DEPARTMENT OF PHARMACY

Bachelor of Pharmacy

VISION

- To provide an excellent teaching–learning environment supported by modern infrastructure and facilities for holistic student development.
- To advance pharmaceutical sciences through creativity, innovation, and research-oriented learning.
- To produce competent and responsible pharmacists who can contribute effectively to the healthcare system and society.

MISSION

- Establishing a Centre of Excellence in pharmaceutical education, research, innovation, and scholarship.
- Preparing Competent Professionals with deep knowledge in drug development and all pharmacy disciplines for a rapidly evolving field.
- Developing Ethical Leaders by fostering communication, teamwork, and a sense of responsibility to the healthcare system and society.

PROGRAMME EDUCATIONAL OBJECTIVES:

PEO 1: Knowledge and Competence:

To equip graduates with the theoretical knowledge and practical skills to excel in the global healthcare system. Our graduates are proficient in designing, evaluating, manufacturing, and regulating safe, effective, and high-quality pharmaceuticals**.**

PEO 2: Professional Excellence and Innovation:

To prepare skilled pharmacy professionals with the technical expertise, research aptitude, and interdisciplinary approach needed to meet the demands of industry, academia, and society.

PEO 3: Leadership, Ethics, and Social Responsibility:

To cultivate pharmacy professionals who are not only skilled but also ethical leaders and effective communicators. We foster an entrepreneurial spirit and a collaborative mindset, empowering our graduates to drive positive change within the profession and serve as responsible citizens in their communities.

PROGRAM SPECIFIC OUTCOME (PSOs)

PSO 1: Professional Excellence:

To foster professional excellence by providing a rigorous foundation of technical knowledge and immersive practical experience, preparing graduates for impactful careers across the pharmaceutical industry, healthcare, research, and academia.

PSO 2: Adaptability and Innovation:

To empower graduates to continuously learn, adapt, and innovate, keeping pace with the rapidly evolving landscape of global pharmaceutical sciences and technology.

PSO 3: Ethics and Lifelong Learning:

To develop well-rounded professionals guided by ethical values, distinguished by their effective communication and collaborative skills, and committed to lifelong learning and social responsibility.

PROGRAMME OUTCOMES:

PO. 1. Pharmacy Knowledge: Graduates will acquire strong fundamental concepts and adequate scientific information regarding basic principles of pharmaceutical, biomedical; behavioral, social, administrative and manufacturing practices by which they will able to handle drugs safely and ensure the rationale use of drugs.

PO. 2. Drug development: Graduates will acquire the ability to develop and/or evaluate various pharmaceuticals and their formulations including cosmeceuticals and quality assurance of various pharmaceutical dosage forms including those of herbal origin as per standards of official monographs, WHO, and other regulatory agencies.

PO. 3. Social Awareness: Graduates will demonstrate the impact of pharmacy knowledge on the society and also will be aware of modern issues. They will create awareness of healthcare issues through interactions with others and will gain a sense of self-respect towards community and citizenship.

PO. 4. Pharmaceutical Ethics: Graduates will demonstrate knowledge of professional and ethical responsibilities as per pharmaceutical jurisprudence. They will be able to demonstrate knowledge and skills in all disciplines of pharmaceutical sciences and develop a sound pharmaceutical care plan to manage medication-related problems. They will retrieve, evaluate, and apply current drug information in the delivery of pharmaceutical care and assure safe and accurate preparation and dispensing of medications.

PO. 5. Professional Identification: The graduates will swear by a code of ethics of Pharmacy Council of India in relation to community and shall act as integral part of a health care system. They will understand, analyze and communicate the value of their professional roles in society (e.g. health care professionals, promoters of health, educators, managers, employers, employees).

PO. 6. Analytical Skills: Graduates will develop skills in qualitative and quantitative analysis of various pharmaceuticals. They will demonstrate their skills to use modern pharmaceutical tools, software, and equipment's to analyze & solve problems. Develop skills in qualitative and quantitative analysis of various pharmaceuticals.

PO. 7. Leadership Skills: Graduates will develop interpersonal skills such as influencing others, negotiating and working with others, conflict management and leading others through the problem-solving process. They will be able to lead and function both individually and as a member of a team.

PO. 8. Communication: The graduates will acquire excellent interpersonal oral communication and writing skills. Demonstrate the ability of verbal communication and writing reports and to lead the team effectively.

PO. 9. Drugs and diseases: Graduates will be able to understand different classes of drugs, their mechanism of action, dynamics, kinetics, structure activity relationships, pathophysiology and pharmacotherapeutics of various diseases.

PO. 10. Problem analysis and Planning: Graduates will utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills.

PO. 11. Life-long learning: Graduates will 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-access and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis.

FIRST YEAR

SEMESTER I

Sl No.	Course Title	Code	Type	Credit	Type		
					L	T	P
1	Human Anatomy and Physiology I– Theory	PAHARU001T01	MC	4	3	1	0
2	Pharmaceutical Analysis I – Theory	PAHARU001T02	MC	4	3	1	0
3	Pharmaceutics I – Theory	PAHARU001T03	MC	4	3	1	0
4	Pharmaceutical Inorganic Chemistry – Theory	PAHARU001T04	MC	4	3	1	0
5	Communication skills – Theory *	PAHARU001T05	MC	2	2	0	0
6	Remedial Biology/ Mathematics– Theory*	PAHARU001T06/ PAHARU001T07	ME	2	2	0	0
7	Human Anatomy and Physiology – Practical	PAHARU001P01	MC	2	0	0	4
8	Pharmaceutical Analysis I – Practical	PAHARU001P02	MC	2	0	0	4
9	Pharmaceutics I – Practical	PAHARU001P03	MC	2	0	0	4
10	Pharmaceutical Inorganic Chemistry – Practical	PAHARU001P04	MC	2	0	0	4
11	Communication skills – Practical*	PAHARU001P05	MC	1	0	0	2
12	Remedial Biology – Practical*	PAHARU001P06	MC	1	0	0	2
Total Credits				**30 Credits**			

[#]Applicable ONLY for the students who have studied Mathematics / Physics / Chemistry at HSC and appearing for Remedial Biology (RB)course.

*[$]Applicable ONLY for the students who have studied Physics / Chemistry / Botany / Zoology at HSC and appearing for Remedial Mathematics (RM)course. * Non-University Examination (NUE)*

SEMESTER-II

Sl No	Course Title	Code	Type	Credit	Type		
					L	T	P
1	Human Anatomy and Physiology II – Theory	PHARU101T01	MC	4	3	1	0
2	Pharmaceutical Organic Chemistry I – Theory	PHARU101T02	MC	4	3	1	0
3	Biochemistry – Theory	PHARU101T03	MC	4	3	1	0
4	Pathophysiology – Theory	PHARU101T04	MC	4	3	1	0
5	Computer Applications in Pharmacy – Theory*	PHARU101T05	MC	3	3	0	0
6	Environmental sciences – Theory*	PHARU101T06	MC	3	3	0	0
7	Human Anatomy and Physiology II – Practical	PHARU101P01	MC	2	0	0	4
8	Pharmaceutical Organic Chemistry I– Practical	PHARU101P02	MC	2	0	0	4
9	Biochemistry – Practical	PHARU101P03	MC	2	0	0	4
10	Computer Applications in Pharmacy – Practical*	PHARU101P05	MC	1	0	0	2
Total Credits				**29 Credits**			

SECOND YEAR

SEMESTER-III

Sl No	Course Title	Code	Type	Credit	Type		
					L	T	P
1	Pharmaceutical Organic Chemistry II – Theory	PHARU201T01	MC	4	3	1	0
2	Physical Pharmaceutics I – Theory	PHARU201T02	MC	4	3	1	0
3	Pharmaceutical Microbiology – Theory	PHARU201T03	MC	4	3	1	0
4	Pharmaceutical Engineering – Theory	PHARU201T04	MC	4	3	1	0
5	Pharmaceutical Organic Chemistry II – Practical	PHARU201P01	MC	2	0	0	4
6	Physical Pharmaceutics I – Practical	PHARU201P02	MC	2	0	0	4
7	Pharmaceutical Microbiology – Practical	PHARU201P03	MC	2	0	0	4
8	Pharmaceutical Engineering –Practical	PHARU201P04	MC	2	0	0	4
Total Credits				**24 Credits**			

SEMESTER-IV

Sl No	Course Title	Code	Type	Credit	Type		
					L	T	P
1	Pharmaceutical Organic Chemistry III– Theory	PHARUT201T09	MC	4	3	1	0
2	Medicinal Chemistry I – Theory	PHARUT201T10	MC	4	3	1	0
3	Physical Pharmaceutics II – Theory	PHARUT201T11	MC	4	3	1	0
4	Pharmacology I – Theory	PHARUT201T12	MC	4	3	1	0
5	Pharmacognosy & Phytochemistry I– Theory	PHARUT201T13	MC	4	3	1	0
6	Medicinal Chemistry I – Practical	PHARU201P14	MC	2	0	0	4
7	Physical Pharmaceutics II – Practical	PHARU201P15	MC	2	0	0	4
8	Pharmacology I – Practical	PHARU201P16	MC	2	0	0	4
9	Pharmacognosy and Phytochemistry I – Practical	PHARU201P17	MC	2	0	0	4
Total Credits				**28 Credits**			

THIRD YEAR

SEMESTER-V

Sl No	Course Title	Code	Type	Credit	Type		
					L	T	P
1	Medicinal Chemistry II – Theory	PHARU401T01	MC	4	3	1	0
2	Industrial Pharmacy I– Theory	PHARU401T02	MC	4	3	1	0
3	Pharmacology II – Theory	PHARU401T03	MC	4	3	1	0
4	Pharmacognosy and Phytochemistry II– Theory	PHARU401T04	MC	4	3	1	0
5	Pharmaceutical Jurisprudence – Theory	PHARU401T05	MC	4	3	1	0
6	Industrial Pharmacy I – Practical	PHARU401P01	MC	2	0	0	4
7	Pharmacology II – Practical	PHARU401P02	MC	2	0	0	4
8	Pharmacognosy and Phytochemistry II – Practical	PHARU401P03	MC	2	0	0	4
Total Credits				**26 Credits**			

SEMESTER-VI

Sl No	Course Title	Code	Type	Credit	Type		
					L	T	P
1	Medicinal Chemistry III – Theory	1170015128	MC	4	3	1	0
2	Pharmacology III – Theory	1170015129	MC	4	3	1	0
3	Herbal Drug Technology – Theory	1170015130	MC	4	3	1	0
4	Biopharmaceutics and Pharmacokinetics – Theory	1170015131	MC	4	3	1	0
5	Pharmaceutical Biotechnology – Theory	1170015132	MC	4	3	1	0
6	Quality Assurance –Theory	1170015133	MC	4	3	1	0
7	Medicinal chemistry III – Practical	1170015228	MC	2	4	0	4
8	Pharmacology III – Practical	1170015229	MC	2	4	0	4
9	Herbal Drug Technology – Practical	1170015230	MC	2	4	0	4
Total Credits				**30 Credits**			

FOURTH YEAR

SEMESTER-VII

Sl No	Course Title	Code	Type	Credit	Type		
					L	T	P
1	Instrumental Methods of Analysis – Theory	1170016101	MC	4	3	1	0
2	Industrial PharmacyII – Theory	1170016102	MC	4	3	1	0
3	Pharmacy Practice – Theory	1170016103	MC	4	3	1	0
4	Novel Drug Delivery System – Theory	1170016104	MC	4	3	1	0
5	Instrumental Methods of Analysis – Practical	1170016205	MC	2	0	0	4
6	Practice School*	1170016506	MC	6	0	0	12
Total Credits				**24 Credits**			

SEMESTER-VIII

Sl No	Course Title	Code	Type	Credit	Type		
					L	T	P
1	Biostatistics and Research Methodology	1170017139	MC	4	3	1	0
2	Social and Preventive Pharmacy	1170017140	MC	4	3	1	0
3	Pharma Marketing Management	2170017101A	ME	4 + 4 = 8	3 + 3 = 6	1 + 1 = 2	0
4	Pharmaceutical Regulatory Science	2170017101B	ME				
5	Pharmacovigilance	2170017101C	ME				
6	Quality Control and Standardization of Herbals	2170017101D	ME				
7	Computer Aided Drug Design	2170017101E	ME				
8	Cell and Molecular Biology	2170017101F	ME				
9	Cosmetic Science	2170017101G	ME				
10	Pharmacological Screening Methods	2170017101H	ME				
11	Advanced Instrumentation Techniques	2170017101I	ME				
12	Dietary Supplements and Nutraceuticals	2170017101J	ME				
13	Project Work	1170017541	MC	6	0	0	12
Total Credits				**22 Credits**			

COURSE CO-PO-PSO MAPPING

SEMESTER I

Human Anatomy and Physiology I

Course Outcomes:

CO1: Define key anatomical terms and identify the structure and functions of cells and basic tissue types.
CO2: Classify different types of bones, joints, and muscle tissues, and illustrate their roles in the structural organisation of the human body.
CO3: Explain the composition, functions, and physiological significance of body fluids, blood, and lymph, and compare the mechanisms regulating their homeostasis.
CO4: Distinguish the components and functions of the peripheral nervous system and analyse the physiological mechanisms underlying the special senses.
CO5: Appraise the coordinated functions of the cardiovascular system in regulating blood flow and pressure and predict physiological outcomes in response to dysfunctions.

Mapping of COs with POs and PSOs

COURSE OUTCOMES	PROGRAMME OUTCOMES											PROGRAMME SPECIFIC OUTCOMES		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	2	1	2	0	2	0	0	1	0	1	1	1	2	3
CO2	2	3	1	2	1	1	1	0	0	1	2	2	2	1
CO3	2	3	2	1	0	1	1	0	2	1	2	3	1	1
CO4	2	3	1	1	0	1	1	0	1	1	2	2	2	2
CO5	2	3	1	1	0	1	1	0	1	1	0	1	3	1

Pharmaceutical Analysis I

Course Outcomes:

CO1: Define the fundamentals of analytical chemistry and describe its scope, objectives, and significance.
CO2: Classify several methods of volumetric titrations and their applications.
CO3: Explain the principles and various types of gravimetric analysis and diazotization titrations.
CO4: Evaluate the theoretical and practical aspects of redox titrations.
CO5: Analyze the theories, methods, and applications of electrochemical techniques.

Mapping of COs with POs and PSOs

COURSE OUTCOMES	PROGRAMME OUTCOMES											PROGRAMME SPECIFIC OUTCOMES		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	2	3	3	3	-	2	-	-	2	-	-	2	2	1
CO2	2	3	3	3	-	1	-	-	1	-	-	3	1	1
CO3	2	2	3	3	-	1	-	-	1	-	-	2	2	2
CO4	2	3	3	3	-	1	-	-	-	-	-	1	3	1
CO5	2	2	3	3	-	1	-	-	-	-	-	1	2	3

Pharmaceutics I

Course Outcomes:

CO1: Describe the history and scope of pharmacy and pharmaceutics.
CO2: Explain different dosage forms and their classification.
CO3: Clarify the principles of formulation of pharmaceutical dosage forms.
CO4: Demonstrate knowledge of pharmaceutical calculations and metrology.
CO5: Practice the principles of packaging and labelling of pharmaceutical products.

Mapping of COs with POs and PSOs

COURSE OUTCOMES	PROGRAMME OUTCOMES											PROGRAMME SPECIFIC OUTCOMES		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	2	1	2	0	2	0	0	1	0	1	1	1	2	3
CO2	2	3	1	2	1	1	1	0	0	1	2	2	1	3
CO3	2	3	2	1	0	1	1	0	2	1	2	3	2	1
CO4	2	3	1	1	0	1	1	0	1	1	2	3	1	2
CO5	2	3	1	1	0	1	1	0	1	1	0	3	2	2

Pharmaceutical Inorganic Chemistry

Course Outcomes:

CO1: Know the sources of impurities and methods to determine the impurities in inorganic drugs and pharmaceuticals.
CO2: Understand the medicinal and pharmaceutical importance of inorganic compounds.
CO3: Prepare different inorganic drugs.
CO4: Test different inorganic impurities present in a drug.
CO5: Hypothesize the reason why a particular inorganic drug is being used in a particular situation.

Mapping of COs with POs and PSOs

COURSE OUTCOMES	PROGRAMME OUTCOMES											PROGRAMME SPECIFIC OUTCOMES		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	1	-	1	1	-	-	-	-	1	2	1	2	3	2
CO2	3	2	2	3	-	-	2	1	1	1	-	3	2	3
CO3	-	1	-	-	-	-	2	1	-	2	-	2	1	1
CO4	-	1	1	3	1	-	2	1	-	1	-	3	2	3
CO5	1	-	-	-	-	1	-	1	-	-	-	1	2	3

Remedial Biology

Course Outcomes:

CO1: the principles of microscopy, section cutting, staining, and permanent slide preparation to demonstrate understanding of basic biological laboratory techniques.

CO2: laboratory skills to prepare and observe cells and tissues using microscopes and staining methods.

CO3: structural differences and modifications in plant organs (stem, root, leaf, seed, fruit, flower) and identify tissues through microscopic examination.

CO4: skeletal observations to accurately identify major human bones, distinguish their structural features, and justify their functional significance.

CO5: and perform simple experimental demonstrations related to human physiology (blood group, blood pressure, tidal volume) to illustrate core biological concepts.

Mapping of COs with POs and PSOs

COURSE OUTCOMES	PROGRAMME OUTCOMES											PROGRAMME SPECIFIC OUTCOMES		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	2	-	1	1	2	-	1	2	1	2	1	1	2
CO2	3	2	-	1	1	2	-	1	2	1	2	2	1	2
CO3	3	2	1	1	2	2	1	1	3	2	2	2	2	3
CO4	3	3	1	1	2	3	2	2	3	3	2	2	2	1
CO5	3	2	1	1	1	3	-	1	2	2	2	3	2	2

Remedial Mathematics

Course Outcomes:

CO1: Explain the use of transformations and approximations in chemical kinetics.
CO2: Solve linear system with applications in pharmaceutical models.
CO3: Examine differentiation techniques to get maxima-minima of functions.
CO4: Verify geometric interpretations of straight lines and integrals.
CO5: Construct ODE to solve Chemical kinetics and Pharmacokinetics system.

Mapping of COs with POs and PSOs

COURSE OUTCOMES	PROGRAMME OUTCOMES											PROGRAMME SPECIFIC OUTCOMES		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	2	2	0	0	0	1	0	0	0	2	2	1	2	1
CO2	2	3	0	0	0	3	0	0	0	3	2	2	1	2
CO3	2	2	0	0	0	1	0	0	0	1	2	3	2	1
CO4	2	2	0	0	0	2	0	0	0	1	2	3	3	2
CO5	2	3	0	0	0	3	0	0	1	3	2	2	2	3

Communication skills

Course Outcomes:

CO1: To understand importance of communication in life and its process.
CO2: To learn how to write Business correspondence.
CO3: To know Importance of listening.
CO4: Students will be equipped with interview skills to express confidence at all levels with great clarity
CO5: To understand how to speak, and how to face Interviews and Group Discussion.

Mapping of COs with POs and PSOs

COURSE OUTCOMES	PROGRAMME OUTCOMES											PROGRAMME SPECIFIC OUTCOMES		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	2	-	1	1	2	-	1	2	1	2	1	1	2
CO2	3	2	-	1	1	2	-	1	2	1	2	2	1	2
CO3	3	2	1	1	2	2	1	1	3	2	2	2	2	3
CO4	3	3	1	1	2	3	2	2	3	3	2	2	2	1
CO5	3	2	1	1	1	3	-	1	2	2	2	3	2	2

SEMESTER II

Human Anatomy and Physiology II

Course Outcomes:

CO1: Explain the organization and functions of the nervous system, including neurons, neurotransmission, and reflex activities.
CO2: Describe the anatomy and physiology of the digestive system and summarize the processes of digestion, absorption, and energy production.
CO3: Apply the concepts of respiratory and urinary physiology to understand mechanisms of gas exchange, urine formation, and maintenance of acid–base balance.
CO4: Analyze the role, regulation, and interrelationship of endocrine glands and hormones in maintaining body homeostasis.
CO5: Evaluate the physiological processes of the reproductive system and illustrate basic genetic mechanisms related to inheritance and protein synthesis.

Mapping of COs with POs and PSOs

COURSE OUTCOMES	PROGRAMME OUTCOMES											PROGRAMME SPECIFIC OUTCOMES		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	2	3	3	3	-	2	-	-	2	-	-	2	2	1
CO2	2	3	3	3	-	1	-	-	1	-	-	3	1	1
CO3	2	2	3	3	-	1	-	-	1	-	-	2	2	2
CO4	2	3	3	3	-	1	-	-	-	-	-	1	3	1
CO5	2	2	3	3	-	1	-	-	-	-	-	1	2	3

Pharmaceutical Organic Chemistry I

Course Outcomes:

CO1: Explain the classification, nomenclature, and structural isomerism of organic compounds according to IUPAC conventions.
CO2: Apply the principles of hybridization and reaction mechanisms to predict and interpret the reactivity of alkanes, alkenes, and conjugated dienes.
CO3: Analyze the mechanisms and stereochemical aspects of substitution reactions (SN1, SN2) and elimination reactions (E1, E2) in alkyl halides and alcohols.
CO4: Evaluate the chemical behavior and synthetic transformations of carbonyl compounds and *distinguish* their characteristic reactions based on functional groups.
CO5: Assess the acidity, basicity, and reactivity of carboxylic acids and amines and *relate* their structure with pharmaceutical applications and formulation relevance.

Mapping of COs with POs and PSOs

COURSE OUTCOMES	PROGRAMME OUTCOMES											PROGRAMME SPECIFIC OUTCOMES		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	2	2	0	0	0	1	0	0	0	2	2	1	2	1
CO2	2	3	0	0	0	3	0	0	0	3	2	2	1	2
CO3	2	2	0	0	0	1	0	0	0	1	2	3	2	1
CO4	2	2	0	0	0	2	0	0	0	1	2	3	3	2
CO5	2	3	0	0	0	3	0	0	1	3	2	2	2	3

Biochemistry

Course Outcomes (COs)

CO1: Explain the structure, classification, and biological significance of biomolecules and summarize the principles of bioenergetics and energy-rich compounds.

CO2: Apply knowledge of carbohydrate metabolism and biological oxidation to illustrate how energy is produced and regulated in living systems.

CO3: Analyze the pathways and regulation of lipid and amino acid metabolism and interpret their role in metabolic disorders and clinical conditions.

CO4: Evaluate the synthesis and degradation of nucleic acids and examine the mechanisms of genetic information transfer, replication, transcription, and translation.

CO5: Design and jus*tify* enzyme-based approaches for therapeutic and diagnostic applications by integrating concepts of enzyme kinetics, inhibition, and regulation.

Mapping of COs with POs and PSOs

COURSE OUTCOMES	PROGRAMME OUTCOMES											PROGRAMME SPECIFIC OUTCOMES		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	2	1	2	0	2	0	0	1	0	1	1	1	2	3
CO2	2	3	1	2	1	1	1	0	0	1	2	2	1	3
CO3	2	3	2	1	0	1	1	0	2	1	2	3	2	1
CO4	2	3	1	1	0	1	1	0	1	1	2	3	1	2
CO5	2	3	1	1	0	1	1	0	1	1	0	3	2	2

Pathophysiology

Course Outcomes:

CO1: Explain the fundamental mechanisms of cell injury, inflammation, and tissue repair, including cellular adaptation, enzyme leakage, and electrolyte imbalance.

CO2: Apply the principles of pathophysiology to *describe* the causes, mechanisms, and clinical manifestations of cardiovascular, respiratory, and renal disorders.

CO3: Analyze the etiopathogenesis and complications of hematological, endocrine, neurological, and gastrointestinal disorders.

CO4: Evaluate the pathophysiological processes underlying hepatic, musculoskeletal, and neoplastic diseases to understand disease progression and therapeutic implications.

CO5: Integrate knowledge of infectious and sexually transmitted diseases to formulate preventive and therapeutic approaches based on their mechanisms and systemic effects.

Mapping of COs with POs and PSOs

COURSE OUTCOMES	PROGRAMME OUTCOMES											PROGRAMME SPECIFIC OUTCOMES		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	2	2	0	0	0	1	0	0	0	2	2	1	2	1
CO2	2	3	0	0	0	3	0	0	0	3	2	2	1	2
CO3	2	2	0	0	0	1	0	0	0	1	2	3	2	1
CO4	2	2	0	0	0	2	0	0	0	1	2	3	3	2
CO5	2	3	0	0	0	3	0	0	1	3	2	2	2	3

Computer Applications in Pharmacy

Course Outcomes:

CO1: Explain the fundamentals of number systems and perform conversions and arithmetic operations using binary, octal, decimal, and hexadecimal systems.

CO2: Apply database management concepts using software tools like MySQL and MS Access to *devel*op and *maintain* pharmacy-related drug databases.

CO3: Analyze the applications of computers in various pharmacy domains, including drug information retrieval, pharmacokinetic modeling, hospital systems, and electronic prescribing.

CO4: Evaluate the principles and databases of bioinformatics and assess their significance in pharmaceutical research and vaccine discovery.

CO5: Design and utilize computer-based data analysis systems such as CDS, LIMS, and TIMS for efficient management of preclinical and laboratory information.

Mapping of COs with POs and PSOs

COURSE OUTCOMES	PROGRAMME OUTCOMES											PROGRAMME SPECIFIC OUTCOMES		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	2	2	0	0	0	1	0	0	0	2	2	1	2	1
CO2	2	3	0	0	0	3	0	0	0	3	2	2	1	2
CO3	2	2	0	0	0	1	0	0	0	1	2	3	2	1
CO4	2	2	0	0	0	2	0	0	0	1	2	3	3	2
CO5	2	3	0	0	0	3	0	0	1	3	2	2	2	3

Environmental Sciences

Course Outcomes:

CO1: Explain the multidisciplinary nature of environmental studies and describe various natural resources and the challenges associated with their utilization and conservation.

CO2: Apply the principles of resource management to promote sustainable use of renewable and non-renewable natural resources in daily life and professional practice.

CO3: Analyze the structure, function, and interrelationships within different types of ecosystems such as forest, grassland, desert, and aquatic ecosystems.

CO4: Evaluate the causes, effects, and control measures of environmental pollution including air, water, and soil pollution, and *assess* their impact on human health and ecology.

CO5: Develop environmentally responsible strategies and propose sustainable solutions for conservation, pollution control, and ecological balance.

Mapping of COs with POs and PSOs

COURSE OUTCOMES	PROGRAMME OUTCOMES											PROGRAMME SPECIFIC OUTCOMES		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	2	1	2	0	2	0	0	1	0	1	1	1	2	3
CO2	2	3	1	2	1	1	1	0	0	1	2	2	1	3
CO3	2	3	2	1	0	1	1	0	2	1	2	3	2	1
CO4	2	3	1	1	0	1	1	0	1	1	2	3	1	2
CO5	2	3	1	1	0	1	1	0	1	1	0	3	2	2

SEMESTER III

Pharmaceutical Organic Chemistry II

Course Outcomes:

CO1: Identify structure, name and the type of isomerism of the organic compounds.
CO2: Classify heterocyclic compunds and illustrate synthetic approaches of pharmaceutically active five- and six-membered heterocyclic compounds.
CO3: Solve the detailed mechanisms of commonly used naming reactions in heterocyclic chemistry.
CO4: Execute synthetic strategies and the therapeutic applications of heterocyclic compounds in disease management
CO5: Explain optical and geometrical isomers and differentiate between them.

Mapping of COs with POs and PSOs

COURSE OUTCOMES	PROGRAMME OUTCOMES											PROGRAMME SPECIFIC OUTCOMES		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	2	2	2	2	-	2	-	-	2	-	-	1	1	2
CO2	2	3	2	3	-	1	-	-	1	-	-	2	1	2
CO3	2	2	3	3	-	1	-	-	1	-	-	2	2	3
CO4	2	3	3	3	-	1	-	-	-	-	-	2	2	1
CO5	2	2	3	3	-	1	-	-	-	-	-	3	2	2

Physical pharmaceutics I

Course Outcomes:

CO1: Identify and explain the physicochemical properties of drug molecules including pH, solubility, distribution, adsorption, and stability.
CO2: Recall the types and properties of surfactants and describe their pharmaceutical applications along with interfacial phenomena and thermodynamic principles.
CO3: Understand and describe flow behavior of fluids, rheology, and the concept of complexation.
CO4: Apply, analyze, and evaluate chemical stability data of drug products based on physicochemical principles.
CO5: Explain and apply the principles of pharmaceutical suspensions, colloids, and disperse systems.

Mapping of COs with POs and PSOs

COURSE OUTCOMES	PROGRAMME OUTCOMES											PROGRAMME SPECIFIC OUTCOMES		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	2	2	3	-	1	-	-	1	-	-	2	3	2
CO2	2	3	2	3	-	1	-	-	1	-	-	3	2	3
CO3	2	3	3	2	-	1	-	-	1	-	-	2	1	1
CO4	3	3	3	3	-	-	-	-	-	-	-	3	2	3
CO5	2	2	3	3	-	-	-	-	-	-	-	1	2	3

Pharmaceutical Microbiology

Course Outcomes:

CO1: Define the fundamental concepts of microbiology including historical perspectives, classification of microorganisms, and microscopy techniques used in microbial studies.

CO2: Explain various staining techniques, compare sterilization methods, and summarize their applications in pharmaceutical processes.

CO3: Demonstrate the use of disinfectants, implement sterility testing protocols for sterile products, and utilize microbial assays in evaluating pharmaceutical formulations.

CO4: Differentiate between microbial spoilage mechanisms, examine contamination sources in aseptic areas, and analyze methods of microbial quality control in pharmaceutical preparations.

CO5: Evaluate the microbial stability of pharmaceutical products, formulate standardization protocols for antibiotics and vitamins, and design aseptic environments to ensure product sterility.

Mapping of COs with POs and PSOs

COURSE OUTCOMES	PROGRAMME OUTCOMES											PROGRAMME SPECIFIC OUTCOMES		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	2	2	3	-	1	-	-	1	-	-			
CO2	2	3	2	3	-	1	-	-	1	-	-			
CO3	2	3	3	2	-	1	-	-	1	-	-			
CO4	3	3	3	3	-	-	-	-	-	-	-			
CO5	2	2	3	3	-	-	-	-	-	-	-			

Pharmaceutical Engineering

Course Outcomes:

CO1: Explain the unit operations and material handling techniques used in pharmaceutical industries.
CO2: Apply pharmaceutical manufacturing processes in practical contexts.
CO3: Analyse environmental control measures through pollution-prevention tests.
CO4: Evaluate the significance of plant layout design for optimum resource utilization.
CO5: Design preventive methods for corrosion control in pharmaceutical industries.

Mapping of COs with POs and PSOs

COURSE OUTCOMES	PROGRAMME OUTCOMES											PROGRAMME SPECIFIC OUTCOMES		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	3	-	-	-	3	2	-	-	2	2	1	1	2
CO2	2	-	-	-	-	3	2	-	-	3	3	2	1	2
CO3	3	3	-	1	-	2	2	-	-	3	3	2	2	3
CO4	2	-	-	-	-	2	3	-	1	2	2	2	2	1
CO5	3	2	-	3	2	3	3	2	-	3	3	3	2	2

SEMESTER IV

Pharmaceutical Organic Chemistry III

Course Outcomes:

CO1: Explain the fundamental concepts of stereochemistry including optical, geometrical, and conformational isomerism and differentiate their configurations and properties.
CO2: Apply stereochemical principles to predict chirality, optical activity, and stereochemical outcomes of organic reactions.
CO3: Analyze the structure, reactivity, and aromaticity of heterocyclic compounds such as pyrrole, furan, thiophene, and their analogues.
CO4: Evaluate the chemical behavior and medicinal significance of nitrogen and oxygen-containing heterocycles including pyridine, quinoline, and purine derivatives.
CO5: Design synthetic pathways using name reactions and rearrangements of synthetic importance (e.g., Birch, Clemmensen, Beckmann, Schmidt) for pharmaceutically relevant compounds.

Mapping of COs with POs and PSOs

COURSE OUTCOMES	PROGRAMME OUTCOMES											PROGRAMME SPECIFIC OUTCOMES		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	2	2	0	0	0	1	0	0	0	2	2	1	2	1
CO2	2	3	0	0	0	3	0	0	0	3	2	2	1	2
CO3	2	2	0	0	0	1	0	0	0	1	2	3	2	1
CO4	2	2	0	0	0	2	0	0	0	1	2	3	3	2
CO5	2	3	0	0	0	3	0	0	1	3	2	2	2	3

Medicinal Chemistry I

Course Outcomes:

CO1: Explain the basic principles of medicinal chemistry including physicochemical properties influencing biological activity and describe the processes of drug metabolism and factors affecting it.

CO2: Apply structure–activity relationship (SAR) principles to interpret the design and pharmacological action of adrenergic and cholinergic agents.

CO3: Analyze the mechanism of action and SAR of sedatives, hypnotics, antipsychotics, and anticonvulsants to understand their therapeutic significance.

CO4: Evaluate the pharmacological profiles and structure modifications of narcotic and non-narcotic analgesics, general anesthetics, and anti-inflammatory agents for efficacy and safety.

CO5: Design new or modified drug candidates by integrating knowledge of physicochemical, metabolic, and SAR parameters to optimize biological activity and reduce toxicity.

Mapping of COs with POs and PSOs

COURSE OUTCOMES	PROGRAMME OUTCOMES											PROGRAMME SPECIFIC OUTCOMES		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	2	1	2	0	2	0	0	1	0	1	1	1	2	3
CO2	2	3	1	2	1	1	1	0	0	1	2	2	1	3
CO3	2	3	2	1	0	1	1	0	2	1	2	3	2	1
CO4	2	3	1	1	0	1	1	0	1	1	2	3	1	2
CO5	2	3	1	1	0	1	1	0	1	1	0	3	2	2

Physical Pharmaceutics II

Course Outcomes:

CO1: Explain the principles of colloidal dispersions, their properties, and behaviour in pharmaceutical systems.
CO2: Apply rheological principles to analyse the flow and deformation behaviour of pharmaceutical liquids and semisolids for formulation design.
CO3: Analyze the formulation parameters, stability mechanisms, and evaluation of coarse dispersions such as suspensions and emulsions.
CO4: Evaluate micromeritic properties such as particle size, surface area, porosity, and flow characteristics to determine their impact on dosage form performance.
CO5: Design stable and effective pharmaceutical dosage forms by integrating concepts of reaction kinetics, degradation pathways, and stabilization techniques.

Mapping of COs with POs and PSOs

COURSE OUTCOMES	PROGRAMME OUTCOMES											PROGRAMME SPECIFIC OUTCOMES		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	2	2	0	0	0	1	0	0	0	2	2	1	2	1
CO2	2	3	0	0	0	3	0	0	0	3	2	2	1	2
CO3	2	2	0	0	0	1	0	0	0	1	2	3	2	1
CO4	2	2	0	0	0	2	0	0	0	1	2	3	3	2
CO5	2	3	0	0	0	3	0	0	1	3	2	2	2	3

Pharmacology I

Course Outcomes:

CO1: Explain the basic principles of pharmacology including pharmacokinetics, pharmacodynamics, routes of administration, and mechanisms of drug action.

CO2: Apply pharmacological principles to analyze factors influencing drug absorption, metabolism, excretion, and interactions in clinical situations.

CO3: Analyze the mechanism of action, therapeutic uses, and adverse effects of drugs acting on the peripheral nervous system and local anesthetics.

CO4: Evaluate the pharmacological actions and clinical applications of drugs acting on the central nervous system, including sedatives, anesthetics, anticonvulsants, and psychopharmacological agents.

CO5: Design rational therapeutic strategies and formulate safe drug regimens considering receptor mechanisms, drug interactions, and pharmacovigilance principles.

Mapping of COs with POs and PSOs

COURSE OUTCOMES	PROGRAMME OUTCOMES											PROGRAMME SPECIFIC OUTCOMES		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	2	1	2	0	2	0	0	1	0	1	1	1	2	3
CO2	2	3	1	2	1	1	1	0	0	1	2	2	1	3
CO3	2	3	2	1	0	1	1	0	2	1	2	3	2	1
CO4	2	3	1	1	0	1	1	0	1	1	2	3	1	2
CO5	2	3	1	1	0	1	1	0	1	1	0	3	2	2

Pharmacognosy and Phytochemistry I

Course Outcomes:

CO1: Explain the scope, sources, classification, and quality control parameters of drugs of natural origin.

CO2: Apply the principles of cultivation, collection, processing, and conservation techniques for medicinal plants to ensure quality and sustainability.

CO3: Analyze the role of plant tissue culture and biotechnological approaches in the production and standardization of medicinal plants and secondary metabolites.

CO4: Evaluate the significance of pharmacognosy in various traditional systems of medicine and *assess* the characteristics and identification tests for secondary metabolites.

CO5: Design appropriate strategies for the identification, evaluation, and utilization of drugs of natural origin—including primary metabolites and marine drugs—in pharmaceutical formulations.

Mapping of COs with POs and PSOs

COURSE OUTCOMES	PROGRAMME OUTCOMES											PROGRAMME SPECIFIC OUTCOMES		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	2	2	0	0	0	1	0	0	0	2	2	1	2	1
CO2	2	3	0	0	0	3	0	0	0	3	2	2	1	2
CO3	2	2	0	0	0	1	0	0	0	1	2	3	2	1
CO4	2	2	0	0	0	2	0	0	0	1	2	3	3	2
CO5	2	3	0	0	0	3	0	0	1	3	2	2	2	3

SEMESTER V

Medicinal chemistry II

Course Outcomes:

CO1: Explain and classify the different categories of medicinal drugs and its structure.
CO2: Discuss and illustrate the chemistry of drugs and apply the concept to evaluate their mechanism of action (MOA).
CO3: Create and formulate the synthetic route for medicinal drugs.
CO4: Appraise and monitor of therapeutic value and adverse effects of medicinal drugs.
CO5: Hypothesize the structure-activity relationship (SAR) of medicinal drugs.

Mapping of COs with POs and PSOs

COURSE OUTCOMES	PROGRAMME OUTCOMES											PROGRAMME SPECIFIC OUTCOMES		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	3	-	-	-	2	-	-	2	-	-			
CO2	3	3	-	-	-	2	-	-	2	-	-			
CO3	3	3	-	-	-	2	-	-	2	-	-			
CO4	3	3	2	-	-	2	-	-	3	-	-			
CO5	3	3	-	-	-	1	-	-	2	-	-			

Pharmacology II

Course Outcomes:

CO1: Define and interpret the mechanism of drug action and its application in the treatment of different diseases
CO2: Demonstrate the isolation of different organs/tissues from the laboratory animals
CO3: Distinguish both beneficial, side effects and adverse effect of particular drug
CO4: Detect the causes of pathological condition and verify the require drugs for a particular pathological condition.
CO5: Formulate the drug therapy regimen required for a particular pathological condition.

Mapping of COs with POs and PSOs

COURSE OUTCOMES	PROGRAMME OUTCOMES											PROGRAMME SPECIFIC OUTCOMES		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	3	0	2	3	3	3	3	3	3	3	1	1	2
CO2	3	3	0	2	3	3	2	2	3	3	3	2	1	2
CO3	3	3	0	2	3	3	3	3	3	3	3	2	2	3
CO4	3	3	0	2	3	3	3	3	3	3	3	2	2	1
CO5	3	3	0	2	3	3	3	3	3	3	3	3	2	2

Pharmacognosy and Phytochemistry II

Course Outcomes:

CO1: Illustrate the basic plant metabolites and the various metabolic pathways to form secondary metabolites.
CO2: Describe the details of phytochemicals for various pharmacological uses.
CO3: Practice the modern extraction techniques, characterization of the herbal drugs and phytoconstituents.
CO4: Demonstrate isolation and identification of phytoconstituents.
CO5: Hypothesize the modern evaluation techniques for the herbal drugs.

Mapping of COs with POs and PSOs

COURSE OUTCOMES	PROGRAMME OUTCOMES											PROGRAMME SPECIFIC OUTCOMES		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	0	3	3	0	0	3	0	2	0	3	2	3	2
CO2	3	0	2	2	0	0	2	0	2	0	3	3	2	3
CO3	3	0	2	2	0	0	2	0	2	0	3	2	1	1
CO4	3	0	2	2	0	0	3	0	3	0	3	3	2	3
CO5	3	0	3	3	0	0	3	0	2	0	3	1	2	3

Pharmaceutical Jurisprudence

Course Outcomes:

CO1: Acquire knowledge on schedule rules, laws andregulations related to drugs and cosmetics
CO2: Explain pharmaceutical legislation, history,evolution, and growth of pharmaceutical industry
CO3: Describe the pharmaceutical education and its regulatory bodies, pharmacy profession in concern to code of ethics
CO4: Explain other acts and rules associated with food and factories.
CO5: Explain the intellectual property rights and regulatory guidelines.

Mapping of COs with POs and PSOs

COURSE OUTCOMES	PROGRAMME OUTCOMES											PROGRAMME SPECIFIC OUTCOMES		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	0	3	2	3	0	2	0	2	0	3	1	1	2
CO2	3	0	3	2	3	0	3	0	2	0	3	2	1	2
CO3	3	0	3	3	3	0	2	0	3	0	3	2	2	3
CO4	3	0	3	3	3	0	3	0	3	0	3	2	2	1
CO5	3	0	2	2	0	0	3	0	3	0	3	3	2	2

Industrial Pharmacy I

Course Outcomes:

CO1: Define the various pharmaceutical dosage forms and their manufacturing techniques and explain the properties and selection of excipients used in different dosage forms.
CO2: Demonstrate the working mechanism of different instruments used in industrial preparation of various dosage forms, such as tablets, capsules, syrups, solutions, suspensions; and also understand different unit operations involved intheir manufacturing processs.
CO3: Analyze the quality control parameters for testing of different dosage forms and organize them in real practice.
CO4: Monitor and coordinate several steps and unit operations involved in industrial production of different solid, liquid, and semisolid dosage forms.
CO5: Design and formulate different types of solid, liquid and semisolid dosage forms and evaluate them for their quality.

Mapping of COs with POs and PSOs

COURSE OUTCOMES	PROGRAMME OUTCOMES											PROGRAMME SPECIFIC OUTCOMES		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	3	-	2	-	-	-	-	-	-	-	2	3	2
CO2	-	-	-	3	-	-	-	-	-	-	-	3	2	3
CO3	-	3	3	-	-	-	2	-	2	2	-	2	1	1
CO4	-	-	3	3	-	-	-	-	3	-	-	3	2	3
CO5	-	3	3	3	2	-	2	2	-	2	-	1	2	3

SEMESTER VI

Medicinal Chemistry III

Course Outcomes

CO1: Explain the chemistry, stereochemistry, structure–activity relationship (SAR), and degradation pathways of various classes of antibiotics and antimalarial agents.

CO2: Apply SAR principles to analyze the design, synthesis, and mechanism of action of anti-tubercular, antiviral, and urinary tract anti-infective agents.

CO3: Analyze the chemical features, mechanisms, and therapeutic relevance of antifungal, antiprotozoal, anthelmintic, sulfonamide, and sulfone drugs.

CO4: Evaluate the influence of physicochemical parameters on drug potency, selectivity, and pharmacokinetic behavior using quantitative structure–activity relationship (QSAR) models.

CO5: Design novel lead compounds and propose optimized structures using modern drug design techniques, including pharmacophore modeling, molecular docking, and combinatorial chemistry approaches.

Mapping of COs with POs and PSOs

COURSE OUTCOMES	PROGRAMME OUTCOMES											PROGRAMME SPECIFIC OUTCOMES		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	2	2	0	0	0	1	0	0	0	2	2	1	2	1
CO2	2	3	0	0	0	3	0	0	0	3	2	2	1	2
CO3	2	2	0	0	0	1	0	0	0	1	2	3	2	1
CO4	2	2	0	0	0	2	0	0	0	1	2	3	3	2
CO5	2	3	0	0	0	3	0	0	1	3	2	2	2	3

Pharmacology III

Course Outcomes

CO1: Explain the pharmacological actions, mechanisms, therapeutic uses, and adverse effects of drugs acting on the respiratory and gastrointestinal systems.

CO2: Apply the principles of chemotherapy to describe the mechanism of action, spectrum of activity, resistance, and clinical uses of major antimicrobial, antimalarial, antiprotozoal, and antihelminthic agents.

CO3: Analyze the pharmacological basis of drug therapy in urinary tract infections, sexually transmitted diseases, malignancy, and the role of immunopharmacological agents such as immunostimulants and immunosuppressants.

CO4: Evaluate the mechanisms, clinical manifestations, and management strategies of toxicological conditions caused by various poisons including barbiturates, morphine, heavy metals, and organophosphorus compounds.

CO5: Integrate knowledge of chronopharmacology to design suitable therapeutic regimens based on biological rhythms and drug timing for optimized therapeutic outcomes.

Mapping of COs with POs and PSOs

COURSE OUTCOMES	PROGRAMME OUTCOMES											PROGRAMME SPECIFIC OUTCOMES		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	2	1	2	0	2	0	0	1	0	1	1	1	2	3
CO2	2	3	1	2	1	1	1	0	0	1	2	2	1	3
CO3	2	3	2	1	0	1	1	0	2	1	2	3	2	1
CO4	2	3	1	1	0	1	1	0	1	1	2	3	1	2
CO5	2	3	1	1	0	1	1	0	1	1	0	3	2	2

Herbal Drug Technology

Course Outcomes:

CO1: Explain the sources, selection, authentication, and processing of herbal raw materials, principles of Indian systems of medicine, and good agricultural and collection practices (GACP) for medicinal plants.

CO2: Apply knowledge of nutraceuticals and herb–drug/herb–food interactions to understand their role in disease management and potential therapeutic or toxicological outcomes.

CO3: Analyze the sources, characteristics, and uses of herbal raw materials, excipients, and cosmetics, and *differentiate* between conventional and novel herbal formulations such as phytosomes.

CO4: Evaluate WHO and ICH guidelines**,** stability testing**,** and regulatory frameworks (IPR, patenting, Schedule Z) relevant to herbal drug standardization and quality assurance.

CO5: Design and formulate strategies for establishing a compliant herbal drug industry by applying Good Manufacturing Practices (Schedule T) and understanding infrastructure, documentation, and quality control requirements.

Mapping of COs with POs and PSOs

COURSE OUTCOMES	PROGRAMME OUTCOMES											PROGRAMME SPECIFIC OUTCOMES		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	2	2	0	0	0	1	0	0	0	2	2	1	2	1
CO2	2	3	0	0	0	3	0	0	0	3	2	2	1	2
CO3	2	2	0	0	0	1	0	0	0	1	2	3	2	1
CO4	2	2	0	0	0	2	0	0	0	1	2	3	3	2
CO5	2	3	0	0	0	3	0	0	1	3	2	2	2	3

Biopharmaceutics and Pharmacokinetics

Course Outcomes:

CO1: Explain the mechanisms and factors influencing drug absorption, distribution, and protein binding, and *summarize* their clinical significance in pharmacotherapy.

CO2: Apply the principles of drug metabolism, renal and non-renal excretion, and bioavailability/bioequivalence to interpret drug elimination profiles and dissolution enhancement methods.

CO3: Analyze pharmacokinetic model**s** (one-compartment and non-compartment) by determining key parameters (KE, t½, Vd, AUC, Ka, ClT, CLR) and correlate them with clinical relevance.

CO4: Evaluate multi-compartment kinetics and multiple dosing regimens, and *assess* their implications for achieving steady-state drug levels and rational dose adjustments.

CO5: Design and predict nonlinear pharmacokinetic models using Michaelis-Menten kinetics to understand dose-dependent drug behaviour and optimize therapeutic regimens.

Mapping of COs with POs and PSOs

COURSE OUTCOMES	PROGRAMME OUTCOMES											PROGRAMME SPECIFIC OUTCOMES		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	2	1	2	0	2	0	0	1	0	1	1	1	2	3
CO2	2	3	1	2	1	1	1	0	0	1	2	2	1	3
CO3	2	3	2	1	0	1	1	0	2	1	2	3	2	1
CO4	2	3	1	1	0	1	1	0	1	1	2	3	1	2
CO5	2	3	1	1	0	1	1	0	1	1	0	3	2	2

Pharmaceutical Biotechnology

Course Outcomes:

CO1: Explain the fundamentals of biotechnology, including enzyme immobilization, biosensors, protein engineering, microbial applications, and basic principles of genetic engineering.

CO2: Apply the concepts of recombinant DNA technology in the production of biopharmaceuticals such as interferon, vaccines (Hepatitis-B), and hormones (insulin), using cloning vectors and PCR techniques.

CO3: Analyze the immune system mechanisms, including humoral and cellular immunity, immunoglobulin structure, hypersensitivity reactions, and evaluate vaccine preparation and hybridoma technology.

CO4: Evaluate genetic and molecular biology techniques such as blotting methods (ELISA, Western, Southern), microbial genetics (transformation, conjugation, transduction), and mutation processes in biotechnology applications.

CO5: Design and demonstrate the biotechnological production process through fermentation — including media selection, fermenter design, control parameters, and large-scale production of bioproducts like penicillin, citric acid, vitamin B12, and glutamic acid.

Mapping of COs with POs and PSOs

COURSE OUTCOMES	PROGRAMME OUTCOMES											PROGRAMME SPECIFIC OUTCOMES		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	2	2	0	0	0	1	0	0	0	2	2	1	2	1
CO2	2	3	0	0	0	3	0	0	0	3	2	2	1	2
CO3	2	2	0	0	0	1	0	0	0	1	2	3	2	1
CO4	2	2	0	0	0	2	0	0	0	1	2	3	3	2
CO5	2	3	0	0	0	3	0	0	1	3	2	2	2	3

Pharmaceutical Quality Assurance

Course Outcomes:

CO1: Explain the fundamental concepts of Quality Assurance and Quality Management, including GMP, TQM, ISO standards, QbD principles, and ICH guidelines related to pharmaceutical quality systems.

CO2: Apply the principles of personnel management, premises design, equipment qualification, and material control to ensure compliance with Good Manufacturing Practices (GMP).

CO3: Analyze the Quality Control and Good Laboratory Practices (GLP) requirements for materials, containers, closures, and laboratory operations, ensuring reliability and reproducibility of test results.

CO4: Evaluate the documentation and complaint handling systems, including preparation of Master Formula Records, SOPs, Quality Audits, and recall procedures as per regulatory expectations.

CO5: Design and implement effective validation and calibration protocols for instruments and analytical methods, and develop systematic warehousing and materials management strategies as per GWP (Good Warehousing Practices).

Mapping of COs with POs and PSOs

COURSE OUTCOMES	PROGRAMME OUTCOMES											PROGRAMME SPECIFIC OUTCOMES		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	2	1	2	0	2	0	0	1	0	1	1	1	2	3
CO2	2	3	1	2	1	1	1	0	0	1	2	2	1	3
CO3	2	3	2	1	0	1	1	0	2	1	2	3	2	1
CO4	2	3	1	1	0	1	1	0	1	1	2	3	1	2
CO5	2	3	1	1	0	1	1	0	1	1	0	3	2	2

SEMESTER VII

Industrial Pharmacy II

Course Outcomes:

CO1: Define the principles and considerations involved in pilot plant scale-up, including SUPAC guidelines and platform technologies, for various pharmaceutical dosage forms.

CO2: Utilize the WHO guidelines for technology transfer to design a structured technology transfer protocol, considering quality risk management and regulatory documentation requirements.

CO3: Examine the roles and responsibilities of regulatory affairs professionals and evaluate the regulatory pathways involved in investigational and new drug applications.

CO4: Differentiate various quality management systems such as TQM, Q_bD, and Six Sigma, and illustrate their application in achieving pharmaceutical quality certifications.

CO5: Implement the knowledge of roles of CDSCO and State Licensing Authorities to explain the approval procedures and regulatory requirements for new drugs in India.

Mapping of COs with POs and PSOs

COURSE OUTCOMES	PROGRAMME OUTCOMES											PROGRAMME SPECIFIC OUTCOMES		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	3	-	1	1	2	-	-	-	2	1	2	3	2
CO2	3	3	1	2	2	2	1	1	-	3	2	3	2	3
CO3	3	2	1	3	3	2	1	1	-	2	2	2	1	1
CO4	3	2	-	2	2	3	-	-	-	3	2	3	2	3
CO5	3	2	1	3	3	2	1	1	-	2	2	1	2	3

Instrumental Methods of Analysis

Course Outcomes:

CO1: The basic theoretical knowledge of the instrumentation techniques available.
CO2: Theoretically understand the aspects of separation for multi components.
CO3: Practical skills for the analysis of drugs and excipients using various instrumentation techniques.
CO4: To make an accurate analysis and report the results in defined formats.
CO5: To learn documentation and express the observations with clarity and understand the professional and safety responsibilities for working in the analysis laboratory.

Mapping of COs with POs and PSOs

COURSE OUTCOMES	PROGRAMME OUTCOMES											PROGRAMME SPECIFIC OUTCOMES		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	2	–	1	1	2	–	–	1	1	2	1	1	2
CO2	3	3	–	1	1	3	–	–	2	3	2	2	1	2
CO3	2	2	–	2	1	3	1	1	1	3	3	2	2	3
CO4	2	2	–	3	2	3	2	2	1	3	3	2	2	1
CO5	3	3	1	3	3	3	1	2	2	3	3	3	2	2

Novel Drug Delivery Systems

Course Outcomes:

CO1: Understand the fundamental concepts, advantages, and limitations of novel drug delivery systems (NDDS).

CO2: Analyze various approaches such as diffusion, dissolution, and ion-exchange used in controlled drug delivery systems.

CO3: Evaluate the selection criteria of drugs and polymers in the formulation of NDDS and assess their physicochemical and biological considerations.

CO4: Apply formulation techniques to design systems like transdermal, mucoadhesive, gastroretentive, nasal, pulmonary, and implantable drug delivery systems.

CO5: Critically assess targeted, ocular, and intrauterine drug delivery systems including current technologies like liposomes, nanoparticles, and monoclonal antibodies.

Mapping of COs with POs and PSOs

COURSE OUTCOMES	PROGRAMME OUTCOMES											PROGRAMME SPECIFIC OUTCOMES		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	2	2	1	2	1	0	0	0	1	1	1	2	3	2
CO2	2	3	1	3	1	3	1	0	3	1	1	3	2	3
CO3	3	2	1	2	0	3	1	0	2	1	1	2	1	1
CO4	3	2	1	2	0	3	1	0	2	1	1	3	2	3
CO5	3	2	1	2	0	3	1	0	2	1	1	1	2	3

Pharmacy Practice

Course Outcomes:

CO1: Explain the principles relevant to pharmacy practice.
CO2: Apply knowledge of hospital drug distribution methods and effectively in pharmacy practice.
CO3: Demonstrate drug store management and inventory control techniques in medication use processes.
CO4: Analyze and evaluate drug therapy through medication chart review, obtain medication histories, counsel patients, and identify drug-related problems to provide patient-centered care.
CO5: Design innovative pharmacy practices and produce ethical and safe medication use strategies based on clinical trial knowledge and professional standards.

Mapping of COs with POs and PSOs

COURSE OUTCOMES	PROGRAMME OUTCOMES											PROGRAMME SPECIFIC OUTCOMES		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	-	3	3	3	-	3	3	2	2	2	2	3	2
CO2	2	-	3	2	3	-	3	2	3	3	2	3	2	3
CO3	3	-	3	3	3	-	3	1	-	2	2	2	1	1
CO4	3	-	3	3	3	-	1	3	1	3	2	3	2	3
CO5	3	-	3	3	3	-	2	-	2	2	2	1	2	3

SEMESTER VIII

Biostatistics and Research Methodology

Course Outcomes

CO1: Explain the fundamental concepts of biostatistics, including measures of central tendency, dispersion, correlation, and probability distributions relevant to pharmaceutical data analysis.

CO2: Apply appropriate parametric and non-parametric statistical tests such as t-test, ANOVA, Wilcoxon, and Kruskal-Wallis for analysis and interpretation of pharmaceutical and clinical data.

CO3: Analyze data using regression, correlation, and factorial design techniques to establish relationships between variables and optimize pharmaceutical processes.

CO4: Evaluate the design, methodology, and validity of experimental, clinical, and observational research studies by applying principles of hypothesis testing, sampling, and data reliability.

CO5: Design and develop research protocols, data presentation formats, and optimization studies using software tools like Excel, SPSS, MINITAB, and Design of Experiments (DOE).

Mapping of COs with POs and PSOs

COURSE OUTCOMES	PROGRAMME OUTCOMES											PROGRAMME SPECIFIC OUTCOMES		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	2	1	2	0	2	0	0	1	0	1	1	1	2	3
CO2	2	3	1	2	1	1	1	0	0	1	2	2	1	3
CO3	2	3	2	1	0	1	1	0	2	1	2	3	2	1
CO4	2	3	1	1	0	1	1	0	1	1	2	3	1	2
CO5	2	3	1	1	0	1	1	0	1	1	0	3	2	2

Social and Preventive Pharmacy

Course Outcomes:

CO1: Explain the concepts of health, disease, and public health, including prevention and control of diseases, nutrition, hygiene, and the influence of sociocultural factors on health.

CO2: Apply the principles of preventive medicine in understanding disease prevention, control measures, and the management of communicable and non-communicable diseases.

CO3: Analyze the objectives, functioning, and outcomes of various national health programs and their impact on public health improvement in India.

CO4: Evaluate the roles and effectiveness of national health interventions such as maternal and child welfare programs, family welfare, and WHO initiatives in improving community health standards.

CO5: Design and propose community health awareness strategies for rural, urban, and school health settings, emphasizing sanitation, health promotion, and disease prevention.

Mapping of COs with POs and PSOs

COURSE OUTCOMES	PROGRAMME OUTCOMES											PROGRAMME SPECIFIC OUTCOMES		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	2	2	0	0	0	1	0	0	0	2	2	1	2	1
CO2	2	3	0	0	0	3	0	0	0	3	2	2	1	2
CO3	2	2	0	0	0	1	0	0	0	1	2	3	2	1
CO4	2	2	0	0	0	2	0	0	0	1	2	3	3	2
CO5	2	3	0	0	0	3	0	0	1	3	2	2	2	3

Pharma Marketing Management

Course Outcomes:

CO1: Explain the fundamental concepts of marketing and pharmaceutical marketing, including consumer behavior, market segmentation, and the role of market research.

CO2: Apply the principles of product management such as product life cycle, product mix, branding, and packaging in pharmaceutical marketing decisions.

CO3: Analyze the promotion and distribution strategies used in pharmaceutical marketing, including the role and effectiveness of various promotional tools and sales representatives.

CO4: Evaluate the pricing strategies and regulatory frameworks like DPCO and NPPA influencing pharmaceutical marketing practices.

CO5: Design comprehensive marketing strategies incorporating product, price, place, and promotion (4Ps) for different market segments and emerging trends such as rural and global marketing.

Mapping of COs with POs and PSOs

COURSE OUTCOMES	PROGRAMME OUTCOMES											PROGRAMME SPECIFIC OUTCOMES		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	2	2	0	0	0	1	0	0	0	2	2	1	2	1
CO2	2	3	0	0	0	3	0	0	0	3	2	2	1	2
CO3	2	2	0	0	0	1	0	0	0	1	2	3	2	1
CO4	2	2	0	0	0	2	0	0	0	1	2	3	3	2
CO5	2	3	0	0	0	3	0	0	1	3	2	2	2	3

Pharmaceutical Regulatory Science

Course Outcomes

CO1: Explain the stages of new drug discovery and development, including pre-clinical, clinical, and generic drug product development processes.
CO2: Apply knowledge of regulatory approval pathways such as IND, NDA, and ANDA processes, and identify the roles of major global regulatory authorities.
CO3: Analyze the registration procedures for Indian drugs in overseas markets, including documentation requirements like DMF, CTD, eCTD, and ACTD.
CO4: Evaluate the ethical and operational aspects of clinical trials, including protocol design, informed consent, GCP compliance, and pharmacovigilance practices.
CO5: Develop a regulatory strategy incorporating global regulatory concepts, terminology, and reference documents such as the Orange Book and Federal Register.

Mapping of COs with POs and PSOs

COURSE OUTCOMES	PROGRAMME OUTCOMES											PROGRAMME SPECIFIC OUTCOMES		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	2	1	2	0	2	0	0	1	0	1	1	1	2	3
CO2	2	3	1	2	1	1	1	0	0	1	2	2	1	3
CO3	2	3	2	1	0	1	1	0	2	1	2	3	2	1
CO4	2	3	1	1	0	1	1	0	1	1	2	3	1	2
CO5	2	3	1	1	0	1	1	0	1	1	0	3	2	2

Pharmacovigilance

Course Outcomes

CO 1: Explain the concept, history, and importance of pharmacovigilance, including global and national programs (WHO-UMC, PvPI) and classification, detection, and management of adverse drug reactions (ADRs).

CO 2: Apply knowledge of drug classification systems, coding standards (MedDRA, WHO-ART, ICD), and procedures for establishing pharmacovigilance programs in hospitals, industries, and CROs.

CO 3: Analyze pharmacovigilance methods and communication strategies, including passive and active surveillance, observational studies, and crisis communication with stakeholders.

CO 4: Evaluate safety data from pre-clinical, clinical, and post-marketing phases in accordance with ICH guidelines and good pharmacovigilance practices (GVP).

CO 5: Develop a framework for drug safety monitoring in special populations and integrate pharmacogenomic and regulatory (CIOMS, CDSCO, Schedule Y) principles into ADR management systems.

Mapping of COs with POs and PSOs

COURSE OUTCOMES	PROGRAMME OUTCOMES											PROGRAMME SPECIFIC OUTCOMES		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	2	2	0	0	0	1	0	0	0	2	2	1	2	1
CO2	2	3	0	0	0	3	0	0	0	3	2	2	1	2
CO3	2	2	0	0	0	1	0	0	0	1	2	3	2	1
CO4	2	2	0	0	0	2	0	0	0	1	2	3	3	2
CO5	2	3	0	0	0	3	0	0	1	3	2	2	2	3

Computer Aided Drug Design (CADD)

Course Outcomes

CO1: Explain the stages of drug discovery and development, and *describe* rational and analog-based drug design approaches including bioisosterism and related case studies.

CO2: Apply the concepts of physicochemical parameters (Hammett constant, Taft's steric constant, partition coefficient) in developing QSAR models and differentiate between SAR and QSAR approaches.

CO3: Analyze virtual screening and molecular docking techniques (rigid, flexible, and de novo design) for identifying potential lead compounds in drug discovery.

CO4: Evaluate the role of bioinformatics and chemoinformatics databases in predicting ADME properties and supporting rational drug design.

CO5: Design and construct molecular models using energy minimization and conformational analysis based on principles of molecular mechanics and quantum mechanics**.**

Mapping of COs with POs and PSOs

COURSE OUTCOMES	PROGRAMME OUTCOMES											PROGRAMME SPECIFIC OUTCOMES		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	2	1	2	0	2	0	0	1	0	1	1	1	2	3
CO2	2	3	1	2	1	1	1	0	0	1	2	2	1	3
CO3	2	3	2	1	0	1	1	0	2	1	2	3	2	1
CO4	2	3	1	1	0	1	1	0	1	1	2	3	1	2
CO5	2	3	1	1	0	1	1	0	1	1	0	3	2	2

Cell and Molecular Biology

Course Outcomes:

CO1: Explain the structure, properties, and functions of prokaryotic and eukaryotic cells, cell membranes, and chemical foundations underlying molecular biology.

CO2: Apply the concepts of DNA replication, transcription, and translation to understand the flow of genetic information and gene expression in living systems.

CO3: Analyze protein structure, synthesis, and cellular processes, emphasizing the regulation and control mechanisms of protein pathways.

CO4: Evaluate the principles of genetics, transgenics, and genomic analysis, and differentiate the mechanisms of cell division and cycle regulation.

CO5: Construct models of cell signaling pathways to demonstrate the role of receptors, protein kinases, and their misregulation in cellular communication and disease.

Mapping of COs with POs and PSOs

COURSE OUTCOMES	PROGRAMME OUTCOMES											PROGRAMME SPECIFIC OUTCOMES		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	2	2	0	0	0	1	0	0	0	2	2	1	2	1
CO2	2	3	0	0	0	3	0	0	0	3	2	2	1	2
CO3	2	2	0	0	0	1	0	0	0	1	2	3	2	1
CO4	2	2	0	0	0	2	0	0	0	1	2	3	3	2
CO5	2	3	0	0	0	3	0	0	1	3	2	2	2	3

Cosmetic Science

Course Outcomes:

CO1: Explain the classification, regulatory definitions, and components of cosmetic and cosmeceutical products, including excipients and their functional roles.

CO2: Apply the principles of formulation and development for skin care, hair care, and oral care products, including understanding their active ingredients and mechanisms.

CO3: Analyze the role of herbal ingredients (like aloe, turmeric, henna, neem, and clove) in cosmetic formulations and *evaluate* BIS specifications and analytical methods for cosmetic products.

CO4: Evaluate the principles and techniques of cosmetic evaluation, such as sebumeter, corneometer, TEWL, and hair tensile strength measurements.

CO5: Develop an understanding to design suitable formulations for managing common skin, hair, and oral cosmetic problems, and *justify* the use of appropriate actives such as antiperspirants and deodorants.

Mapping of COs with POs and PSOs

COURSE OUTCOMES	PROGRAMME OUTCOMES											PROGRAMME SPECIFIC OUTCOMES		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	2	2	0	0	0	1	0	0	0	2	2	1	2	1
CO2	2	3	0	0	0	3	0	0	0	3	2	2	1	2
CO3	2	2	0	0	0	1	0	0	0	1	2	3	2	1
CO4	2	2	0	0	0	2	0	0	0	1	2	3	3	2
CO5	2	3	0	0	0	3	0	0	1	3	2	2	2	3

Pharmacological Screening Methods

Course Outcomes:

CO1: Explain the ethical guidelines (CPCSEA and OECD) and *describe* the maintenance, breeding, and handling procedures for various laboratory animals used in preclinical studies.

CO2: Apply knowledge of dose calculation**,** species selection, and experimental design in planning and performing preclinical studies, including the use of control groups and drug administration techniques.

CO3: Analyze the screening methods for evaluating CNS and ANS active drugs such as analgesics, sedatives, antidepressants, sympathomimetics, and parasympatholytics using appropriate animal models.

CO4: Evaluate preclinical screening models for CVS and other system-active drugs (antiulcer, antidiabetic, anticancer, anti-asthmatic) and interpret their pharmacological significance in drug discovery.

CO5: Design a preclinical research protocol including hypothesis formulation, study design, data collection, and statistical analysis (Student's t-test, ANOVA), with graphical representation of results.

Mapping of COs with POs and PSOs

COURSE OUTCOMES	PROGRAMME OUTCOMES											PROGRAMME SPECIFIC OUTCOMES		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	2	1	2	0	2	0	0	1	0	1	1	1	2	3
CO2	2	3	1	2	1	1	1	0	0	1	2	2	1	3
CO3	2	3	2	1	0	1	1	0	2	1	2	3	2	1
CO4	2	3	1	1	0	1	1	0	1	1	2	3	1	2
CO5	2	3	1	1	0	1	1	0	1	1	0	3	2	2

Advanced Instrumentation Techniques

Course Outcomes:

CO1: Explain the principles, instrumentation, and applications of NMR and Mass Spectrometry, including chemical shift, spin–spin coupling, ionization techniques, and analyzers.

CO2: Apply the knowledge of thermal and X-ray diffraction methods (TGA, DTA, DSC, and XRD) for the characterization and structural elucidation of pharmaceutical compounds.

CO3: Analyze the procedures for calibration and validation of analytical instruments such as UV-Vis, IR, HPLC, GC, and balance as per ICH and USFDA guidelines.

CO4: Evaluate the principle, techniques, and applications of Radio Immunoassay and extraction methods (solid-phase and liquid-liquid) for analytical sample preparation.

CO5: Integrate and design analytical approaches using hyphenated techniques such as LC-MS/MS, GC-MS/MS, and HPTLC-MS for advanced pharmaceutical analysis.

Mapping of COs with POs and PSOs

COURSE OUTCOMES	PROGRAMME OUTCOMES											PROGRAMME SPECIFIC OUTCOMES		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	2	2	0	0	0	1	0	0	0	2	2	1	2	1
CO2	2	3	0	0	0	3	0	0	0	3	2	2	1	2
CO3	2	2	0	0	0	1	0	0	0	1	2	3	2	1
CO4	2	2	0	0	0	2	0	0	0	1	2	3	3	2
CO5	2	3	0	0	0	3	0	0	1	3	2	2	2	3

Dietary Supplements and Nutraceuticals

Course Outcomes:

CO1: Explain the concept, classification, and importance of functional foods, nutraceuticals, and dietary supplements, along with their role in preventing and managing major health disorders.

CO2: Apply knowledge of phytochemicals and bioactive compounds such as carotenoids, flavonoids, polyphenols, and phytoestrogens to evaluate their therapeutic benefits and nutritional applications.

CO3: Analyze the generation and impact of free radicals on biological macromolecules and the role of dietary fibers and complex carbohydrates as functional ingredients.

CO4: Evaluate the role of antioxidants (endogenous, synthetic, and natural) in disease prevention and discuss their mechanisms in combating oxidative stress-related disorders.

CO5: Integrate regulatory, safety, and quality control principles (FSSAI, FDA, HACCP, GMP) to design and assess stable, effective, and compliant nutraceutical formulations.

Mapping of COs with POs and PSOs

COURSE OUTCOMES	PROGRAMME OUTCOMES											PROGRAMME SPECIFIC OUTCOMES		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	2	2	0	0	0	1	0	0	0	2	2	1	2	1
CO2	2	3	0	0	0	3	0	0	0	3	2	2	1	2
CO3	2	2	0	0	0	1	0	0	0	1	2	3	2	1
CO4	2	2	0	0	0	2	0	0	0	1	2	3	3	2
CO5	2	3	0	0	0	3	0	0	1	3	2	2	2	3