadership qualities
Remedial Mathematics	BP106RM T	Upon completion of the course, student will be able to	
		CO1	Solve the different types of pharmaceutical problems by applying Partial Fractions,



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			Logarithms, Functions & Limits
		CO2	Choose proper methods of matrices and determinants to solve pharmacokinetic equations
		CO3	Differentiate the different types of problems by applying the derivatives
		CO4	Solve the different types of problems by using the concept of straight lines and integrations
		CO5	Evaluate the method of solving the differential equations and Laplace transforms to solve chemical kinetics and pharmacokinetics equations

I year II semester

Course/Subject name	Course Code	Course Outcome number	Course Outcome
Human Anatomy and Physiology II	BP201T	Upon completion of the course, student will be able to	
		CO1	Explain the structure and functions of various systems of the human body
		CO2	Describe various homeostatic mechanisms and their imbalances, which cause diseases/ disorders in human body
		CO3	Perform haematological tests and record BP, heart rate, pulse and respiratory volumes
		CO4	Identify and describe various tissues and organs of different systems of human body
		CO5	Explain the concepts related to genetics
Pharmaceutical Organic Chemistry-I	BP202T	Upon completion of the course, student will be able to	
		CO1	Explain Nomenclature, Isomerism, types of organic reactions
		CO2	Describe about alkanes, alkenes, conjugated dienes



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		CO3	Explain about alkyl halides, alcohols reactions
		CO4	Summarize carbonyl compounds
		CO5	Illustrate carboxylic acids, aliphatic amines reactions
Biochemistry	BP203T	Upon completion of the course, student will be able to	
		CO1	Explain importance of metabolic pathways of Carbohydrates metabolism
		CO2	Describe Lipid metabolism and its importance
		CO3	Explain metabolic pathways of Amino acid metabolism
		CO4	Describe Nucleic acid metabolism and its importance
		CO5	Illustrate the importance of Enzymes
Pathophysiology	BP204T	Upon completion of the course, student will be able to	
		CO1	Describe the etiology and pathogenesis of selected diseases and process of injury and inflammation
		CO2	Explain about signs and symptoms of the disease
		CO3	Compare and contrast pathophysiological aspects of various diseases
		CO4	Apply the knowledge of pathophysiology for safe practice of medicine
		CO5	Decide rational and effective drug use
Computer Applications in Pharmacy	BP205T	Upon completion of the course, student will be able to	
		CO1	Use Basic Number Systems and concept of information systems and softwares
		CO2	Compare Web Technologies (HTML, XML, CSS, etc)
		CO3	Apply the knowledge of Computers in Pharmacy
		CO4	Summarize Bioinformatics and its applications
		CO5	Integrate computer data analysis in Pre-clinical Development



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II year I semester			
Course/Subject name	Course Code	Course Outcome number	Course Outcome
Pharmaceutical Organic Chemistry-II	BP301T	Upon completion of the course, student will be able to	
		CO1	Explain the chemical aspects and reactions of organic compounds
		CO2	Interpret the methods of preparation and properties of organic compounds
		CO3	Describe the aromaticity and reactivity of the heterocyclic compounds
		CO4	Summarize the medicinal uses and other applications of polynuclear aromatic Hydrocarbons
		CO5	Describe the stability and reactivity of cycloalkanes
Physical Pharmaceutics-I	BP302T	Upon completion of the course, student will be able to	
		CO1	Compare States of matter; explain properties of matter and physicochemical properties of drug molecules
		CO2	Analyze solubility of drugs, dissolution, diffusion and distribution of drugs
		CO3	Analyze properties of powders, particles depending on their sizes and distribution
		CO4	Illustrate the concept of Complexation and protein binding
		CO5	Explain about p^H , buffers and isotonic solutions
Pharmaceutical Microbiology	BP303T	Upon completion of the course, student will be able to	
		CO1	Describe the scope of Microbiology, importance of microorganisms, nutritional



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			requirements, Isolation and preservation methods
		CO2	Choose proper identification test, sterilization and disinfection method, evaluation of sterilization by performing sterility testing
		CO3	Describe the morphology, classification, reproduction, replication of fungi and virus, factors affecting disinfection, evaluation
		CO4	Explain importance of aseptic area, laminar air flow, sources of contamination, methods of standardization of antibiotics, vitamins and aminoacids
		CO5	Describe various types of spoilage, factors affecting preservation of pharmaceutical products, concepts of animal cell culture methods and applications
Pharmaceutical Engineering	BP304T	Upon completion of the course, student will be able to	
		CO1	Illustrate various operations used in Pharma industry
		CO2	Demonstrate material handling techniques
		CO3	Apply various process involved in Pharma industry
		CO4	Perform various tests to prevent pollution
		CO5	Construct plant layout, design for optimum use of resources

II year II semester

Course/Subject name	Course Code	Course Outcome number	Course Outcome
Pharmaceutical Organic	BP401T	Upon completion of the course, student will be able to	



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Chemistry-III		CO1	Explain the methods of preparation and properties of organic compounds
		CO2	Describe the stereo chemical aspects and reactions of organic compounds
		CO3	Describe the aromaticity and reactivity of the heterocyclic compounds
		CO4	Summarize medicinal uses and other applications of organic compounds
		CO5	Describe the named reactions and synthetic importance
Medicinal Chemistry I	BP402T	Upon completion of the course, student will be able to	
		CO1	Explain the importance of SAR towards pharmacology
		CO2	Describe in detail about metabolic reactions (phase-I & phase-II)
		CO3	Discuss the structure, chemistry & pharmacology of the drugs
		CO4	Describe the synthesis of important drugs
Physical Pharmaceutics-II	BP403T	Upon completion of the course, student will be able to	
		CO1	Describe the Reaction kinetics, reaction order, factors affecting the rate of reaction and stability testing
		CO2	State the derived flow properties of powders and understand the flow behavior of fluids and formulation development
		CO3	Explain the formulation concepts of Pharmaceutical Suspensions and Emulsion; and their stability problems
		CO4	Describe the role of Surfactants and interfacial phenomenon in formulation development
		CO5	Discuss the concept of Colloids and methods to determine the particle size in formulation development
		Upon completion of the course, student will be able to	
Pharmacology - I	BP404T	Upon completion of the course, student will be able to	



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		CO1	Describe the pharmacological aspects of drugs falling under various categories
		CO2	Appreciate the importance of pharmacology subject in clinical aspects
		CO3	Apply the Pharmacology knowledge of drugs therapeutically
		CO4	Demonstrate the Pharmacology of drugs acting on CNS, ANS
		CO5	Illustrate the concept of drug dependance, tolerance and addiction
Pharmacognosy and Phytochemistry-I	BP405T	Upon completion of the course, student will be able to	
		CO1	Describe the history of pharmacognosy, classification of drugs, and quality control of drugs
		CO2	Illustrate the principles and production of plant cultivation, collection, processing, and storage of drugs of natural origin
		CO3	Describe plant tissue culture
		CO4	Explain the role of pharmacognosy in Ayurveda, Unani, siddha and homeopathy and Chinese systems
		CO5	Explain about primary metabolites

III year I semester

Course/Subject name	Course Code	Course Outcome number	Course Outcome
Medicinal Chemistry II	BP501T	Upon completion of the course, student will be able to	
		CO1	Depict synthetic routes of important medicinal agents
		CO2	Interpret the chemistry of drugs with pharmacological activity



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		CO3	Describe the structure activity relationship and different classes of drugs
		CO4	Differentiate the metabolic Pathways and therapeutic value of drugs
		CO5	Integrate various classes of drugs molecules
Industrial Pharmacy - I	BP502T	Upon completion of the course, student will be able to	
		CO1	Demonstrate the various Pre-formulation parameters for Formulation development
		CO2	Compare the various pharmaceutical dosage forms and their manufacturing techniques
		CO3	Discriminate various considerations in development of pharmaceutical dosage forms
		CO4	Formulate solid, liquid, liquid orals and sterile dosage forms
		CO5	Evaluate various dosage forms like solid, liquid, liquid orals, sterile products and packaging materials
Pharmacology II	BP503T	Upon completion of the course, student will be able to	
		CO1	Explain the mechanism of drug action and its reference in treatment of different diseases
		CO2	Demonstrate the isolation of different organs/tissues from the laboratory animals by simulated experiments
		CO3	Demonstrate the various receptor action using isolated tissue preparation
		CO4	Describe the pharmacological aspects of drugs' importance of pharmacology subject as a basis of therapeutics and correlate the knowledge therapeutically
		CO5	Describe the patho-physiology of selected disease states and the rationale for drug therapy and the therapeutic approach to management of these diseases
Pharmacognosy and Phytochemistry - II	BP504T	Upon completion of the course, student will be able to	
		CO1	Analyze the importance of various biosynthetic techniques and importance of their pathways of various constituents



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		CO2	Categorize various phytochemical based on their chemistry and chemical groups
		CO3	Identify various types of metabolites (primary and secondary by the schematic study)
		CO4	Distinguish the difference between various isolations, extractions and various process used for isolations
		CO5	Distinguish various production methods of herbals and relate their utilization in various industries
Pharmaceutical jurisprudence	BP505T	Upon completion of the course, student will be able to	
		CO1	Examine the Pharmaceutical Legislation and code of Pharmaceutical Ethics drafted by PCI
		CO2	Compare the various objectives and legal definitions of Drugs & Cosmetics Act 1940, Pharmacy Act-1948, Medicinal and Toilet preparations Act-1955, Narcotic and Psychotropic substance Act-1985
		CO3	Discriminate various parameters in Drugs & Cosmetics Act 1940, Pharmacy Act-1948, Medicinal and Toilet preparations Act-1955, Narcotic and Psychotropic substance Act-1985
		CO4	Associate the Drugs and Magic Remedies Act, DPCO, National drug policy, Prevention of cruelty to animals Act-1960, Patents & Design Act-1970
		CO5	Compare various Prescription and Non-prescription products
Cosmetic science (Open Elective -I)	BP.C318T	Upon completion of the course, student will be able to	
		CO1	Identify the cosmetic products and cosmetic excipients
		CO2	Describe skincare and oral care, hair care products, and their method of preparation
		CO3	Illustrate the regulations about cosmetics and their excipients
		CO4	Explain the role of herbs in sunscreens and evaluation procedures
		CO5	Describe the creams, antiperspirants, deodorants, and hair care products. Describe alopecia and acne.



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III year II semester			
Course/Subject name	Course Code	Course Outcome number	Course Outcome
Medicinal Chemistry - III	BP601T	Upon completion of the course, student will be able to	
		CO1	Analyze the concept of Computer Aided Drug Discovery
		CO2	Assess structural activity relationship of drugs of therapeutic interest
		CO3	Interpret the chemistry of drugs with respect to their biological activity
		CO4	Design and synthesis of various intermediates and medicinally important compounds
		CO5	Interpret the metabolism, adverse effects and therapeutic value of drugs
Pharmacology - III	BP602T	Upon completion of the course, student will be able to	
		CO1	Compare and contrast the drugs falling under each drug category of Respiratory system and GIT
		CO2	Explain about the pharmacological aspect of different chemotherapeutic drugs
		CO3	Explain about the pharmacological aspect of different Immuno-stimulants, suppressants and other drugs
		CO4	Apply the knowledge of drugs therapeutically in clinical case scenario
		CO5	Apply the knowledge of drugs in treating different types of poisoning
Herbal Drug Technology	BP603T	Upon completion of the course, student will be able to	
		CO1	Describe herbs as raw materials, herbal medicine, and drugs from cultivation to drug products
		CO2	Discuss the cultivation of medicinal plants, pest management in medicinal plants, and the



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			herbal industry
		CO3	Describe nutraceuticals, herbal-drug interactions, cosmetics, excipients, and formulations
		CO4	Explain the process of evaluating drugs, patenting, regulatory requirements of natural products, and regulatory issues
		CO5	Discuss good manufacturing practices, objectives, SOP documentation, infrastructural requirements, and records
Biopharmaceutics and Pharmacokinetics	BP604T	Upon completion of the course, student will be able to	
		CO1	Describe the basic concepts of Bio-pharmaceutics and Pharmacokinetics and their application in dosage form formulation and evaluation
		CO2	Calculate Pharmacokinetic parameters (ADME) from the data- Calculation of Half-life, K_E , K_a , V_d etc.
		CO3	Categorize the different factors relating to ADME of drugs
		CO4	Categorize the different compartment models (one, two, multi), Non- compartment, Non Linear pharmacokinetics & derive the equations
		CO5	Calculate Dissolution parameters of drugs & Measurement of Bioavailability, Compare BA, BE of two drug products
Pharmaceutical Biotechnology		Upon completion of the course, student will be able to	
		CO1	Explain the role of biotechnology in pharmaceutical sciences, including enzyme biotechnology, biosensors, and protein engineering
		CO2	Describe genetic engineering principles, cloning vectors, and recombinant DNA technology, with applications in medicine like vaccine and hormone production.
		CO3	Understand immune mechanisms, hypersensitivity reactions, vaccine preparation, and



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			hybridoma technology.
		CO4	Apply immunoblotting techniques and microbial genetics concepts, including transformations, transductions, and microbial biotransformations.
		CO5	Analyze fermentation processes, large-scale production of pharmaceuticals, and methods for blood product collection and storage.
Pharmaceutical Quality Assurance	BP606T	Upon completion of the course, student will be able to	
		CO1	Illustrate concepts, elements, philosophies, objectives with steps of Quality Assurance/QC/GMP/TQM/Principles and procedures of NABL and ISO 9000
		CO2	Summarize personnel responsibilities, plant layout, maintenance of records, equipment, purchase and store of raw materials
		CO3	Explain the QC test of containers, closures, secondary packaging and practices, its requirements
		CO4	Discuss about complaint handling, return of goods and recalling waste, documentation of SOP, audit report, etc
		CO5	Demonstrate principles, procedures of calibration, validation, qualification, good warehousing and material management



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IV year I semester			
Course/Subject name	Course Code	Course Outcome number	Course Outcome
Instrumental Methods of Analysis	BP701T	Upon completion of the course, student will be able to	
		CO1	Perform qualitative and quantitative analysis of drugs
		CO2	Demonstrate various analytic instruments
		CO3	Handle the analytical instruments
		CO4	Apply instrumental methods for analysis of drugs
		CO5	Summarize the principles of instruments
Industrial Pharmacy-II	BP702T	Upon completion of the course, student will be able to	
		CO1	Design the pilot plant and scale-up studies for different types of pharmaceutical dosage forms
		CO2	Perform technology transfer from lab scale to commercial batch
		CO3	Generalize the laws and acts that regulate the pharmaceuticals in India and US



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		CO4	Prepare the quality management system (QMS) and certification of ISO 9000 and ISO 14000 series
		CO5	Apply the Drug Approval Process in India and US
Pharmacy Practice	BP703T	Upon completion of the course, student will be able to	
		CO1	Illustrate the organization of Hospital, Hospital Pharmacy and Community pharmacy
		CO2	Explain Drug distribution system in Hospital, Therapeutic Drug Monitoring and community pharmacy management
		CO3	Summarize Drug information services, Patient counseling and Educational training programs in Hospital
		CO4	Describe Clinical pharmacy and explain about OTC
		CO5	Explain Drug store management and Inventory control
Novel Drug Delivery System	BP704T	Upon completion of the course, student will be able to	
		CO1	Explain different types of Oral Drug Delivery Systems (ODDS), materials employed and evaluation of ODDS
		CO2	Explain different types of Transdermal Drug Delivery Systems (TDDS), materials employed and evaluation of TDDS
		CO3	Describe mechanism of Bioadhesion, mucoadhesive materials, formulation and development of Mucoadhesive Delivery System
		CO4	Explain formulation, evaluation and applications of Liposomes, Resealed Erythrocytes and Nanoparticles
		CO5	Discuss the principle and fabrication of IUD/injections/implants



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IV year II semester			
Course/Subject name	Course Code	Course Outcome number	Course Outcome
Biostatistics and Research Methodology	BP801T	Upon completion of the course, student will be able to	
		CO1	Evaluate and apply the methods of measuring central tendency, dispersion and correlation
		CO2	Choose a proper method of testing hypothesis to solve statistical problems
		CO3	Evaluate the clinical study designs and prepare the reports in pharmaceutical sciences
		CO4	Apply the knowledge of various graphs and softwares in pharmaceutical sciences and clinical trial phases
		CO5	Design and analysis of various factorial designs and optimization of Response Surface Methodology
Social and Preventive Pharmacy	BP802T	Upon completion of the course, student will be able to	
		CO1	Point out various health issues and their challenges
		CO2	Compare various principles of prevention and control of disease
		CO3	Discriminate various National Health Programs
		CO4	Explain the role of the pharmacist in community services
		CO5	Evaluate alternative ways of solving problems related to health and pharmacist issues



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Pharmacovigilance	BP805T	Upon completion of the course, student will be able to	
		CO1	Relate the importance of pre-clinical drug safety assessments and review current requirements for such testing
		CO2	Summarize the risks and analysis of therapeutic products
		CO3	Evaluate the requirement for post-marketing compliance, Pharmacovigilance activities and their contribution to the safety of a therapeutic product
		CO4	Design activities associated with the role of the Pharmacovigilance specialist within a pharmaceutical company
		CO5	Integrate knowledge, skills and experience of Pharmacovigilance and risk profiles
Pharmaceutical Regulatory Science	BP804ET	Upon completion of the course, student will be able to	
		CO1	Describe process of drug discovery
		CO2	Describe process of drug development
		CO3	Choose regulatory authorities (USFDA, Japan, Canada, Europe) governing the manufacture of pharmaceuticals
		CO4	Choose regulatory authorities (USFDA, Japan, Canada, Europe) governing the sale of pharmaceuticals
		CO5	Explain regulatory approval process and registration in Indian and International markets.



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PROGRAM: DOCTOR OF PHARMACY (R17)

COURSE OUTCOMES (COs)

I year

Course/Subject name	Course Code	Course Outcome number	Course Outcome
Human Anatomy and Physiology	17T00101	Upon completion of the course, student will be able to	
		CO1	Describe the structure (gross and histology) and functions of various organs of the human body
		CO2	Describe the various homeostatic mechanisms and their imbalances of various systems
		CO3	Identify the various tissues and organs of the different systems of the human body
		CO4	Illustrate coordinated working pattern of different organs of each system
		CO5	Explain the interlinked mechanisms in the maintenance of normal functioning (homeostasis) of human body
Pharmaceutics	17T00102	Upon completion of the course, student will be able to	
		CO1	Illustrate the history of Profession of pharmacy and Pharmacopoeias
		CO2	Explain different dosage forms, pharmaceutical incompatibilities and pharmaceutical calculations



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		CO3	Describe the parts of Prescription and handling of prescription
		CO4	Prepare conventional dosage forms according to standard formula of I.P.
		CO5	Explain factors affecting P3osology and pediatric dose calculations. Explain Galenicals, Surgical aids
Medicinal Biochemistry	17T00103	Upon completion of the course, student will be able to	
		CO1	Interpret the diagnosed diseases based upon the enzyme deficiencies and analyze the disorder
		CO2	Analyze the metabolic disorders in various disease states
		CO3	Apply the knowledge gained from protein disorder in mutations
		CO4	Reproduce the results from organ function tests & can identify the diseases
		CO5	Perform the qualitative analysis of bio-molecules in body fluids
Pharmaceutical Organic Chemistry	17T00104	Upon completion of the course, student will be able to	
		CO1	Predict the name of different functional group of organic compounds
		CO2	Describe the physical properties of compounds
		CO3	Analyze the different chemical aspects and reactions of organic compounds
		CO4	State the medicinal uses and other applications of important named reactions
		CO5	Analyze preparatory methods of medicinally useful organic compounds
Pharmaceutical Inorganic Chemistry	17T00105	Upon completion of the course, student will be able to	
		CO1	Analyze the accuracy of results in pharmaceutical analysis
		CO2	Perform different volumetric and gravimetric analytical procedures
		CO3	Apply various analytical principles for limit tests
		CO4	Prepare different inorganic pharmaceuticals as per monograph



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		CO5	Differentiate and define individual inorganic pharmaceutical formulations and radio pharmaceuticals
Remedial Mathematics	17T00106	Upon completion of the course, student will be able to	
		CO1	Solve the problems of Matrices and Determinants by applying theory.
		CO2	Solve the problems by using the concept of Trigonometry and Geometry.
		CO3	Differentiate the problems by applying Derivatives.
		CO4	Evaluate the Integration problems by applying theory.
		CO5	Choose a proper method to solve the Differential equations and Laplace transforms.

II year			
Course/Subject name	Course Code	Course Outcome number	Course Outcome
Pathophysiology	17T00201	Upon completion of the course, student will be able to	
		CO1	Describe the etiology and pathogenesis of the selected disease states
		CO2	Name the signs and symptoms of the diseases
		CO3	State the complications of the diseases
		CO4	Describe the mechanism of the diseases
		CO5	Discuss the etiology and pathogenesis of diseases
Pharmaceutical Microbiology	17T00202	Upon completion of the course, student will be able to	
		CO1	Describe the scope of microbiology and role of microorganisms in production of various



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			products
		CO2	Choose proper identification tests, methods for cultivation, isolation and preservation of microorganisms
		CO3	Choose proper sterilization and disinfection process and factors affecting it, importance of sterility testing
		CO4	Evaluate the antibiotics and vitamins by microbiological assay
		CO5	Describe the various infectious diseases, etiology, pathogenesis, test, treatment and control, diagnostic tests
Pharmacognosy & Phytopharmaceuticals	17T00203	Upon completion of the course, student will be able to	
		CO1	Analyze the importance of alternative system of medicine to Allopathic system of medicine
		CO2	Categorize various techniques in cultivation and explain process of cultivation
		CO3	Identify the sources, constituents, uses and other aspects of crude drugs
		CO4	Distinguish original drug to adulterated/ substituted drugs
		CO5	Identify and relate the individual crude drugs according to their micro and macroscopical characters
Pharmacology-I	17T00204	Upon completion of the course, student will be able to	
		CO1	Discuss the pharmacological aspects of drugs falling under various categories
		CO2	Appraise the importance of pharmacology subject as a basis of therapeutics
		CO3	Integrate and apply the knowledge of Pharmacology therapeutically
		CO4	Demonstrate the Pharmacology of drugs acting on various cardio vascular disease, CNS, ANS
		CO5	Illustrate the Pharmacology of Autocoids, Non-steroidal anti-inflammatory agents, anti-



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			gout drugs
Community Pharmacy	17T00205	Upon completion of the course, student will be able to	
		CO1	Discuss the scope, Roles and responsibilities, code of ethics of community pharmacist and use of essential drug concept, rational drug use of community pharmacist
		CO2	Describe about the community pharmacy management site, layout and management skills required in community pharmacy
		CO3	Explain about prescription and OTC Medications, understand possible drug interactions during dispensing of drugs
		CO4	Illustrate the need of inventory control and understand various methods of inventory control approaches
		CO5	Analyze pharmaceutical care, various health screening services, Responding to symptoms of minor ailments, patient counselling and patient medication adherence
Pharmacotherapeutics-I	17T00206	Upon completion of the course, student will be able to	
		CO1	Describe pathophysiology of selected diseases
		CO2	Prepare the individual therapeutic plan
		CO3	Discuss therapeutic approach to management of diseases
		CO4	Prepare factors regarding non-pharmacological approaches
		CO5	Evaluate the patient specific parameters relevant in initiation of drug therapy



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III year			
Course/Subject name	Course code	Course outcome number	Course Outcome
Pharmacology-II	17T00301	Upon completion of the course, student will be able to	
		CO1	Explain and contrast the drugs falling under each category
		CO2	Explain about the pharmacological aspect of different drugs under each category
		CO3	Apply the knowledge of drugs therapeutically in Clinical case scenario
		CO4	Explain and summarize various concepts pertaining to genes and Cells
		CO5	Apply the knowledge of drugs practically and predict the effects of drugs and principles of Bioassay
Pharmaceutical Analysis	17T00302	Upon completion of the course, student will be able to	
		CO1	Identify and analyze the sources of quality variations and prepare different documents for quality review
		CO2	Demonstrate various chromatographic techniques and apply principles of chromatography for separation
		CO3	Perform various electrochemical methods and apply principles of electro chemical methods in Pharma industry
		CO4	Apply principles of spectroscopy for qualitative and quantitative analysis
		CO5	Interpret the result of different spectroscopic methods
Pharmacotherapeutics-II	17T00303	Upon completion of the course, student will be able to	
		CO1	Describe pathophysiology of selected diseases
		CO2	Prepare the individual therapeutic plan



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		CO3	Discuss therapeutic approach to management of diseases
		CO4	Prepare factors regarding non-pharmacological approaches
		CO5	Evaluate the patient specific parameters relevant in initiation of drug therapy
Pharmaceutical Jurisprudence	17T00304	Upon completion of the course, student will be able to	
		CO1	Examine the Pharmaceutical Legislation and code of Pharmaceutical Ethics drafted by PCI
		CO2	Compare the various objectives and legal definitions of Drugs & Cosmetics Act 1940, Pharmacy Act-1948, Medicinal and Toilet preparations Act-1955, Narcotic and Psychotropic substance Act-1985
		CO3	Discriminate various parameters in Drugs & Cosmetics Act 1940, Pharmacy Act-1948, Medicinal and Toilet preparations Act-1955, Narcotic and Psychotropic substance Act-1985
		CO4	Associate the Drugs and Magic Remedies Act, DPCO, National drug policy, Prevention of cruelty to animals Act-1960, Patents & Design Act-1970
		CO5	Compare various Prescription and Non-prescription products
Medicinal Chemistry	17T00305	Upon completion of the course, student will be able to	
		CO1	Explain the importance of drug design and different techniques of drug design.
		CO2	Analyze various heterocyclic which can be used as pharmacologic groups
		CO3	Discuss regarding different drugs to be synthesized which are active.
		CO4	Evaluate & analyze various drugs for adverse effects & measures to reduce toxicity profile of a drug.
		CO5	Describe metabolism of different drugs & design novel drugs.



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Pharmaceutical Formulations	17T00306	Upon completion of the course, student will be able to	
		CO1	Define various pharmaceutical dosage forms based on their classification along with their advantages and disadvantages
		CO2	Formulate dosage forms for eyes, body, skin with fundamentals of pharmaceutical science
		CO3	Select suitable equipment for manufacturing of dosage forms in small and large scale and storage conditions for stability of dosage forms
		CO4	Evaluate Tablets, Capsules, liquid orals, semisolid and parenteral preparations as per standard Pharmacopoeias
		CO5	Describe the concept of Novel drug delivery systems along with their requirements for formulation and evaluation



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IV year			
Course/Subject name	Course Code	Course Outcome number	Course Outcome
Pharmacotherapeutics-III	17T00401	Upon completion of the course, student will be able to	
		CO1	Describe pathophysiology of selected diseases
		CO2	Prepare the individual therapeutic plan
		CO3	Discuss therapeutic approach to management of diseases
		CO4	Prepare factors regarding non-pharmacological approaches
		CO5	Evaluate the patient specific parameters relevant in initiation of drug therapy
Hospital Pharmacy	17T00402	Upon completion of the course, student will be able to	
		CO1	Describe roles and responsibilities of Hospital pharmacist, drug policies and guidelines for Hospital pharmacy
		CO2	Describe organizational structure of Hospital pharmacy and to manage material and budget
		CO3	Describe drug policy and drug committee
		CO4	Design parenteral formulations and powders
		CO5	Prepare a News-letter for providing continuous education and awareness



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Clinical Pharmacy	17T00403	Upon completion of the course, student will be able to	
		CO1	Evaluate drug therapy, ADR and laboratory data
		CO2	Describe the services provided by a clinical pharmacist
		CO3	Assess drug related problems
		CO4	Design protocols to maintain standards in drug therapy and to avoid medication errors
		CO5	Support clinicians by providing drug and poison information
Biostatistics & Research Methodology	17T00404	Upon completion of the course, student will be able to	
		CO1	Design the research methods and experimental design in clinical studies
		CO2	Evaluate and apply the methods of measuring central tendency and spread of data
		CO3	Evaluate the clinical study designs and prepare the reports in pharmaceutical sciences
		CO4	Choose proper method of testing hypothesis for determining the given data
		CO5	Apply the knowledge of various graphs and softwares in pharmaceutical sciences
Biopharmaceutics & Pharmacokinetics	17T00405	Upon completion of the course, student will be able to	
		CO1	Describe the basic concepts of Biopharmaceutics and Pharmacokinetics and their application in dosage form formulation and evaluation
		CO2	Calculate Pharmacokinetic parameters (ADME) from the data- Calculation of Half-life, K_E , K_a , V_d , etc



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		CO3	Categorize the different factors relating to ADME of drugs, different compartment models & derive equations
		CO4	Calculate Dissolution parameters of drugs & Measurement of Bioavailability
		CO5	Classify BCS drugs & Compare BA, BE of drugs
Clinical Toxicology	17T00406	Upon completion of the course, student will be able to	
		CO1	Describe the general principles involved and devise healthcare professionals in the management of poisoning
		CO2	Differentiate the clinical symptoms and explain the management of different acute poisonings
		CO3	Distinguish the clinical symptoms and explain the management of different chronic poisoning by heavy metals
		CO4	Recognize the clinical symptoms and management of envenomation, food poisoning and poisoning by various plants
		CO5	Evaluate, minimize and prevent the substance abuse cases in local population and devise the treatment of dependence

V year			
Course/Subject name	Course Code	Course Outcome number	Course Outcome
Clinical Research	17T00501	Upon completion of the course, student will be able to	



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		CO1	Illustrate the Drug development process and various approaches to drug discovery
		CO2	Explain different phases of Clinical trials, roles and responsibilities of personnel involved in Clinical trials
		CO3	Explain different guidelines (ICH, GCP, CDSCO) and challenges in implementing them
		CO4	Distinguish various regulatory submissions in India, US, Europe
		CO5	List out documentation (Informed consent), data management and safety monitoring in clinical trials
Pharmacoepidemiology and Pharmacoeconomics	17T00502	Upon completion of the course, student will be able to	
		CO1	Discuss the scope and measurement of outcomes in Pharmacoepidemiology
		CO2	Measure the concept of risk in Pharmacoepidemiology
		CO3	Classify methods of Pharmacoepidemiology and sources of data for its studies
		CO4	Explain selected special applications of Pharmacoepidemiology
		CO5	Discuss the history and applications of Pharmacoeconomics and explain the methods used in Pharmacoeconomics
Clinical Pharmacokinetics & Pharmacotherapeutic Drug Monitoring	17T00503	Upon completion of the course, student will be able to	
		CO1	Explain the basic concepts in biopharmaceutics and pharmacokinetics and their significance
		CO2	Explain the use of plasma drug concentration-time data to calculate the pharmacokinetic parameters
		CO3	Summarize the concepts of bioavailability and bioequivalence of drug products and their Significance
		CO4	Discuss various pharmacokinetic parameters, their significance & applications



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		CO5	Demonstrate clear information on compartmental models and methods to assess the models and describe the kinetics of drug absorption, distribution, metabolism, excretion, elimination.
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PROGRAM: M PHARMACY (R22)

PHARMACEUTICS

COURSE OUTCOMES (COs)

I year I Semester

Course/Subject name	Course Code	Course Outcome number	Course Outcome
Modern Pharmaceutics – I (Professional Core – I)	M.PT.C111T	Upon completion of the course, student will be able to	
		CO1	Describe the goals of Preformulation, its parameters, different forms of drugs and selection of drugs
		CO2	Categorize different excipients used in development of Solid dosage forms
		CO3	Compare different Coating techniques and explain about Micro-encapsulation
		CO4	Discuss formulation development of Capsules
		CO5	Choose the optimization techniques in pharmaceutical formulation and process
Applied Biopharmaceutics and Pharmacokinetics (Professional Core – II)	M.PT.C112T	Upon completion of the course, student will be able to	
		CO1	Summarize the various biological and metabolic factors affecting bioavailability and explain the methods of assessment of biological samples to determine bioavailability
		CO2	Determine various pharmacokinetic parameters by using different compartment models
		CO3	Calculate rate of absorption for different kinetic orders



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		CO4	Explain the concept of Non-linear and Clinical pharmacokinetics
		CO5	Analyze Time dependent pharmacokinetics and various Drug interactions
Drug Regulatory Affairs (Professional Elective – I)	M.PT.C114T	Upon completion of the course, student will be able to	
		CO1	Explain different competent Regulatory Authorities globally
		CO2	Apply technical aspects pertaining to the marketing authorization application
		CO3	Compare regulatory guidelines by various regulatory bodies
		CO4	Apply suitable regulatory guidelines for best fit of drug into market
		CO5	Discuss about the records related to pharmaceutical industry departments
Stability of Drugs and Dosage Forms (Professional Elective – II)	M.PT.C118T	Upon completion of the course, student will be able to	
		CO1	Describe Hydrolysis and Acyltransferase: nature of reaction, structure and utility, and stabilization of pharmaceuticals with examples
		CO2	Discuss the kinetics of solid-state decomposition
		CO3	Describe the identification and quantitative determination of various excipients and factors affecting extraction of drugs
		CO4	Explain general methods of analysis to determine the quality of raw materials used in cosmetic industry
		CO5	Discuss methods of analysis to determine the quality of cosmetics in the finished forms
Research Methodology and IPR	M.PT.C119T	Upon completion of the course, student will be able to	
		CO1	Summarize Research problem and sources of research problem
		CO2	Compare different literature studies approaches and analyze Plagiarism and research ethics
		CO3	Infer effective technical writing and write report



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		CO4	Discuss about Patents, Designs, Trade and Copyrights
		CO5	Analyze licensing and technology transfer

I year II Semester

Course/Subject name	Course Code	Course Outcome number	Course Outcome
Modern Pharmaceutics – II (Professional Core – III)	M.PT.C121T	Upon completion of the course, student will be able to	
		CO1	Describe the pilot plant and its scale up techniques used in manufacturing of various pharmaceuticals
		CO2	Discuss the formulation development of Parenteral dosage forms
		CO3	Explain the manufacturing process of Aerosols
		CO4	Describe the manufacturing process of Cosmetics and Nutraceuticals
		CO5	Analyze the Aseptic processing operation
Advanced Drug Delivery Systems (Professional Core – IV)	M.PT.C122T	Upon completion of the course, student will be able to	
		CO1	Explain about Controlled release oral drug delivery systems and Parenteral controlled release drug delivery systems
		CO2	Discuss about Implantable therapeutic systems, Transdermal delivery systems, Ocular, Intrauterine delivery systems and Vaccine delivery
		CO3	Summarize Bioadhesive drug delivery systems, Nasal drug delivery systems and Drug delivery to colon
		CO4	Describe: Liposomes, Niosomes, Microspheres, Nanoparticles and Resealed



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			Erythrocytes
		CO5	Distinguish Drug delivery to Lungs, Brain and targeting Neoplasms
Industrial Pharmacy (Professional Elective – III)	M.PT.C123T	Upon completion of the course, student will be able to	
		CO1	Describe machinery and the theory of pharmaceutical unit operations
		CO2	Discuss principles and production techniques in the large-scale production of various dosage forms
		CO3	Describe the Good Manufacturing Practices (GMP) and Total Quality Management (TQM)
		CO4	Explain the process of effluent analysis, specifications and preventive measures for water, solid, air and sound pollution
		CO5	Discuss regulatory basis, validation process for solid dosage forms, sterile products and liquid dosage forms
Nano based Drug Delivery Systems (Professional Elective – IV)	M.PT.C126T	Upon completion of the course, student will be able to	
		CO1	Explain Nanotechnology. Determine and classify various properties of nanomaterials
		CO2	Summarize various physical, chemical and biological methods for synthesis of nanoparticles (gold, magnetic, polymeric, self-assembly structures)
		CO3	Elaborate about different biomedical applications of nanotechnology
		CO4	Design nanomaterials for different drug delivery (nasal, pulmonary, cancer therapy, cardiovascular diseases, localized drug delivery)
		CO5	Explain different methods of size reduction, size separation and analysis of nanoparticles



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II year I Semester			
Course/Subject name	Course Code	Course Outcome number	Course Outcome
Production area, Design and Packaging Development (Professional Elective – V)	M.PT.C213T	Upon completion of the course, student will be able to	
		CO1	Illustrate Production Area Design and General utilities in production area
		CO2	Explain cGMP used in pharmaceutical industry and its documentation
		CO3	Describe pharmaceutical packaging, components of packaging, label, design research, package development and materials used in packaging
		CO4	Discuss Stability of packaging (Legislation, Regulation and Testing conditions)
		CO5	Differentiate between packaging of solids, semisolids, parenterals, ophthalmics and aerosols
Cosmetic Science (Open Elective)	M.PT.C2111T	Upon completion of the course, student will be able to	
		CO1	Classify Cosmetics, Cosmeceutical products and excipients used in it
		CO2	Explain principles of formulation of skin care, hair care and oral care products
		CO3	Classify sunscreens; Explain SPF, role of herbs used in cosmetics and analysis of cosmetics
		CO4	Explain principles of cosmetic evaluation
		CO5	Describe various cosmetic problems associated with hair, scalp and skin



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PROGRAM: M PHARMACY (R22)

PHARMACEUTICAL ANALYSIS

COURSE OUTCOMES (COs)

I year I Semester

Course/Subject name	Course Code	Course Outcome number	Course Outcome
Modern Pharmaceutical Analytical Techniques	21S01101	Upon completion of the course, student will be able to	
		CO1	Predict the names of different functional groups of organic compounds from Spectra
		CO2	Describe the chromatographic separation and analysis of drugs
		CO3	Analyze the quantitative and qualitative analysis of drugs by using different analytical instruments
		CO4	Analyze various spectral aspects of GC, HPLC, HPTLC, UV-Visible, IR Spectroscopy, Mass and NMR, etc
		CO5	Interpret the spectra and illustrate the structure of different compounds
Pharmaceutical and Food Analysis	21S07102	Upon completion of the course, student will be able to	
		CO1	Analyze food constituents by different analytical techniques
		CO2	Prepare different finished food products using different food constituents



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		CO3	Perform various instrumental methods for identification of pesticides in food products
		CO4	Demonstrate different food regulations and legislations
		CO5	Choose suitable additives for preparation of food products
ADVANCED PHARMACEUTICAL ANALYSIS	21S07101	Upon completion of the course, student will be able to	
		CO1	Understand the concepts of Impurity profiling and categorize the impurities like (inorganic, organic and residual solvents)
		CO2	Gain appropriate knowledge about analytical skills required for the analysis of impurities in the bulk drugs and various formulations.
		CO3	Understand the official and non-official methods to analyses the related substance.
		CO4	Demonstrate stability testing protocols and stability testing of pharmaceuticals.
		CO5	Understand and explain bioassays and immunoassays,
Quality Control and Quality Assurance	21S07103	Upon completion of the course, student will be able to	
		CO1	Analyze pharmaceutical samples in pharmaceutical industries
		CO2	Develop and formulate high quality pharmaceutical products
		CO3	Prepare documentation in Quality Assurance laboratory
		CO4	Differentiate cGMP and Quality Control tests
		CO5	Differentiate GLP and Regulatory Affairs guidelines



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I year II Semester			
Course/Subject name	Course Code	Course Outcome number	Course Outcome
Advanced Instrumental Analysis	21S07201	Upon completion of the course, student will be able to	
		CO1	Predict different analytical data from different instruments (LC-MS, GC-MS, SEM, DSC, etc)
		CO2	Describe the operational parameters for each analytical instrument
		CO3	Interpret the spectra and illustrate the structure of different compounds
		CO4	Analyze various spectral aspects of X-Ray, IR, SEM, ORD, etc
		CO5	Describe the techniques for recording and evaluating analytical data derived from different analytical instruments and solve a variety of numerical problems dealing with analysis of samples
HERBAL AND COSMETIC ANALYSIS	21S07203	Upon completion of the course, student will be able to	
		CO1	Student shall be able to understand the determination of herbal remedies
		CO2	Student shall be able to understand various herbal regulations
		CO3	Student shall be able to understand various analytical techniques in the determination of herbal products
		CO4	Student shall be able to understand the herbal monographs
		CO5	Student shall be able to understand various herbal drug interactions



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Modern Bio-analytical Techniques	21S07202	Upon completion of the course, student will be able to	
		CO1	Analyze the extraction techniques of drugs from biological samples
		CO2	Evaluate different techniques for the separation of drugs
		CO3	Prepare the guidelines for bio-equivalent and bio-analytical principles
		CO4	Apply compatibility studies for different drug analysis methods
		CO5	Apply the concepts of bio-samplers using automated systems
PHARMACEUTICAL VALIDATION	21SOE301a	Upon completion of the course, student will be able to	
		CO1	Understand the concepts of calibration, qualification and validation, qualification of various pharmaceutical equipment and instruments.
		CO2	Study the Process validation of different dosage forms and validation of analytical method for estimation of drugs.
		CO3	Understand Cleaning validation of equipment employed in the manufacture of pharmaceuticals.
		CO4	Understand Intellectual property rights and patent filing and know about the concept of qualification of laboratory instruments.
		CO5	Understand validation of sterile and non-sterile plant and computerized system validation.



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PROGRAM: M PHARMACY (R21)

PHARMACEUTICS

COURSE OUTCOMES (COs)

I year I Semester

Course/Subject name	Course Code	Course Outcome number	Course Outcome
MODERN PHARMACEUTICAL ANALYTICAL TECHNIQUES	21S01101	Upon completion of the course, student will be able to	
		CO1	The students shall understand and apply knowledge in UVVisible, IR, spectrofluorimetry, atomic absorption and flame emission spectroscopy.
		CO2	The student shall understand and analyze the instrumentation and applications in NMR spectroscopy.
		CO3	The students will understand and apply the knowledge the instrumentation and applications of Mass spectroscopy.
		CO4	The students impart wide knowledge in students on various chromatographic techniques, electrophoresis methods, Xray Crystallography and Immunoassays.
		CO5	The students shall understand and apply knowledge in UVVisible, IR, spectrofluorimetry, atomic absorption and flame emission spectroscopy.
Advanced Biopharmaceutics and Pharmacokinetics	21S01103	Upon completion of the course, student will be able to	
		CO1	Summarize the various biological and metabolic factors affecting bioavailability and explain the methods of assessment of biological samples to determine bioavailability
		CO2	Determine various pharmacokinetic parameters by using different compartment models
		CO3	Calculate rate of absorption for different kinetic orders



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		CO4	Explain the concept of Non-linear and Clinical pharmacokinetics
		CO5	Analyze Time dependent pharmacokinetics and various Drug interactions
Advanced Physical Pharmaceutics	21S03101	Upon completion of the course, student will be able to	
		CO1	Classify polymers and understand their roles in drug delivery systems.
		CO2	Apply principles of tablet compression and compaction in formulation.
		CO3	Evaluate stability kinetics and conduct stability testing for dosage forms.
		CO4	Analyze rheological properties of disperse systems and characterize APIs and excipients.
		CO5	Assess dissolution and solubilization techniques for enhancing drug release
MODERN PHARMACEUTICS - I	21S03102	Upon completion of the course, student will be able to	
		CO1	Preformulation concepts: Drug Excipient interactions - different methods, kinetics of stability, Stability testing.
		CO2	Optimization techniques in pharmaceutical formulation and processing. Statistical design, Response surface method, Contour designs, Factorial designs and application in formulation development.
		CO3	Introduction to Pharmaceutical Validation, Scope & merits of Validation, Types of Validation, Government regulation, Manufacturing process Model, URS,DQ,IQ,OQ& P.Q.of facilities.
		CO4	Regulatory approval process for medical devices and IVDs in India, US, Canada, EU, Japan and ASEAN clinical evaluation and investigation of medical devices and IVDs
		CO5	Study of Diffusion parameters, Dissolution parameters and Pharmacokinetic parameters, Heckel plots, Similarity factors – f2 and f1, Higuchi



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I year II Semester			
Course/Subject name	Course Code	Course Outcome number	Course Outcome
Modern Pharmaceutics – II (Professional Core – III)	21S03201	Upon completion of the course, student will be able to	
		CO1	Describe the pilot plant and its scale up techniques used in manufacturing of various pharmaceuticals
		CO2	Discuss the formulation development of Parenteral dosage forms
		CO3	Explain the manufacturing process of Aerosols
		CO4	Describe the manufacturing process of Cosmetics and Nutraceuticals
		CO5	Analyze the Aseptic processing operation
Advanced Drug Delivery	21S03202	Upon completion of the course, student will be able to	
		CO1	Explain about Controlled release oral drug delivery systems and Parenteral controlled release drug delivery systems
		CO2	Discuss about Implantable therapeutic systems, Transdermal delivery systems, Ocular, Intrauterine delivery systems and Vaccine delivery
		CO3	Summarize Bioadhesive drug delivery systems, Nasal drug delivery systems and Drug delivery to colon
		CO4	Describe: Liposomes, Niosomes, Microspheres, Nanoparticles and Resealed
		CO5	Distinguish Drug delivery to Lungs, Brain and targeting Neoplasms



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Industrial Pharmacy	21S03203	Upon completion of the course, student will be able to	
		CO1	Describe machinery and the theory of pharmaceutical unit operations
		CO2	Discuss principles and production techniques in the large-scale production of various dosage forms
		CO3	Describe the Good Manufacturing Practices (GMP) and Total Quality Management (TQM)
		CO4	Explain the process of effluent analysis, specifications and preventive measures for water, solid, air and sound pollution
		CO5	Discuss regulatory basis, validation process for solid dosage forms, sterile products and liquid dosage forms
Nano Drug Delivery Systems	21S03204	Upon completion of the course, student will be able to	
		CO1	Explain Nanotechnology. Determine and classify various properties of nanomaterials
		CO2	Summarize various physical, chemical and biological methods for synthesis of nanoparticles (gold, magnetic, polymeric, self-assembly structures)
		CO3	Elaborate about different biomedical applications of nanotechnology
		CO4	Design nanomaterials for different drug delivery (nasal, pulmonary, cancer therapy, cardiovascular diseases, localized drug delivery)
		CO5	Explain different methods of size reduction, size separation and analysis of nanoparticles



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II year I Semester			
Course/Subject name	Course Code	Course Outcome number	Course Outcome
Research Methodology and IPR	21DRM101	Upon completion of the course, student will be able to	
		CO1	Summarize Research problem and sources of research problem
		CO2	Compare different literature studies approaches and analyze Plagiarism and research ethics
		CO3	Infer effective technical writing and write report
		CO4	Discuss about Patents, Designs, Trade and Copyrights
		CO5	Analyze licensing and technology transfer



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PROGRAM: M PHARMACY (R21)

PHARMACOLOGY

COURSE OUTCOMES (COs)			
I year I Semester			
Course/Subject name	Course Code	Course Outcome number	Course Outcome
Modern Pharmaceutical Analytical Techniques	21S01101	Upon completion of the course, student will be able to	
		CO1	Predict the names of different functional groups of organic compounds from Spectra
		CO2	Describe the chromatographic separation and analysis of drugs
		CO3	Analyze the quantitative and qualitative analysis of drugs by using different analytical instruments
		CO4	Analyze various spectral aspects of GC, HPLC, HPTLC, UV-Visible, IR Spectroscopy, Mass and NMR, etc
		CO5	Interpret the spectra and illustrate the structure of different compounds
ADVANCED PHARMACOLOGY - I	21S01102	Upon completion of the course, student will be able to	
		CO1	The student shall understand the general aspects and steps involved in neurotransmission, autonomic nervous system and central nervous system
		CO2	They would have elaborately learnt the recent advances in pathophysiology, drugs used for the treatment of various diseases affecting autonomic nervous system, Central nervous system and cardio vascular system



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		CO3	To gain the knowledge of concepts of drug action and mechanisms involved in the autocoid pharmacology
		CO4	The student shall apply the knowledge of learned principles of drug action in the pharmacotherapy of certain diseases
		CO5	The student shall understand the underlying the cellular and molecular mechanisms of drug action in mentioned diseases
CLINICAL PHARMACOLOGY AND PHARMCOTHERAPEUTICS	21S01103	Upon completion of the course, student will be able to	
		CO1	Apply pharmacokinetic and pharmacodynamic principles to tailor drug therapy for diverse patients.
		CO2	Explain mechanisms, effects, and uses of major drug classes in disease management.
		CO3	Utilize evidence-based pharmacotherapy for safe and cost-effective treatments.
		CO4	Identify and manage drug reactions and interactions to ensure patient safety.
		CO5	Adapt treatment plans based on patient response and clinical guidelines.
CELLULAR AND MOLECULAR PHARMACOLOGY	21S01104	Upon completion of the course, student will be able to	
		CO1	The student shall understand about the fundamental knowledge of cellular components, genetic code, concept to g Gene, siRNA and miRNA technologies
		CO2	To understand the receptor signal transduction process and apply that knowledge for understanding drug action
		CO3	To gain the knowledge of molecular pathways affected by drugs and their role in therapy
		CO4	The student shall understand and appreciate the components of cell cycle and cell death process
		CO5	The student shall understand and apply the knowledge of cell culture techniques and their application in drug discovery and screening



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I year II Semester			
Course/Subject name	Course Code	Course Outcome number	Course Outcome
ADVANCED PHARMACOLOGY - II	21S01201	Upon completion of the course, student will be able to	
		CO1	The student shall understand the molecular and cellular mechanism of action of hormones and their disorders
		CO2	They would have elaborately learnt the recent advances in different fields of chemotherapy
		CO3	To gain the knowledge of concepts of drug action and mechanisms involved in the immunopharmacology, drug allergy, and hypersensitivity reactions
		CO4	The student shall apply the knowledge of learned principles of drug action in the pharmacotherapy of certain diseases. The student should analyse the underlying cellular and molecular mechanisms of drug action in mentioned diseases
		CO5	The student shall comprehend the cellular and molecular mechanisms of free radicals and their role in diseases
PHARMACOLOGICAL SCREENING METHODS AND TOXICOLOGY	21S01202	Upon completion of the course, student will be able to	
		CO1	The student shall understand about the need and application of Common laboratory animals, Transgenic animals, their maintenance and breeding animals as per the CPCSEA guidelines. Student shall need to apply this knowledge to conduct experiments on animals
		CO2	The student should understand the basics of preclinical evaluation and recent experimental techniques used for screening
		CO3	Student should gain the knowledge of in silico, in-vivo and invitro methods available in screening of drugs or chemical entities for the mentioned diseases
		CO4	They would have learnt to describe the various screening methods involved in the drug discovery process



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		CO5	The student shall understand and apply alternatives for animal experimentation.
PRINCIPLES OF DRUG DISCOVERY	21S01203	Upon completion of the course, student will be able to	
		CO1	Understand key stages of drug discovery, including target identification, validation, and lead optimization.
		CO2	Explain methods of lead identification, such as high-throughput screening and combinatorial chemistry.
		CO3	Apply computational tools in protein structure prediction, molecular docking, and virtual screening.
		CO4	Analyze structure-activity relationships (SAR) and quantitative structure-activity relationships (QSAR) for drug design and optimization.
		CO5	Discuss ethical, regulatory, and practical considerations in modern drug discovery processes.
CLINICAL RESEARCH AND PHARMACOVIGILANCE	21S01204	Upon completion of the course, student will be able to	
		CO1	The student shall understand regulatory perspectives and ethical issues of conducting clinical trials as per ICH, EPA, CDSCO, ICMR guidelines
		CO2	Student should understand and demonstrate informed consent, types and study designs of clinical trials.
		CO3	To gain the knowledge about role and responsibilities, key players, protocol design and execution methods to conduct clinical trials,
		CO4	The student shall appreciate the importance and understand the safety monitoring, reporting and close-out activities.
		CO5	The student shall understand and analyze the types of ADR, need and methods of pharmacovigilance



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PROGRAM: M PHARMACY (R21)

PHARMACY PRACTICE

COURSE OUTCOMES (COs)

I year I Semester

Course/Subject name	Course Code	Course Outcome number	Course Outcome
PHARMACOTHERAPEUTICS I	21S09101	Upon completion of the course, student will be able to	
		CO1	Describe pathophysiology in major organ systems.
		CO2	Recognize drug-induced conditions across multiple systems
		CO3	Recommend effective treatments for common diseases.
		CO4	Select appropriate treatments based on symptoms.
		CO5	Support safe, evidence-based medication use.
CLINICAL PHARMACY PRACTICE	21S09102	Upon completion of the course, student will be able to	
		CO1	Recognize the role and scope of clinical pharmacy in healthcare, including pharmaceutical care services
		CO2	Conduct clinical pharmacy services such as medication review, therapy monitoring, and patient counseling.
		CO3	Analyze patient data by interpreting medical histories and laboratory test results for drug therapy management.
		CO4	Interpret laboratory data related to hematological, renal, hepatic, and cardiac functions for clinical decision-making.
		CO5	Provide reliable medicine and poison information through effective query handling and resource management



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HOSPITAL AND COMMUNITY PHARMACY	21S09103	Upon completion of the course, student will be able to	
		CO1	Describe hospital pharmacy management, including legal requirements and drug policies.
		CO2	Develop formulary guidelines and understand drug procurement and inventory control
		CO3	Implement education and training programs for pharmacy and healthcare staff.
		CO4	Interpret prescription laws and promote rational use of over-the-counter medications.
		CO5	Participate in health promotion activities, including family planning and disease prevention
CLINICAL RESEARCH	21S09104	Upon completion of the course, student will be able to	
		CO1	Explain the drug development process and investigational new drug application submission.
		CO2	Identify ethical principles in biomedical research and roles of ethics committees.
		CO3	Design and plan clinical trials, understanding phases, types, and methodologies.
		CO4	Prepare essential clinical trial documents and execute start-up activities.
		CO5	Implement quality assurance practices in clinical trials and data management systems



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I year II Semester			
Course/Subject name	Course Code	Course Outcome number	Course Outcome
PHARMACOTHERAPEUTICS II	21S09201	Upon completion of the course, student will be able to	
		CO1	Analyze treatments for nervous system disorders, including epilepsy and Parkinson's disease.
		CO2	Evaluate management strategies for psychiatric disorders such as schizophrenia and depression.
		CO3	Apply guidelines for the rational use of antibiotics in infectious diseases, including UTIs and tuberculosis.
		CO4	Assess treatment options for gynecological disorders like dysmenorrhea and hormone replacement therapy.
		CO5	Discuss principles of cancer chemotherapy and pharmacotherapy for malignancies like breast and lung cancer.
CLINICAL PHARMACOKINETICS AND THERAPEUTIC DRUG MONITORING	21S09202	Upon completion of the course, student will be able to	
		CO1	Describe clinical pharmacokinetics principles, including models, clearance, and bioavailability.
		CO2	Analyze pharmacokinetic drug interactions affecting metabolism and excretion.
		CO3	Apply non-linear mixed effects modeling to population pharmacokinetic data.
		CO4	Evaluate altered pharmacokinetics in populations like the elderly and those with renal failure.
		CO5	Conduct therapeutic drug monitoring to individualize drug dosing regimens.



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PRINCIPLES OF QUALITY USE OF MEDICINES	21S09203	Upon completion of the course, student will be able to	
		CO1	Explain the principles of quality use of medicines (QUM) and the responsibilities of key partners.
		CO2	Describe the concepts of evidence-based medicine and its application in clinical settings.
		CO3	Evaluate the role of healthcare professionals in promoting QUM across various settings.
		CO4	Analyze regulatory aspects of QUM in India, including the roles of pharmacists and the industry.
		CO5	Identify medication errors, their causes, and strategies for detection and prevention in pharmacovigilance
PHARMACOEPIDEMIOLOGY & PHARMACOECONOMICS	21SOE301e	Upon completion of the course, student will be able to	
		CO1	Define the scope and applications of pharmacoepidemiology and outcome measurement.
		CO2	Apply qualitative and quantitative methods to evaluate drug utilization and health outcomes.
		CO3	Explain pharmacoconomics principles, including cost categorization and resource estimation.
		CO4	Conduct pharmaco-economic evaluations using various models and analyze their advantages.
		CO5	Evaluate health-related quality of life measures and apply decision analysis techniques.



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PROGRAM: M PHARMACY (R21)

PHARMACEUTICAL CHEMISTRY

COURSE OUTCOMES (COs)

I year I Semester

Course/Subject name	Course Code	Course Outcome number	Course Outcome
Modern Pharmaceutical Analytical Techniques	21S01101	Upon completion of the course, student will be able to	
		CO1	Predict the names of different functional groups of organic compounds from Spectra
		CO2	Describe the chromatographic separation and analysis of drugs
		CO3	Analyze the quantitative and qualitative analysis of drugs by using different analytical instruments
		CO4	Analyze various spectral aspects of GC, HPLC, HPTLC, UV-Visible, IR Spectroscopy, Mass and NMR, etc
		CO5	Interpret the spectra and illustrate the structure of different compounds
ADVANCED ORGANIC CHEMISTRY – I	21S02101	Upon completion of the course, student will be able to	
		CO1	To describe mechanisms for reactions in organic chemistry.
		CO2	To apply all the naming reactions in multistep process in manufacturing of drugs and drug intermediates special reactive intermediates including carbenes, carbanions and free radicals.



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		CO3	To understand the applications of reagents and protecting groups.
		CO4	To understand and apply the structure and theory to the study of organic reaction in heterocyclic chemistry.
		CO5	To develop synthetic route for small molecules. To carry out an organic reaction, including isolating, purifying, and characterizing the product.
ADVANCED MEDICINAL CHEMISTRY I	21S02102	Upon completion of the course, student will be able to	
		CO1	Design around the various market approved drug molecules. A detailed understanding of the processes involved in the design, development and discovery of medicinal compounds.
		CO2	Study on different biological targets
		CO3	To understand the mechanism of action of drugs belonging to the classes of Antihypertensive and Psychoactive.
		CO4	Anticonvulsant, H1/H2 receptor antagonistic, COX1 & COX2 inhibiting, adrenergic & cholinergic, antineoplastic and antiviral agents.
		CO5	Various strategies to design and develop new drug like molecules for biological targets
CHEMISTRY OF NATURAL PRODUCTS	21S02103	Upon completion of the course, student will be able to	
		CO1	Explain the pharmacology and therapeutic uses of CNS drugs, anticancer agents, cardiovascular drugs, and neuromuscular blockers.
		CO2	Describe the chemistry, classification, and biological activity of alkaloids, flavonoids, steroids, terpenoids, and vitamins.
		CO3	Identify the structural features and therapeutic potential of macrolide and β -lactam antibiotics.
		CO4	Assess the therapeutic applications of marine natural products with cardiovascular, anti-inflammatory, antimicrobial, antiviral, and antiparasitic properties.
		CO5	Apply spectroscopic methods (IR, $^1\text{H-NMR}$, $^{13}\text{C-NMR}$, MS) for the structural characterization of natural compounds.



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I year II Semester			
Course/Subject name	Course Code	Course Outcome number	Course Outcome
ADVANCED ORGANIC CHEMISTRY - II	21S02201	Upon completion of the course, student will be able to	
		CO1	Evaluate synthetic reagents and their applications.
		CO2	Analyze types of catalysis, including heterogeneous and homogeneous.
		CO3	Examine molecular rearrangements and their applications.
		CO4	Assess peptide synthesis methods and purification techniques.
		CO5	Apply principles of green chemistry to enhance reaction efficiency.
ADVANCED MEDICINAL CHEMISTRY - II	21S02202	Upon completion of the course, student will be able to	
		CO1	Analyze enzyme inhibitors' pharmaceutical significance.
		CO2	Evaluate ACE and acetylcholinesterase inhibitors.
		CO3	Assess neurotransmitters in antipsychotics.
		CO4	Design peptidomimetics and related compounds.
		CO5	Examine processes in recombinant drug production.
COMPUTER AIDED DRUG DESIGN	21S02203	Upon completion of the course, student will be able to	
		CO1	Explain the principles and history of Computer Aided Drug Design (CADD) and Quantitative Structure Activity Relationships (QSAR).
		CO2	Analyze QSAR applications, including Hansch and Free Wilson analyses, and their statistical methodologies.
		CO3	Explain the principles and history of Computer Aided Drug Design (CADD) and Quantitative Structure Activity Relationships (QSAR).
		CO4	Assess molecular modeling techniques, energy minimization, and docking methods in drug



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			design.
		CO5	Predict and analyze ADMET properties and explore de novo drug design strategies.
PHARMACEUTICAL PROCESS CHEMISTRY	21S02204	Upon completion of the course, student will be able to	
		CO1	Outline process chemistry concepts, scale-up stages, and impurity management in API production.
		CO2	Explain extraction, filtration, distillation, evaporation, and crystallization techniques in API processing.
		CO3	Describe unit processes including nitration, halogenation, and oxidation with industrial applications.
		CO4	Analyze reduction methods, fermentation processes for antibiotics and vitamins, and reaction kinetic analysis for efficient route selection.
		CO5	Discuss industrial safety protocols, MSDS, PPE, fire hazards, OHSAS-1800, and ISO-14001 standards for environmental and occupational safety