



**K. R. MANGALAM UNIVERSITY**

**THE COMPLETE WORLD OF EDUCATION**

## **School of Medical and Allied Sciences**

**Bachelor of Pharmacy**

**(B. Pharm.)**

**Program Code: 12**

**(2022-2026)**

**Approved in the 29<sup>th</sup> Meeting of Academic Council Held on 09  
August 2022**



  
**Registrar**  
K. R. Mangalam University  
Sohna Road, Gurugram, (Haryana)



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## **PREFACE**

The KRMU envisions all its programs in the best interest of their students and in this endeavour it offers a new vision to all its courses. Through its programs it aims to provide a focused, student-centric syllabus with an agenda to structure the teaching-learning experiences experientially.

The curriculum strengthens students' experiences and prepare the students for both, academia and employability, sustainability and life-long learning.

Each program reflects the promise to accomplish the learning outcomes by studying the courses. The graduate attributes encompass values related to well-being, emotional stability, critical thinking, social justice and also skills for entrepreneurship.

The K.R. Mangalam University hopes the curriculum will help students in making an informed decision at the time of working in the field of pharmacy.

## **ACKNOWLEDGEMENT**

The development of the curriculum for Undergraduate degree courses in the School of Medical and Allied Sciences is a result of thoughtful deliberations at various stages of dedicated and specialized experts. This curriculum has been framed to meet the expectations of an academically challenging environment, develop problem-solving skills by students and align with current standards and to enrich the students to make them self-enablers and/or match job requirements on successful completion of their degrees.

I wish to acknowledge all our experts who have been involved in the process of developing this curriculum for B. Pharmacy. I am greatly gratified Ms. Manvi Arora for her supervision contribution, guidance, and support throughout the development of this curriculum. Special thanks and gratitude to Prof. Aditya Mallik Vice Chancellor, K.R. Mangalam University who have been instrumental and encouraging throughout the process of developing this curriculum. Last, but not the least, I also sincerely thanks to all faculty members for preparation of this handbook for B. Pharmacy program.

**Dean**

**School of Medical and Allied Sciences**

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## **1. Introduction**

The K.R. Mangalam Group has made a name for itself in the field of education. The K.R. Mangalam story goes back to the chain of schools that offered an alternative option of world-class education, pitching itself against the established elite schools, which had enjoyed a position of monopoly till then. Having blazed a new trail in school education, the focus of the group was aimed at higher education.

K.R. Mangalam University is the fastest-growing higher education institute in Gurugram, India. K. R. Mangalam University was established under the Haryana Private University Act 2006, received the approval of Haryana Legislature vide Amendment Act # 36 of 2013 and consent of the Hon'ble Governor of Haryana on 11th April 2013, which was published in the Gazette notification vide Leg. No.10/2013, dated 3rd May 2013.

Since its inception in 2013, the University has been striving to fulfil its prime objective of transforming young lives through ground-breaking pedagogy, global collaborations, and world-class infrastructure. Resources at K.R Mangalam University have been continuously upgraded to optimize opportunities for the students. Our students are groomed in a truly interdisciplinary environment where they grow up with integrative skills through interaction with students from engineering, social sciences, management and other study streams.

### **1.1 K. R. Mangalam University is unique because of its**

- I. Enduring legacy of providing education to high achievers who demonstrate leadership in diverse fields.
- II. Protective and nurturing environment for teaching, research, creativity, scholarship, social and economic justice.

### **1.2 Objectives**

1. To impart undergraduate, post-graduate and Doctoral education in identified areas of higher education.
2. To undertake research programs with industrial interface.
3. To integrate its growth with the global needs and expectations of the major stake holders through teaching, research, exchange & collaborative programs with foreign, Indian Universities/Institutions and MNCs.
4. To act as a nodal center for transfer of technology to the industry.

To provide job oriented professional education to the student community with particular focus on Haryana

## **2. About School**

School of Medical and Allied Sciences mainly focused on training to students for various subjects and practical aspects related to drug formulation and testing along with co-curricular development. School offers Diploma, undergraduate, post graduate courses in pharmacy and Bachelor degree in physiotherapy post. We provide an extra edge to our students by teaching and training by leading Pharma industry experts to facilitate industry academia interaction, participation in conferences / workshops / skill development programs, carrier guidance, coaching for GPAT and other competitive examinations. We encourage students to participate in various health camps organized by department to make general awareness amongst people regarding various diseases like diabetes, hypertension, communicable and non-communicable diseases. We provide placement assistance to students for getting jobs in various government and private laboratories. We have tie up with various pharmaceutical industries like Dabur Research Foundation, Sun Pharma, Arbo Pharma, Indian Pharmacopoeial Commission, Catalyst Clinical Services, Suraksha Pharma, Medicamen Biotech , Mankind Pharma etc. which provide various carrier opportunities in pharmaceutical production, pharmaceutical quality control, quality assurance, pharmaceutical sales & distribution, drug information services, health insurance, medical coding, supply chain management, forensic sciences, pharmacovigilance, product management team, clinical trials, clinical data management and in Indian Pharmacopeia Commission.

### **3. School Vision**

To contribute towards healthcare needs of the society by producing a skilled, motivated and accessible workforce dedicated towards achieving health for all.

### **4. School Mission**

**M1:** To produce self-motivated, self-reliant and socially sensitive young healthcare professionals catering to the needs of academia, industry and research.

**M2:** To create a centre of excellence for learning and research in the field of pharmaceutical and allied health sciences with inter-disciplinary approach in emerging area of science and technology with focus on industry-academia interaction.

**M3:** To nurture transformational research for the benefit of the society.

**M4:** To interlink pharmaceutical and allied health sciences with interdisciplinary life sciences.

## **5. Programs offered by the school**

School offers diploma, undergraduate, post-graduate and doctoral Programme in Pharmacy all these programs are designed to impart scientific knowledge to the students and will provide theoretical as well as practical training in their respective fields. The programs offered by the school are approved by Pharmacy Council of India, New Delhi.

### **5.1 B. Pharmacy**

School of Medical and Allied Sciences offers B. Pharmacy degree course which is duly approved by the Pharmacy Council of India (F.No.01.109/2020-PCI, minutes of 109th central council meeting on 08-09 April, 2020, Item No. HR-17 /2020-2021). The curriculum has been specifically designed so as to impart latest knowledge and skills relevant to Pharmaceutical Sciences including Industrial Visits / Training / Guest Lectures of Experts from Industry and Academia.

### **5.2 Eligibility Criteria:**

#### **5.2.1 First year B. Pharm:**

Candidate shall have passed 10+2 examination conducted by the respective state/central government authorities recognized as equivalent to 10+2 examination by the Association of Indian Universities (AIU) with English as one of the subjects and Physics, Chemistry, Mathematics (P.C.M) and or Biology (P.C.B / P.C.M.B.) as optional subjects individually. Any other qualification approved by the Pharmacy Council of India as equivalent to any of the above examinations.

#### **5.2.2 B. Pharm lateral entry (to third semester):**

A pass in D. Pharmacy course from an institution approved by the Pharmacy Council of India under section 12 of the Pharmacy Act.

#### **4.2.3 Course Outline:**

Inorganic chemistry / Organic chemistry / Pharmaceutics / Analysis / Environmental Sciences / Biochemistry / Pharmaceutical Chemistry / Pharmacology/ Pharmacognosy.



#### 4.2.4 Career Options:

Opportunities exist in Drug Inspector Drug Analyst Research & Development of Drugs, Cosmetics, Diagnostics and Vaccines, Drug Patents, Medical Writing, Quality Control, Clinical Research, Hospital Pharmacy, Community Pharmacy/Pharmaceutical Marketing, pharmaceutical industries, regulatory education and forensic drug laboratories.

#### 4.2.5 Program Duration

The course of study for B. Pharmacy shall extend over a period of eight semesters (four academic years) and six semesters (three academic years) for lateral entry students. The curriculum and syllabi for the program shall be prescribed from time to time by Pharmacy Council of India, New Delhi.

#### 4.2.6 Class Timings

The classes will be held from Monday to Friday from 09:10 am to 04:00 pm.

#### 5.2.7 Syllabus

The syllabus of B. Pharmacy programs offered by SMAS is as per the norms of Pharmacy Council of India, New Delhi as mentioned below Programme Duration: - 4 Years the maximum period for the completion of the B. Pharmacy Programme offered by the University shall be four years.

### 5. Syllabus and Scheme of Studies of B. Pharmacy Programme

#### 6.1 Four year B. Pharmacy Programme at a glance

	Semester I	Semester II	Semester III	Semester IV	Semester V	Semester VI	Semester VII	Semester VIII	Total
Courses	12	10	8	9	9	9	11	6	74
Credits	30	29	24	28	25	22	27	23	208

Semester-I					
Course code	Course Title	L	T	P	C
BP101T	Human Anatomy and Physiology I– Theory	3	1		4

BP102T	Pharmaceutical Analysis I – Theory	3	1		4
BP103T	Pharmaceutics I – Theory	3	1		4
BP104T	Pharmaceutical Inorganic Chemistry – Theory	3	1		4
BP105T	Communication skills – Theory *	2	-		2
BP106RBT/ BP106RMT	Remedial Biology/ Remedial Mathematics – Theory*	2	-		2
BP107P	Human Anatomy and Physiology – Practical		-	4	2
BP108P	Pharmaceutical Analysis I – Practical		-	4	2
BP109P	Pharmaceutics I – Practical		-	4	2
BP110P	Pharmaceutical Inorganic Chemistry – Practical		-	4	2
BP111P	Communication skills – Practical*		-	2	1
BP112RBP	Remedial Biology – Practical*		-	2	1
	<b>Total</b>	<b>16</b>	<b>4</b>	<b>20</b>	<b>30</b>

<b>Semester-II</b>					
<b>Course code</b>	<b>Course Title</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
BP201T	Human Anatomy and Physiology II – Theory	3	1		4
BP202T	Pharmaceutical Organic Chemistry I – Theory	3	1		4
BP203T	Biochemistry – Theory	3	1		4
BP204T	Pathophysiology – Theory	3	1		4
BP205T	Computer Applications in Pharmacy – Theory *	3	-		3
BP206T	Environmental sciences – Theory *	3	-		3
BP207P	Human Anatomy and Physiology II –Practical		-	4	2
BP208P	Pharmaceutical Organic Chemistry I– Practical		-	4	2
BP209P	Biochemistry – Practical		-	4	2
BP210P	Computer Applications in Pharmacy – Practical*		-	2	1
<b>Total</b>		<b>32</b>	<b>4</b>	<b>14</b>	<b>29</b>

<b>Semester-III</b>					
<b>Course code</b>	<b>Course Title</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>

BP301T	Pharmaceutical Organic Chemistry II – Theory	3	1		4
BP302T	Physical Pharmaceutics I – Theory	3	1		4
BP303T	Pharmaceutical Microbiology – Theory	3	1		4
BP304T	Pharmaceutical Engineering – Theory	3	1		4
BP305P	Pharmaceutical Organic Chemistry II – Practical		-	4	2
BP306P	Physical Pharmaceutics I – Practical		-	4	2
BP307P	Pharmaceutical Microbiology – Practical		-	4	2
BP 308P	Pharmaceutical Engineering –Practical		-	4	2
<b>Total</b>		<b>12</b>	<b>4</b>	<b>16</b>	<b>24</b>

<b>Semester-IV</b>					
<b>Course code</b>	<b>Course Title</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
BP401T	Pharmaceutical Organic Chemistry III– Theory	3	1		4
BP402T	Medicinal Chemistry I – Theory	3	1		4
BP403T	Physical Pharmaceutics II – Theory	3	1		4
BP404T	Pharmacology I – Theory	3	1		4
BP405T	Pharmacognosy and Phytochemistry I– Theory	3	1		4
BP406P	Medicinal Chemistry I – Practical		-	4	2
BP407P	Physical Pharmaceutics II – Practical			4	2
BP408P	Pharmacology I – Practical		-	4	2
BP409P	Pharmacognosy and Phytochemistry I – Practical		-	4	2
<b>Total</b>		<b>15</b>	<b>5</b>	<b>16</b>	<b>28</b>

<b>Semester-V</b>					
<b>Course code</b>	<b>Course Title</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
BP501T	Medicinal Chemistry II – Theory	3	1		4
BP502T	Industrial PharmacyI– Theory	3	1		4
BP503T	Pharmacology II – Theory	3	1		4
BP504T	Pharmacognosy and Phytochemistry II– Theory	3	1		4
BP505T	Pharmaceutical Jurisprudence – Theory	3	1		4
BP506P	Industrial PharmacyI – Practical		0	4	2
BP507P	Pharmacology II – Practical		0	4	2
BP508P	Pharmacognosy and Phytochemistry II – Practical		0	4	2
<b>Total</b>		15	5	12	26

<b>Semester-VI</b>					
<b>Course code</b>	<b>Course Title</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
BP601T	Medicinal Chemistry III – Theory	3	1		4
BP602T	Pharmacology III – Theory	3	1		4
BP603T	Herbal Drug Technology – Theory	3	1		4
BP604T	Biopharmaceutics and Pharmacokinetics – Theory	3	1		4
BP605T	Pharmaceutical Biotechnology – Theory	3	1		4
BP606T	Quality Assurance –Theory	3	1		4
BP607P	Medicinal chemistry III – Practical		0	4	2
BP608P	Pharmacology III – Practical		0	4	2
BP609P	Herbal Drug Technology – Practical		0	4	2
<b>Total</b>		18	5	12	30

<b>Semester-VII</b>					
<b>Course code</b>	<b>Course Title</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
BP701T	Instrumental Methods of Analysis – Theory	3	1		4
BP702T	Industrial PharmacyII – Theory	3	1		4
BP703T	Pharmacy Practice – Theory	3	1		4
BP704T	Novel Drug Delivery System – Theory	3	1		4
BP705P	Instrumental Methods of Analysis – Practical	4	0		2
BP706PS	Practice School		0	12	6
<b>Total</b>		16	4	12	24

<b>Semester-VIII</b>					
<b>Course code</b>	<b>Course Title</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
BP801T	Biostatistics and Research Methodology	3	1		4
BP802T	Social and Preventive Pharmacy	3	1		4
BP803ET	Pharma Marketing Management				
BP804ET	Pharmaceutical Regulatory Science				
BP805ET	Pharmacovigilance				
BP806ET	Quality Control and Standardization of Herbals				
BP807ET	Computer Aided Drug Design				
BP808ET	Cell and Molecular Biology				
BP809ET	Cosmetic Science				
BP810ET	Experimental Pharmacology				
BP811ET	Advanced Instrumentation Techniques				
BP812ET	Dietary Supplements and Nutraceuticals				
BP813PW	Project Work				
<b>Total</b>			<b>4</b>	<b>12</b>	<b>22</b>

## **Programme Educational Objectives (PEO)**

**PEO1:** To produce pharmacy graduates with profound knowledge and high technical skills to meet various aspects in wide areas of Pharmaceutical industry.

**PEO2:** To enable pharmacy graduates to gain theoretical and practical knowledge in various subjects to discover novel formulation for the benefits of the society.

**PEO3:** To prepare entrepreneurs in Pharma sector with effective communication skills, teamwork and ethical attitude with high integrity for the betterment of the community and the society.

**PEO4:** To promote and train the pharmacy graduates towards contribution of health care system and patient counselling for prevention and treatment of diseases.

**PEO5:** To encourage the pharmacy graduates for lifelong learning and highly competent career prospect related to interdisciplinary pharmaceutical sciences.

## **Programme Outcomes**

The entire curriculum of B. Pharmacy is planned to have following Programme outcomes

**PO 1 Pharmacy Knowledge:** Possess the core and basic knowledge associated with the profession of pharmacy.

**PO 2 Thinking Abilities:** Examine issues rationally and logically; shall acquire, evaluate, and synthesize information and knowledge relevant to an identified problem.

**PO3 Planning Abilities:** Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills.

**PO 4 Leadership Skills:** Acquire knowledge of leadership traits and skills through curricular and co-curricular activities and develop skills and abilities that will enable him/her to lead or actively contribute to organizational improvement.

**PO 5 Professional Identity:** Understand, analyze and communicate the value of their professional roles in society.

**PO 6 Pharmacy 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.

**PO 7 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

**PO 8 Professional Ethics:** Honor personal values and apply ethical principles in professional and social contexts and take responsibility for the outcomes associated with the decisions.

**PO 9 Individual or teamwork:** Understand the need for leadership and team-building for fulfillment of practice, professional and societal responsibilities.

**PO 10 Communication:** Develop good communication skills so as to communicate effectively with the pharmacy community and with society at large.

**PO 11 Modern & Usage:** Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.

**PO 12 Life-long Learning:** Recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self-assess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis.

### **Programme Specific Outcomes (PSO)**

After completion of the program students are able:

**PSO1.** To impart theoretical & Practical knowledge among students in the various fields of pharmaceutical sciences viz., Pharmaceutics, Pharmaceutical Chemistry, Pharmacology, Pharmacognosy, Biotechnology, Pharmaceutical jurisprudence and Pharmaceutical marketing etc.

**PSO2.** To develop the skill acquired in various regulatory aspects related to clinical, preclinical and medical devices used for human use. The students will be able to experience hand on manufacturing, packaging of drugs. After completing this course students will be able to work as a skilled pharmacist in manufacturing of drugs and cosmetics

### FOUR YEAR B. PHARM PROGRAMME AT A GLANCE

	Semester I	Semester II	Semester III	Semester IV	Semester V
<b>Courses</b>	<b>12</b>	<b>10</b>	<b>8</b>	<b>9</b>	<b>8</b>
<b>Credits</b>	<b>30</b>	<b>29</b>	<b>24</b>	<b>28</b>	<b>26</b>

	Semester V I	Semester VII	Semester VIII	Total
<b>Courses</b>	<b>9</b>	<b>6</b>	<b>13</b>	<b>75</b>
<b>Credits</b>	<b>30</b>	<b>24</b>	<b>22</b>	<b>213</b>

## Semester-I

<b>BP 101T</b>	<b>Human Anatomy And Physiology-I</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
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<b>Version 2.0</b>		<b>3</b>	<b>1</b>	<b>0</b>	4
<b>Total Contact Hours</b>	45 Hours				
<b>Pre-requisites/Exposure</b>	Pharmacology				
<b>Co-requisites</b>	Pharmacology				
<b>Course Objectives</b>					
<b>Upon completion of this course the student should be able to:</b>					
<ol style="list-style-type: none"> <li>1. Explain the gross morphology, structure and functions of various organs of the human body</li> <li>2. Describe the various homeostatic mechanisms and their imbalances</li> <li>3. Identify the various tissues and organs of different systems of human body</li> <li>4. Perform the various experiments related to special senses and nervous system</li> <li>5. Appreciate coordinated working pattern of different organs of each system</li> </ol>					
<b>Course Outcomes (CO)</b>					
<b>On completion of this course, the student will be able to:</b>					
CO1. This subject is designed to impart fundamental knowledge on the structure and functions of the various systems of the human body.					
CO2. It also helps in understanding both homeostatic mechanisms					
CO3. The subject provides the basic knowledge required to understand the various disciplines of pharmacy.					
CO4. It enlightens the students about the cells, various types of tissues in human body, skeleton system, skeletal and smooth muscles.					

CO5. It also deals with the composition of blood, blood groups, blood coagulation, various disease-causing agents and preventive measures, balanced diet, disorders and treatment involve in nutritional deficiency.

**Programme and Course Mapping**

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO 1	PSO 2
CO1	3	1	-	-	2	3	1	-	1	-	2	3	3	3
CO2	3	2	-	-	2	3	-	1	1	-	2	2	2	3
CO3	3	1	-	-	3	3	-	2	1	-	2	-	3	3
CO4	3	1	-	-	3	3	-	2	1	-	2	-	3	3
CO5	3	-	-	-	3	3	-	2	-	-	2	-	2	2

1=lightly mapped

2= moderately mapped

3=strongly mapped

Unit	Relevance to the local, national, regional and global developmental needs				Relevance To the Employability/ Entrepreneurship/ Skill Development			Relevance to the Professional Ethics, Gender, Human Values, Environment & Sustainability				SDG	NEP	POE/4 <sup>th</sup> IR
BP101T	Local	Regional	National	Global	Employability	Entrepreneurship	Skill Development	Professional Ethics	Gender	Human Values	Environment & Sustainability			
Unit I	-	-	-	-	-	-	Enrichment of thinking ability and creativity as well a tool for building confidence	-	-	-	-	SDG 3: Ensure healthy lives and promote well-	NEP (9.1-9.3)	Student centric Technical Skills that match Industry Needs

							in the students which is done by providing opportunities to students to give presentations and debates in the classroom					being for all at all ages.  SDG 4.4: Skills for Decent Work		
Unit II	-	-	-	-	-	-	Enrichment of thinking ability and creativity as well a tool for building confidence in the students which is done by providing opportunities to students to give presentations	-	-	-	-	SDG 3: Ensure healthy lives and promote well-being for all at all ages.  SDG 4.4:	NEP (9.1-9.3)	Student centric Technical Skills that match Industry Needs

							and debates in the classroom					Skills for Decent Work		
Unit III	-	-	-	-	-	-	Enrichment of thinking ability and creativity as well a tool for building confidence in the students which is done by providing opportunities to students to give presentations and debates in the classroom	-	-	-	-	SDG 3: Ensure healthy lives and promote well-being for all at all ages.  SDG 4.4: Skills for Decent Work	NEP (9.1-9.3)	Student centric Technical Skills that match Industry Needs

Unit IV	-	-	-	-	-	-	Enrichment of thinking ability and creativity as well a tool for building confidence in the students which is done by providing opportunities to students to give presentations and debates in the classroom	-	-	-	-	SDG 3: Ensure healthy lives and promote well-being for all at all ages.  SDG 4.4: Skills for Decent Work	NEP (9.1-9.3)	Student centric Technical Skills that match Industry Needs
Unit V	-	-	-	-	-	-	Enrichment of thinking ability and creativity as well a tool for building confidence in the students	-	Gender Based knowledge will benefit the students to respect and understand	-	-	SDG 3: Ensure healthy lives and promote well-being for all	NEP 21.1-21.10: Adult Education and Lifelong	Student centric Technical Skills that match Industry Needs

							which is done by providing opportunities to students to give presentations and debates in the classroom		the other gender in a better way			at all ages.  SDG 4.4: Skills for Decent Work	Learning	
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<b>BP102T</b>	<b>Pharmaceutical Analysis (Theory)</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
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<b>Version 2.0</b>		<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>									
<b>Total Contact Hours</b>	45 Hours													
<b>Pre-requisites/Exposure</b>	Pharmaceutical Analytical Chemistry													
<b>Co-requisites</b>	Analytical Chemistry													
<b>Course Objectives</b>														
<p><b>Upon completion of this course the student should be able to</b></p> <ol style="list-style-type: none"> <li>1. To Know the history of Pharmacopoeia</li> <li>2. Understand the principles of volumetric and electro chemical analysis</li> <li>3. Carryout various volumetric and electrochemical titrations</li> <li>4. Develop analytical skills</li> <li>5. To understand with acid base titration.</li> </ol>														
<b>Course Outcomes (CO)</b>														
<b>On completion of this course, the student will be able to:</b>														
CO1. This subject is designed to impart fundamental knowledge on pharmaceutical preparations.														
CO2. The subject provides the basic knowledge required to understand the various disciplines of Analysis.														
CO3. This subject deals with the monographs of inorganic drugs and pharmaceuticals.														
CO4. Provide Knowledge about Indian Pharmacopoeia, British Pharmacopoeia and other Regulatory agencies.														
CO5. Carryout various volumetric and electrochemical titrations.														
<b>Programme and Course Mapping</b>														
<b>CO</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO</b>	<b>PO11</b>	<b>PO12</b>	<b>PSO</b>	<b>PSO 2</b>



										<b>10</b>			<b>1</b>	
<b>CO1</b>	<b>3</b>	<b>1</b>	<b>-</b>	<b>-</b>	<b>2</b>	<b>3</b>	<b>1</b>	<b>-</b>	<b>1</b>	<b>-</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>-</b>
<b>CO2</b>	<b>3</b>	<b>2</b>	<b>-</b>	<b>-</b>	<b>2</b>	<b>3</b>	<b>-</b>	<b>1</b>	<b>1</b>	<b>-</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>-</b>
<b>CO3</b>	<b>3</b>	<b>1</b>	<b>-</b>	<b>-</b>	<b>3</b>	<b>3</b>	<b>-</b>	<b>2</b>	<b>1</b>	<b>-</b>	<b>2</b>	<b>-</b>	<b>3</b>	<b>-</b>
<b>CO4</b>	<b>3</b>	<b>1</b>	<b>-</b>	<b>-</b>	<b>3</b>	<b>3</b>	<b>-</b>	<b>2</b>	<b>1</b>	<b>-</b>	<b>2</b>	<b>-</b>	<b>3</b>	<b>-</b>
<b>CO5</b>	<b>3</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>3</b>	<b>3</b>	<b>-</b>	<b>1</b>	<b>-</b>	<b>-</b>	<b>3</b>	<b>-</b>	<b>2</b>	<b>-</b>
1=lightly mapped                      2= moderately mapped                      3=strongly mapped														

<b>Unit</b>	<b>Relevance to the local, national, regional and global developmental needs</b>	<b>Relevance To the Employability/ Entrepreneurship/ Skill Development</b>	<b>Relevance to the Professional Ethics, Gender, Human Values, Environment &amp; Sustainability</b>	<b>SDG</b>	<b>NEP</b>	<b>POE/4<sup>th</sup> IR</b>
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BP1 02T	Local	Regional	National	Global	Employability	Entrepreneurship	Skill Development	Professional Ethics	Gender	Human Values	Environment & Sustainability			
Unit I	Empowerment of Local Workforce: Developing skills in pharmaceutical analysis at the local level empowers the workforce within the community .	Skilled professionals in pharmaceutical analysis can contribute to the development and growth of the regional pharmaceutical industry	National Drug Quality and Safety: Skilled professionals in pharmaceutical analysis play a vital role in ensuring the quality, safety, and efficacy of pharmaceutical products	-	-	-	Understanding the principles and applications of these techniques helps develop expertise in selecting and applying the appropriate analytical	-	-	-	-	1.b Create sound policy frameworks ... (SDG 1a)		Updated Curriculum

							method for different pharmaceutical compounds.							
Unit II	Local Analytical Services and Consulting: Skilled professionals in pharmaceutical analysis can offer analytical services and consulting to local pharmaceutical companies, healthcare institutions, and research	National Drug Quality and Safety: Skilled professionals in pharmaceutical analysis play a vital role in ensuring the quality, safety, and efficacy of pharmaceutical products circulating in the country.	Regulatory Compliance: National regulatory bodies responsible for drug approval and oversight can benefit from expertise in pharmaceutical analysis.	Capacity Building and Knowledge Transfer: Sharing knowledge and building capacity in pharmaceutical analysis globally	-	-	Laboratory Techniques: The paragraph mentions specific laboratory techniques associated with each method, such as the construction and working of electrodes, preparation of standard solutions, and handling of	-	-	-	-	Ensure healthylives and promote well-being for all ages (SDG 3)	Quality Universities and Colleges: A New and Forward-looking Vision for India's Higher	<b>Internship Programs</b>

	organizations.			enhances the capabilities of developing countries			precipitates						Educational System (9.1 - 9.3)	
Unit III	Their expertise enhances local research capabilities and supports the development of new pharmaceutical products and technologies	Public Health and Patient Safety: Skilled professionals in pharmaceutical analysis play a crucial role in ensuring the quality, safety, and efficacy of pharmaceutical products available in the country.	Pharmaceutical Industry Competitiveness: A strong foundation in pharmaceutical analysis at the national level can enhance the competitiveness of the domestic pharmaceutical industry.	Global Collaborations and Partnerships: Global expertise in pharmaceutical analysis facilitates collaborations and partner	-	-	Laboratory Techniques: The paragraph mentions specific laboratory techniques associated with each method, such as the construction and working of electrodes, preparation of standard	-	-	-	-	Skills for Decent Work (SDG 4.4)	Optimal Learning Environments and Support for Students (12.1-12.1)	International Exchange Student Programs

				ships between countries, academic institutions, and pharmaceutical companies			solutions, and handling of precipitates						0)	
Unit IV	Empowerment of Local Workforce: Developing skills in pharmaceutical analysis at the local level empowers the workforce within the	Quality Control and Assurance: Skilled professionals in pharmaceutical analysis are crucial for establishing and maintaining quality control and assurance systems.	Research and Development: National research institutions and universities focusing on pharmaceutical sciences can benefit from expertise in pharmaceuti	International Trade and Regulation Compliance: Global expertise in pharmaceutical analysi	-	-	Method Selection and Optimization: The paragraph introduces different methods and techniques used in analytical chemistry, providing	-	-	-	-	Safe and Inclusive Learning Environments (SDG 4.a)	Equity and Inclusion in Higher Education (14.1-14.4)	Skill Development

	community		cal analysis	s promotes international trade and regulatory compliance			individuals with a broad understanding of the available options for analysis.						.2)	
Unit v	Contribution to Local Research and Innovation: Skilled professionals in pharmaceutical analysis at the local level can contribute to research and innovation initiatives within the	Regulatory Compliance: National regulatory authorities responsible for overseeing the pharmaceutical industry rely on professionals in pharmaceutical analysis to enforce regulatory standards and ensure compliance	Pharmacovigilance and Post-Marketing Surveillance : Skilled professionals in pharmaceutical analysis can contribute to national pharmacovigilance efforts.	International Trade and Regulation: Knowledge and skills in pharmaceutical analysis facilitate interna	-	-	Data Interpretation: Analytical chemistry involves the interpretation of experimental data and drawing conclusions based on the results obtained.	-	-	-	-	Professional Development of Teachers (SDG 4.c)	Equity and Inclusion in Higher Education (14.1-14.4.2)	Hands-on Experience

community			ditional trade in pharma ceutica l produc ts.											
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<b>BP 103T</b>	<b>Pharmaceutics-I (Theory)</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Version 2.0</b>		<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>
<b>Total Contact Hours</b>	45 Hours				
<b>Pre-requisites/Exposure</b>	Pharmaceutics				
<b>Co-requisites</b>	Posology				
<b>Course Objectives</b>					
<p><b>Upon completion of this course the student should be able to</b></p> <ol style="list-style-type: none"> <li>1. Know the history of profession of pharmacy</li> <li>2. Understand the basics of different dosage forms, pharmaceutical incompatibilities and pharmaceutical calculations</li> <li>3. Understand the professional way of handling the prescription</li> </ol>					

4. Preparation of various conventional dosage
5. Introduction about novel drug delivery system

**Course Outcomes (CO)**

**On completion of this course, the student will be able to:**

CO1. This subject is designed to impart fundamental knowledge on pharmaceutical preparations.

CO2. The subject provides the basic knowledge required to understand the various disciplines of pharmacy.

CO3. It enlightens the students about the dosage, various types of dosage form, NDDS, depot preparation.

CO4. Provide Knowledge about Indian Pharmacopoeia, British Pharmacopoeia and other Regulatory agencies

CO5. Provide Knowledge about metric system and calculation of dosages.

**Programme and Course Mapping**

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2
CO1	2	1	-	-	2	3	1	2	1	-	2	3	3	-
CO2	3	2	-	-	2	3	-	1	1	-	2	3	2	-
CO3	3	1	-	-	3	3	-	2	1	-	2	3	3	-
CO4	3	1	-	-	3	3	-	2	1	-	2	3	3	-
CO5	3	-	-	-	3	3	-	1	-	-	3	3	2	-

1=lightly mapped

2= moderately mapped

3=strongly mapped



Unit	Relevance to the local, national, regional and global developmental needs				Relevance To the Employability/ Entrepreneurship/ Skill Development			Relevance to the Professional Ethics, Gender, Human Values, Environment & Sustainability				SDG	NEP	POE/4 <sup>th</sup> IR
	Local	Regional	National	Global	Employability	Entrepreneurship	Skill Development	Professional Ethics	Gender	Human Values	Environment & Sustainability			
Unit I	It allows pharmacists to provide culturally sensitive care, comply with local regulations, address local healthcare needs, and	This enhances their ability to provide patient-centered care, collaborate with healthcare stakeholders, and contribute to the overall health and well-being of the local	Provides pharmacists with a solid foundation in the evolution of their field, enhances their professional identity, and equips them with the knowledge and skills	--	It equips professionals with the necessary skills and knowledge to contribute to the advancement of pharmacy and improve	--	--	--	--	--	--	Skills for Decent Work (SDG 4.4)	Professional Education (17.1-17.5)	Focus on Employability Skills (Local/Regional and Global)

	actively engage with the local community to improve healthcare outcomes.	population	necessary for safe and effective pharmaceutical practice.		patient care.										
Unit II	--	--	--	Promote harmonization of pharmaceutical practices, improve patient outcomes on a global scale, and advance the development and accessibility of medications worldwide.	Enhances employability in various sectors of the pharmaceutical industry, including manufacturing, quality control, research and development, regulatory affairs, education, and consultancy. It provides a competitive edge and opens up opportunities	--	--	--	--	--	--	Skills for Decent Work (SDG 4.4)	Professional Education (17.1-17.5)	Focus on Employability Skills (Local/Regional and Global)	

					s for career advancement and specialization in the global pharmaceutical landscape.									
Unit III	--	--	--	This knowledge facilitates the selection of appropriate excipients, manufacturing processes, and quality control measures to meet regulatory requirements and deliver safe and efficacious pharmaceut	Various sectors of the pharmaceutical industry, including formulation development, quality control, manufacturing, regulatory affairs, research and development and pharmacy practice.	--	--	--	--	--	--	Skills for Decent Work (SDG 4.4)	Professional Education (17.1-17.5)	Focus on Employability Skills (Local/Regional and Global)

				ical products to patients.										
Unit IV	--	--	--	Helps in optimizing drug delivery, formulation stability, patient compliance , and ensuring the safety and efficacy of pharmaceutical products	Various sectors of the pharmaceutical industry, including formulation and development , quality control, regulatory affairs, research and development , clinical practice, and pharmaceutical education and training.	--	--	--	--	--	--	Skills for Decent Work (SDG 4.4)	Professional Education (17.1-17.5)	Focus on Employability Skills (Local/Regional and Global)
Unit v	--	--	--	It provides experts with the knowledge	Opens up diverse career opportunitie	--	--	--	--	--	--	Skills for Decent Work	Professional Education (17.1-17.5)	Focus on Employability Skills (Local/Re

				and abilities required to create stable and effective semisolid dosage forms for a range of therapeutic purposes.	s in formulation development , quality control, research and development , regulatory affairs, manufacturing, dermatology , cosmetics, academia, and research institutions within the pharmaceutical industry.						(SDG 4.4)		gional and Global)
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<b>BP104T</b>	<b>Pharmaceutical Inorganic Chemistry (Theory)</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Version 2.0</b>		<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>

<b>Total Contact Hours</b>	45 Hours
<b>Pre-requisites/Exposure</b>	Pharmaceutical Chemistry
<b>Co-requisites</b>	Chemistry
<b>Course Objectives</b>	
<p><b>Upon completion of this course the student should be able to</b></p> <ol style="list-style-type: none"> <li>1. To Know the history of Pharmacopoeia</li> <li>2. To know the sources of impurities and methods to determine the impurities in inorganic drugs and pharmaceuticals.</li> <li>3. Understand the medicinal and pharmaceutical importance of inorganic compounds</li> <li>4. Preparation of various radio pharmaceutical dosage</li> <li>5. Introduction about Antidotes</li> </ol>	
<b>Course Outcomes (CO)</b>	
<b>On completion of this course, the student will be able to:</b>	
<p>CO1. This subject is designed to impart fundamental knowledge on pharmaceutical preparations.</p> <p>CO2. The subject provides the basic knowledge required to understand the various disciplines of pharmacy.</p> <p>CO3. This subject deals with the monographs of inorganic drugs and pharmaceuticals.</p> <p>CO4. Provide Knowledge about Indian Pharmacopoeia, British Pharmacopeia and other Regulatory agencies.</p> <p>CO5. Provide Knowledge about metric system and calculation of dosages to understand.</p>	
<b>Programme and Course Mapping</b>	

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	1	-	-	3	2	-	2	1	-	2	3	3	-
CO2	3	2	-	-	2	3	-	1	1	-	2	3	3	-
CO3	3	1	-	-	3	3	-	2	1	-	2	3	3	-
CO4	3	1	-	-	3	3	-	2	1	-	2	3	3	-
CO5	3	-	-	-	3	3	-	1	-	-	3	3	3	-
1=lightly mapped                      2= moderately mapped                      3=strongly mapped														

Unit	Relevance to the local, national, regional and global developmental needs	Relevance To the Employability/ Entrepreneurship/ Skill Development	Relevance to the Professional Ethics, Gender, Human Values, Environment & Sustainability	SDG	NEP	POE/4 <sup>th</sup> IR

	Local	Regional	National	Global	Employability	Entrepreneurship	Skill Development	Professional Ethics	Gender	Human Values	Environment & Sustainability			
Unit I	-	-	Impurities in pharmaceutical substances: History of Pharmacopoeia, Sources and types of impurities	Impurities in pharmaceutical substances: History of Pharmacopoeia, Sources and types of impurities	Determination of impurities in pharmacopoeial substance generate employment.	-	Determination of impurities in pharmacopoeial substance. Which develop skills	-	-	-	-	Skill for decent work SD G4.4.	Professional Education (17.1-17.5)	It helps in developing technical skills that industry requires. And thus helps in creating employment.



Unit II	-	-	Acids, Bases and Buffers 2. Major extra and intracellular electrolytes 3. Dental products	Acids, Bases and Buffers 2. Major extra and intracellular electrolytes 3. Dental products	Production of acid base, Electrolyte solution, dentifrices the globe provides a lot of employment.	Production of acid base, Electrolyte solution, dentifrices the globe provides a lot of employment.	-	-	-	-	-	Skills for Decent Work (SDG 4.4)	Professional Education (17.1-17.5)	Skill Development It helps in developing technical skills that industry requires and thus helps in creating employment
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Unit III	-	-	Synthesis, reactions and medicinal uses of following compounds/derivatives  Gastric acidifiers, antacid and cathartics	Synthesis, reactions and medicinal uses of following compounds/derivatives  Gastric acidifiers, antacid and cathartics	Synthesis, reactions and medicinal uses of following compounds/derivatives  Gastric acidifiers, antacid and cathartics	-	Synthesis of HCl, Magnesium sulphate, Sodium hydrogen carbonate, combined antacid preparation helps in honing the technical skill and expertise in production	-		-	-	Skills for Decent Work (SDG 4.4)	Professional Education (17.1-17.5)	Skill Development  It helps in developing technical skills that industry require and thus helps in creating employment
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Unit IV	-	-	Synthesis, reactions and medicinal uses of following compounds/derivatives  Expectorants, emetics, antidotes, Haematinics	Synthesis, reactions and medicinal uses of following compounds/derivatives  Expectorants, emetics, antidotes, Haematinics	Synthesis, reactions and medicinal uses of following compounds/derivatives  Expectorants, emetics, antidotes, Haematinics  globe provides a	-	Synthesis of Haematinics, Antidotes, expectorants preparation helps in honing the technical skill and expertise in production	-		-	-	Skills for Decent Work (SDG 4.4)	Professional Education (17.1-17.5)	Skill Development  It helps in developing technical skills that industry requires and thus helps in creating employment
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					lot of empl oyme nt.										
Unit v	-	-	Radiopharm aceuticals	Radiop harmac eutical s  Produc tions	Radi opha rmac eutic als	-	-	-.	-	-		Skil ls for Dec ent Wor k (SD G 4.4)	Prof essi onal Edu cati on (17. 1- 17.5 )	Skill Develo pment  It helps in develop ing technic al skills that industr y require s and thus helps in creatin g employ ment	

<b>BP-105T</b>	<b>Communication Skills (Theory)</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Version 2.0</b>		<b>3</b>	<b>0</b>	<b>0</b>	<b>2</b>
<b>Total Contact Hours</b>	30 Hours				
<b>Pre-requisites/Exposure</b>	<b>Communication Skills</b>				
<b>Co-requisites</b>	<b>Communication Skills</b>				
<b>Course Objectives</b>					
<p><b>Upon completion of this course the student should be able to</b></p> <ol style="list-style-type: none"> <li>1. Communicate effectively (Verbal and Non-Verbal)</li> <li>2. Effectively manage the team as a team player</li> </ol>					
<b>Course Outcomes (CO)</b>					
<b>On completion of this course, the student will be able to:</b>					
<p>CO1. Understand the behavioural needs for a pharmacist to function effectively in the areas of pharmaceutical operation</p> <p>CO2. Develop interview skills</p> <p>CO3. Develop Leadership qualities and essentials</p> <p>CO4. Develop confidence in pursuing interdisciplinary</p>					
<b>Programme and Course Mapping</b>					

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2
CO1	3	1	3	2	1	3	1	1	3	3	1	2	-	-
CO2	3	1	2	2	1	3	1	1	2	3	1	2	-	-
CO3	1	1	2	2	1	3	1	1	2	3	1	2	-	-
CO4	1	1	1	2	1	3	1	1	1	3	1	2	-	-
1=lightly mapped                      2= moderately mapped                      3=strongly mapped														

Unit	Relevance to the local, national, regional and global developmental needs	Relevance To the Employability/ Entrepreneurship/ Skill Development	Relevance to the Professional Ethics, Gender, Human Values, Environment & Sustainability	SDG	NEP	POE/4 <sup>th</sup> IR
Local						
Regional						
National						
Global						
Employability						
Entrepreneurship						
Skill Development						
Professional Ethics						
Gender						
Human Values						
Environment & Sustainability						

Unit I & II	-	-	-	Awarin g student s about commu nicatio n skill, barrier in commu nicatio ns and styles	-	-	Knowledge of different communicat ion styles, barrier, elements (face to face, verbal ,nonverbal communicat ion will help in communicat ing to the world	-	-	-	-	Skill s for Dece nt Work (SD G 4.4)	Profes sional Educat ion (17.1- 17.5)	Skill Devel opmen t
Unit III	-	-	-	Global ly aware student s about listenin g skills and writing emails	-	-	Knowledge of writing emails and listening will help students in expression their views/com municating through writing	-	-	-	-	Tech nology Use & Integ ratio n (23.1 - 23.1 3)	Focus on Emplo yabilit y Skills (Local /Regio nal and Global )	Skill Devel opmen t

Unit IV	-	-	-	Fulfils the need for interview skills	-		Knowledge of interview skills will help in building confidence to face interview	-	-	-	-	Skills for Decent Work (SDG 4.4)	Focus on Employability Skills (Local /Regional and Global)	Skill Development
Unit v	-	-	-	Globally aware about communication skills used in group discussion	-		Knowledge of group methods, their do's and don'ts will help in facing interview rounds	-	-	-	-	Technology Use & Integration (23.1 - 23.13)	Focus on Employability Skills (Local and Global)	Employability, Skill Development



<b>BP106 RBT</b>	<b>Remedial Biology (Theory)</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Version 2.0</b>		<b>2</b>	<b>0</b>	<b>0</b>	<b>2</b>
<b>Total Contact Hours</b>	30 Hours				
<b>Pre-requisites/Exposure</b>	Biology				
<b>Co-requisites</b>	Biology				
<b>Course Objectives</b>					
<p><b>Upon completion of this course the student should be able to</b></p> <ol style="list-style-type: none"> <li>1. know the classification and salient features of five kingdoms of life</li> <li>2. understand the basic components of anatomy &amp; physiology of plant</li> <li>3. know understand the basic components of anatomy &amp; physiology animal with special reference to human</li> </ol>					
<b>Course Outcomes (CO)</b>					
<b>On completion of this course, the student will be able to:</b>					
CO1. To learn and understand the components of living world, structure and functional system of plant kingdom (leaf, root, stem).					
CO2. To learn and understand the components Composition of blood, blood groups, coagulation of blood.					
CO3. It provides knowledge about structure and function of heart.					
CO4. It provides knowledge about Digestive system, Reproductive system.					
CO5. It helps in understanding the concept of Respiration system.					
<b>Programme and Course Mapping</b>					

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	-	-	3	2	-	-	-	-	2	3	3	3
CO2	3	2	-	-	2	3	-	-	-	-	2	3	3	3
CO3	3	2	-	-	3	3	-	-	-	-	2	3	3	3
CO4	3	2	-	-	3	3	-	-	-	-	2	3	3	3
CO5	3	2	-	-	3	3	-	-	-	-	3	3	3	3
1=lightly mapped                      2= moderately mapped                      3=strongly mapped														

Unit	Relevance to the local, national, regional and global developmental needs	Relevance To the Employability/ Entrepreneurship/ Skill Development	Relevance to the Professional Ethics, Gender, Human Values, Environment & Sustainability	SDG	NEP	POE/4 <sup>th</sup> IR

	Local	Regional	National	Global	Employability	Entrepreneurship	Skill Development	Professional Ethics	Gender	Human Values	Environment & Sustainability			
Unit I				Student will be able to understand importance of the living world on a global scale allows for informed decision-making and actions aimed at promoting the coexistence of humans and nature while preserving the planet's ecological integrity.			Remedial Biology Remedial Biology provides a strong foundation for various careers and areas related to health, fitness, and medical sciences. The knowledge		Remedial Biology provides a foundational understanding of the human body, including its structures and function for			(SD G 4.4)	(9.1 - 9.3)	Global Education Knowledge, Skill Development, Employability

							gained can enhance critical thinking, problem-solving skills, and the ability to apply scientific principles to practical situations, contributing to skill development in these fields.		both gender					
Unit II		-		Student will be able to know Body fluids and circulation, as well as digestion and absorption, have broad implications for global water resources, nutrient cycling, agricultural practices, food security, and waste management. By understanding and managing these processes sustainably, we can contribute to a more balanced and environmentally conscious global system.								(SD G 4.4)	(9.1 - 9.3)	Global Education Knowledge, Skill Development, Employability
Unit III		-	-	Knowledge of respiratory mechanisms, urinary system functions, endocrine system basics, and reproductive system disorders, students can play a significant role in analysing, addressing,								(SD G 4.4)	(9.1 - 9.3)	Global Education Knowledge, Skill Development, Employability

				and finding solutions to global issues related to respiratory disorders, urinary disorders, endocrine disorders like diabetes, and reproductive system-related disorders.										ability
Unit IV		-	-	By understanding and managing the mineral nutrition of plants, we can enhance these global impacts and promote a sustainable and thriving planet.								(SD G 4.4)	(9.1 - 9.3)	Global Education Knowledge, Skill Development, Employability
Unit v				Understanding and harnessing the potential of these processes is essential for addressing global challenges and promoting a sustainable future.								(SD G 4.4)	(9.1 - 9.3)	Global Education Knowledge, Skill Development, Employability

<b>BP106 RMT</b>	<b>Remedial Mathematics (Theory)</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Version 2.0</b>		<b>2</b>	<b>0</b>	<b>0</b>	<b>2</b>
<b>Total Contact Hours</b>	30 Hours				
<b>Pre-requisites/Exposure</b>					
<b>Co-requisites</b>					
<b>Course Objectives</b>					
<p><b>Upon completion of this course the student should be able to</b></p> <ol style="list-style-type: none"> <li>1. Know the theory and their application in Pharmacy</li> <li>2. Solve the different types of problems by applying</li> <li>3. Appreciate the important application of mathematics in Pharmacy</li> </ol>					
<b>Course Outcomes (CO)</b>					
<b>On completion of this course, the student will be able to:</b>					
CO1. To learn and understand the advance mathematics and its implementation in pharmacy					

CO2. It provides knowledge of fraction and its implementation in pharmacy

CO3. It provides knowledge of analytical geometry and calculus

CO4. It helps in understanding the matrices and determinant

**Programme and Course Mapping**

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2
CO1	3	2	3	-	-	-	-	-	-	-	2	3	-	-
CO2	3	2	3	-	-	-	-	-	-	-	2	3	-	-
CO3	3	2	3	-	-	-	-	-	-	-	2	3	-	-
CO4	3	2	3	-	-	-	-	-	-	-	2	3	-	-
1=lightly mapped                      2= moderately mapped                      3=strongly mapped														

<b>BP107P</b>	<b>Human Anatomy and Physiology (HAP) – Practical</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Version 2.0</b>		<b>0</b>	<b>0</b>	<b>4</b>	<b>2</b>

<b>Total Contact Hours</b>	60 Hours
<b>Pre-requisites/Exposure</b>	HAP-1 Practical
<b>Co-requisites</b>	Experimental Pharmacology

**Course Objectives**

**Upon completion of this course the student should be able to**

1. Practical physiology is complimentary to the theoretical discussions in Physiology.
2. Practical allows the verification of physiological processes discussed in theory classes through experiments on living tissue, intact animals or normal human beings.
3. This is helpful for developing an insight into human anatomy and physiology.

**Course Outcomes (CO)**

**On completion of this course, the student will be able to:**

CO1. To learn and understand the components of living world, structure and functional system of plant kingdom.

CO2. It provides knowledge about blood, their composition, function and coagulation factor.

CO3. To learn the about bones with special reference to human.

CO4. Provide practical knowledge of biological system and human anatomy

**Programme and Course Mapping**

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO 1	PSO 2
CO1	3	3	2	2	3	2	-	2	2	2	3	3	3	3



Unit	Relevance to the local, national, regional and global developmental needs						Relevance To the Employability/ Entrepreneurship/ Skill Development				Relevance to the Professional Ethics, Gender, Human Values, Environment & Sustainability				SDG	NEP	POE/4 <sup>th</sup> IR
CO2	3	3	3	2	2	2	-	1	2	2	3	3	3	3			
CO3	3	3	2	2	3	2	-	2	2	2	3	3	3	3			
CO4	3	2	2	2	3	2	-	2	2	2	3	3	3	3			
<p style="text-align: center;">1=lightly mapped                      2= moderately mapped                      3=strongly mapped</p>																	

BP107P	Local	Regional	National	Global	Employability	Entrepreneurship	Skill Development	Professional Ethics	Gender	Human Values	Environment & Sustainability			
Unit I Practicals 1-3	-	-	The concepts once imbibed will help the students to use the practical information in providing better health services to the nation as a whole	-	-	-	Enrichment of thinking ability and creativity. The practical knowledge of the topic will help them to understand the physiology of skin and diseases related to the system in a better	-	-	-	-	SDG 3: Ensure healthy lives and promote well-being for all at all ages.  SDG 4.4: Skills for Decent	NEP (9.1-9.3)	Student centric Technical Skills that match Industry Needs

							way and they will be able to correlate the knowledge and information gathered in their day-to-day life and future job prospective also					Work		
Unit II Practica 1 4-6	-	-	The concepts once imbibed will help the students to use the practical information in providing better health services to	-	-	-	Enrichment of thinking ability and creativity. The practical knowledge of the topic will help them to understand the physiology of skin and diseases	-	-	-	-	SDG 3: Ensure healthy lives and promote well-being for all at all ages.  SDG	NEP (9.1-9.3)	Student centric Technical Skills that match Industry Needs

			the nation as a whole				related to the system in a better way and they will be able to correlate the knowledge and information gathered in their day-to-day life and future job prospective also					4.4: Skills for Decent Work		
Unit III Practica 17-9	-	-	The concepts once imbibed will help the students to use the practical information in providing	-	-	-	Enrichment of thinking ability and creativity. The practical knowledge of the topic will help them to understand the	-	-	-	-	SDG 3: Ensure healthy lives and promote well-being for all at all ages.	NEP (9.1-9.3)	Student centric Technical Skills that match Industry Needs

			better health services to the nation as a whole				physiology of skin and diseases related to the system in a better way and they will be able to correlate the knowledge and information gathered in their day-to-day life and future job prospective also					SDG 4.4: Skills for Decent Work		
Unit IV Practicals 10-12	-	-	The concepts once imbibed will help the students to use the practical	-	-	-	Enrichment of thinking ability and creativity. The practical knowledge of the topic will help	-	The practical knowledge of the contraceptive methods and related topics will enrich the knowledge	-	-	SDG 3: Ensure healthy lives and promote well-being for all	NEP (9.1-9.3)	Student centric Technical Skills that match Industry Needs

			information in providing better health services to the nation as a whole				them to understand the physiology of skin and diseases related to the system in a better way and they will be able to correlate the knowledge and information gathered in their day-to-day life and future job prospective also		of the students in the field			at all ages.		
												SDG 4.4: Skills for Decent Work		
Unit V Practica 1 13-15	-	-	The concepts once imbibed will help the	-	-	-	Enrichment of thinking ability and creativity. The practical	-	The practical knowledge of the contraceptive methods and related topics	-	-	SDG 3: Ensure healthy lives and promote	NEP (9.1-9.3)	Student centric Technical Skills that match

		students to use the practical information in providing better health services to the nation as a whole			knowledge of the topic will help them to understand the physiology of skin and diseases related to the system in a better way and they will be able to correlate the knowledge and information gathered in their day-to-day life and future job prospective also		will enrich the knowledge of the students in the field			well-being for all at all ages.  SDG 4.4: Skills for Decent Work	Industry Needs
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<b>BP 108P</b>	<b>Pharmaceutical Analysis (Practical)</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Version 2.0</b>		<b>0</b>	<b>0</b>	<b>4</b>	<b>2</b>
<b>Total Contact Hours</b>	60 hrs				
<b>Pre-requisites/Exposure</b>	Pharmaceutical Analysis				
<b>Co-requisites</b>	Pharmaceutical Chemistry				
<b>Course Objectives</b>					
<p><b>Upon completion of this course the student should be able to</b></p> <ol style="list-style-type: none"> <li>1. To Know the history of Pharmacopoeia</li> <li>2. Understand the principles of volumetric and electro chemical analysis</li> <li>3. Carryout various volumetric and electrochemical titrations</li> <li>4. Develop analytical skills</li> </ol>					
<b>Course Outcomes (CO)</b>					



**On completion of this course, the student will be able to:**

CO1. This subject is designed to impart fundamental knowledge on pharmaceutical preparations.

CO2. The subject provides the basic knowledge required to understand the various disciplines of Analysis.

CO3. This subject deals with the monographs of inorganic drugs and pharmaceuticals.

CO4. Provide Knowledge about Indian Pharmacopoeia, British Pharmacopoeia and other Regulatory agencies.

CO5. Provide Knowledge about metric system and calculation of dosages.

**Programme and Course Mapping**

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO 1	PSO 2
CO1	3	3	2	2	3	2	-	2	2	2	3	3	3	-
CO2	3	3	3	2	2	2	-	1	2	2	3	3	3	-
CO3	3	3	2	2	3	2	-	2	2	2	3	3	3	-
CO4	3	3	2	2	3	2	-	2	2	2	3	3	3	-
CO5	3	3	2	2	3	2	-	1	2	2	3	3	3	-

1=lightly mapped

2= moderately mapped

3=strongly mapped

Unit	Relevance to the local, national, regional and global developmental needs	Relevance To the Employability/ Entrepreneurship/ Skill Development	Relevance to the Professional Ethics, Gender, Human Values, Environment & Sustainability	SDG	NEP	POE/4 <sup>th</sup> IR
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BP1 08P	Local	Regional	National	Global	Employability	Entrepreneurship	Skill Development	Professional Ethics	Gender	Human Values	Environment & Sustainability			
Unit I	-	-	To Perform Quality control of marketed formulations	To analyse the impurity in API by limit test	-	-	Analysis of impurities helps in quality control of Drugs	-	-	-	-	Skills for Decent Work (SDG 4.4)	Promoting High-quality research (18.1-18.9),	Skill Development, Employability
Unit II	-	-	To Perform the standardization of different solutions for further synthesis	To determine the concentration of solution	-	-	Standardization of solution will help in assay of Drugs	-	-	-	-	Skills for Decent Work (SD	Promoting High-quality rese	Skill Development, Employability

			use and analysis	n								G 4.4)	arch (18.1-18.9),	
Unit III	-	-	To Perform Quality control of marketed formulations	To analyse the import sample by following different assay methods	-	-	Assay of Drugs helps in Quality control of Drugs					Skills for Decent Work (SDG 4.4)	Technical Skills that match Industry Needs	Skill Development, Employability
Unit IV	-	-	To determine the normality of drugs during quality check of product	To determine the concentration of solution	-	-	Standardization of solution will help in assay of Drugs				-	Skills for Decent Work (SDG 4.4)	Technical Skills that match Industry	Hands-on Experience

													Needs	
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<b>BP 109P</b>	<b>Pharmaceutics-I (Practical)</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Version 2.0</b>		<b>0</b>	<b>0</b>	<b>4</b>	<b>2</b>
<b>Total Contact Hours</b>	60 Hours				
<b>Pre-requisites/Exposure</b>	Pharmaceutics				
<b>Co-requisites</b>	Pharmaceutics				
<b>Course Objectives</b>					
<p><b>Upon completion of this course the student should be able to</b></p> <ul style="list-style-type: none"> <li>• Know the history of profession of pharmacy</li> <li>• Understand the basics of different dosage forms, pharmaceutical incompatibilities and pharmaceutical calculations</li> <li>• Understand the professional way of handling the prescription</li> <li>• Preparation of various conventional dosage</li> </ul>					
<b>Course Outcomes (CO)</b>					
<b>On completion of this course, the student will be able to:</b>					
CO1. This subject is designed to impart fundamental knowledge on pharmaceutical preparations.					

CO2. The subject provides the basic knowledge required to understand the various disciplines of Pharmacy.

CO3. It enlightens the students about the dosage, various types of dosage form, NDDS, depot preparation.

CO4. Provide Knowledge about Indian Pharmacopoeia, British Pharmacopoeia and other Regulatory Agencies.

CO5. Provide Knowledge about metric system and calculation of dosages.

**Programme and Course Mapping**

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2
CO1	3	3	2	2	3	2	-	2	2	2	3	3	3	-
CO2	3	2	3	2	2	2	-	1	2	2	3	3	3	-
CO3	3	3	2	2	3	2	-	2	2	2	3	3	3	-
CO4	3	2	2	2	3	2	-	2	2	2	3	3	3	-
CO5	3	3	2	2	3	2	-	1	2	2	3	3	3	-

1=lightly mapped

2= moderately mapped

3=strongly mapped

Unit	Relevance to the local, national, regional and global developmental needs				Relevance To the Employability/ Entrepreneurship/ Skill Development			Relevance to the Professional Ethics, Gender, Human Values, Environment & Sustainability					SDG	NEP	POE/4 <sup>th</sup> IR
	Local	Regional	National	Global	Employability	Entrepreneurship	Skill Development	Professional Ethics	Gender	Human Values	Environment & Sustainability				
Unit I	-	-	-	Syrups and elixirs contribute globally by offering a palatable and easily administered liquid dosage form, ensuring widespread accessibility to medications, particularly for children and individuals with swallowing difficulties. They enhance patient compliance and contribute to improved global healthcare outcomes.	-	Syrups and elixirs contribute to entrepreneurship by providing opportunities for formulation innovation and niche market creation in the pharmaceutical industry. Entrepreneurs can leverage these liquid dosage forms to develop unique and specialized medication solutions,	-	-	-	-	-	Skills for Decent Work (SDG 4.4	Promoting High-quality research (18.1-18.9	Focus on Employability Skills (Local/Regional and Global)	

						catering to specific patient needs and establishing their own successful ventures.						)	)	
Unit II	-	-	-	Linctus and solutions contribute globally by offering convenient and precise delivery of medications, improving patient compliance and access to treatment. They play a crucial role in global healthcare, particularly in the management of respiratory conditions, cough, and other ailments.	-	Linctus and solutions provide entrepreneurial opportunities by enabling the development of unique formulations and specialized products for specific market segments. Entrepreneurs can capitalize on these liquid medication options to address specific patient needs and create innovative solutions, establishing successful ventures in the pharmaceutical industry.	-	-	-	-	-	Skills for Decent Work (SDG 4.4)	Promoting High-quality research (18.1-18.9)	Focus on Employability Skills (Local/Regional and Global)
Unit III	-	-	-	Suspensions and emulsions contribute globally by providing versatile formulations for the delivery of poorly soluble drugs, enhancing their bioavailability and therapeutic effectiveness. They offer diverse applications in pharmaceuticals, food, and cosmetic industries, driving innovation and improving global	-	Suspensions and emulsions offer entrepreneurial opportunities by enabling the development of unique formulations and product lines, catering to specific market needs. Entrepreneurs can	-	-	-	-	-	Skills for Decent Work (S	Promoting High-quality research	Focus on Employability Skills (Local/Regional and

				access to effective medications and consumer products.		leverage these versatile dosage forms to create innovative solutions, establish niche brands, and tap into the growing demand for specialized suspensions and emulsion-based products.							DG 4.4 )	(18.1-18.9 )	Global)
Unit IV	-	-	-	Powders and granules, suppositories, gargles, and mouthwashes contribute globally by offering versatile and accessible dosage forms for medication administration, providing convenience, targeted treatment, and improved patient outcomes in diverse healthcare settings worldwide. They address specific needs such as ease of administration, localized therapy, and oral hygiene, contributing to global healthcare accessibility and improved quality of life.	-	Powders and granules, suppositories, gargles, and mouthwashes offer entrepreneurial opportunities through the development of specialized formulations and niche product lines. Entrepreneurs can leverage these unique dosage forms to create innovative healthcare products, cater to specific market segments, and establish successful ventures in the pharmaceutical and personal care industries.	-	-	-	-	-	-	Skills for Decent Work (SDG 4.4 )	Promoting High-quality research (18.1-18.9 )	Focus on Employability Skills (Local/Regional and Global)
Unit v	-	-	-	Suppositories, semisolids, gargles, and mouthwashes have global significance as they play crucial roles	-	Entrepreneurs may explore the development and manufacturing of	-	-	-	-	-	-	Skills for	Promoting	Focus on Employ



			in healthcare by delivering medications rectally, providing topical treatments for various skin conditions, and promoting oral hygiene, respectively, thereby improving patient outcomes and enhancing overall well-being.	innovative suppository formulations, semisolid products, or oral hygiene solutions, aiming to address unmet needs, improve existing formulations, or introduce novel approaches to medication delivery and personal care. By leveraging their knowledge of these healthcare products, entrepreneurs can create businesses that contribute to the advancement of medical treatments, patient care, and overall wellness.							De cent Work (SDG 4.4)	Hig h-quality rese arch (18.1-18.9)	ability Skills (Local/Regional and Global)
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<b>BP 110P</b>	<b>Pharmaceutical Inorganic Chemistry (Practical)</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Version 2.0</b>		<b>0</b>	<b>0</b>	<b>4</b>	<b>2</b>
<b>Total Contact Hours</b>	60 Hours				

<b>Pre-requisites/Exposure</b>	Inorganic chemistry													
<b>Co-requisites</b>	Pharmaceutical chemistry													
<b>Course Objectives</b>														
<p><b>Upon completion of this course the student should be able to</b></p> <ol style="list-style-type: none"> <li>1. To Know the history of Pharmacopoeia</li> <li>2. To know the sources of impurities and methods to determine the impurities in pharmaceuticals</li> <li>3. Understand the medicinal and pharmaceutical importance of inorganic compounds</li> <li>4. Preparation of different category of pharmaceutical inorganic compounds</li> <li>5. Analysis of pharmaceutical compounds</li> </ol>														
<b>Course Outcomes (CO)</b>														
<b>On completion of this course, the student will be able to:</b>														
CO1. This subject is designed to impart fundamental knowledge on pharmaceutical preparations.														
CO2. Provide Knowledge about Indian Pharmacopoeia, British Pharmacopoeia and other Regulatory Agencies.														
CO3. Provide practical learning of impurity test in pharmaceuticals														
CO4. Provide Knowledge of calculation involved pharmaceutical chemistry subject														
<b>Programme and Course Mapping</b>														
<b>CO</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO 10</b>	<b>PO11</b>	<b>PO12</b>	<b>PSO 1</b>	<b>PSO 2</b>
CO1	3	3	2	2	3	2	-	2	2	2	3	3	3	-

<b>CO2</b>	<b>3</b>	<b>2</b>	<b>3</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>-</b>	<b>1</b>	<b>2</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>-</b>
<b>CO3</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>2</b>	<b>3</b>	<b>2</b>	<b>-</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>-</b>
<b>CO4</b>	<b>3</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>3</b>	<b>2</b>	<b>-</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>-</b>
1=lightly mapped                      2= moderately mapped                      3=strongly mapped														

Unit	Relevance to the local, national, regional and global developmental needs				Relevance To the Employability/ Entrepreneurship/ Skill Development			Relevance to the Professional Ethics, Gender, Human Values, Environment & SDG				NEP	POE/4 <sup>th</sup> IR	
	Local	Regional	National	Global	Employability	Entrepreneurship	Skill Development	Professional Ethics	Gender	Human Values	Environment &			
Unit I	-	-	<b>Limit tests for following ions</b>  Chloride, Sulphate, Iron,	<b>Limit tests for following ions</b>  Chloride, Sulphate, Iron,	-	-	Limit test helps to meet industry demand in production of pure API	-	-	-	D r u g s s h	Skills for Decent Work (SDG 4.4), Ensure sustainable consumptio	Technical Skills that match Industry Needs	Employability

			Arsenic	Arsenic							o u l d b e m i n i m u m  o f i m p u r i t y	n and production patterns (SDG 12)		
Unit II		-	<b>Identifica tion test</b>  Magnesiu m	<b>Identifica tion test</b>  Magnesiu m	-	-	Identification test helps to meet industry demand in production of pure API	-	-	-	-	Skills for Decent Work (SDG 4.4)	Practical Courses from Industry/Alumn i	Skill Develo pment, Employ ability

			hydroxide Ferrous sulphate Sodium bicarbonate Calcium gluconate Copper sulphate	hydroxide Ferrous sulphate Sodium bicarbonate Calcium gluconate Copper sulphate										
Unit III		-	<b>Test for purity</b>  Swelling power of Bentonite  Neutralizing capacity of aluminium hydroxide	<b>Test for purity</b>  Swelling power of Bentonite  Neutralizing capacity of aluminium hydroxide	-	-	Determination of physicochemical properties of Drugs assist in Preformulation studies	-	-	-	-	Skills for Decent Work (SDG 4.4)	Promoting High-quality research (18.1-18.9), Practical Courses from Industry/Alumni	Skill Development, Employability

			gel	gel										
Unit IV			<b>Preparation of inorganic pharmaceuticals</b>  Boric acid  Potash alum	<b>Preparation of inorganic pharmaceuticals</b>  Boric acid  Potash alum								Skills for Decent Work (SDG 4.4)	Promoting High-quality research (18.1-18.9), Practical Courses from Industry/Alumni	Skill Development, Employability

<b>BP111P</b>	<b>Communication skills (Practical)</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Version 2.0</b>		<b>0</b>	<b>0</b>	<b>2</b>	<b>1</b>
<b>Total Contact Hours</b>	30 Hours				
<b>Pre-requisites/Exposure</b>	Communication Skills				
<b>Co-requisites</b>	Communication Skills				

## Course Objectives

**Upon completion of this course the student should be able to**

1. Communicate effectively (Verbal and Non-Verbal)
2. Effectively manage the team as a team player

## Course Outcomes (CO)

**On completion of this course, the student will be able to:**

CO1. Understand the behavioral needs for a pharmacist to function effectively in the areas of pharmaceutical operation

CO2. Develop interview skills

## Programme and Course Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO 1	PSO 2
CO1	3	3	2	2	3	2	-	2	2	2	3	3	3	-
CO2	3	2	3	2	2	2	-	1	2	2	3	3	3	-

1=lightly mapped

2= moderately mapped

3=strongly mapped

<b>Unit</b>	<b>Relevance to the local, national, regional and global developmental needs</b>	<b>Relevance To the Employability/ Entrepreneurship/ Skill Development</b>	<b>Relevance to the Professional Ethics, Gender, Human Values, Environment &amp; Sustainability</b>	<b>SDG</b>	<b>NEP</b>	<b>POE/4<sup>th</sup> IR</b>
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BP111 P	Local	Regional	National	Global	Employability	Entrepreneurship	Skill Development	Professional Ethics	Gender	Human Values	Environment & Sustainability			
Unit I	This course is designed to give basic communication skills with a focus on local relevance and developmental needs.	This course is designed to give basic communication skills with a focus on regional relevance and developmental needs.	This course is designed to give basic communication skills with a focus on national relevance and developmental needs.	<b>This course is designed to give basic communication skills with a focus on global relevance and developmental needs.</b>	meant to teach effective communication skills, which are essential for employment.	meant to teach effective communication skills, which are essential for Entrepreneurship.	Effective Communication /Writing Skills /Effective Writing /Interview Handling Skills /E-	yes	-	-	-	1.a Ensure significant mobilization of resources from a variety of	-	Technical Skills that match Industry&osultancy Needs/ Soft Skills/Skill Development



							Mail Etiquette Presentation Skills,					sources..		
Unit II	This course is designed to teach Pronunciation, a fundamental communication skill with local relevance and developmental requirements.	This course is designed to teach Pronunciation, a fundamental communication skill with regional relevance and developmental requirements.	This course is designed to teach Pronunciation, a fundamental communication skill with national relevance and developmental requirements.	This course is designed to teach Pronunciation, a fundamental communication skill with global relevance and developmental requirements.	meant to teach effective communication skills, which are essential for employment.	meant to teach effective communication skills, which are essential for Entrepreneurship.	Effective Communication /Writing Skills /Effective Writing /Interview Handling Skills /E-Mail Etiquette Presentation	yes	-	-	-	1.a Ensure significant mobilization of resources from a variety of sources..	-	Technical Skills that match Industry&osultancy Needs/ Soft Skills/Skill Development

							Skills,							
Unit III	This course is designed to teach Effective Communication /Writing Skills /Effective Writing /Interview Handling Skills /E-Mail Etiquette Presentation Skills, which are fundamental communication skills with local relevance and development requirements.	This course is designed to teach Effective Communication /Writing Skills /Effective Writing Handling Skills /E-Mail Etiquette Presentation Skills, which are fundamental communication skills with regional relevance and development requirements.	This course is designed to teach Effective Communication /Writing Skills /Effective Writing Handling Skills /E-Mail Etiquette Presentation Skills, which are fundamental communication skills with national relevance and development requirements.	This course is designed to teach Effective Communication /Writing Skills /Effective Writing Handling Skills /E-Mail Etiquette Presentation Skills, which are fundamental communication	meant to teach effective communication skills, which are essential for employment .	meant to teach effective communication skills, which are essential for Entrepreneurship	Effective Communication /Writing Skills /Effective Writing /Interview Handling Skills /E-Mail Etiquette Presentation Skills,	yes	-	-	-	1.a Ensure significant mobilization of resources from a variety of sources..	-	Technical Skills that match Industry & consultancy Needs/ Soft Skills/Skill Development

				skills with global relevance and development requirements.										
Unit IV												1.a Ensure significant mobilization of resources from a variety of sources..	-	Technical Skills that match Industry&osultancy Needs/ Soft Skills/Skill Development

Unit v												1.a Ens ure sign ifica nt mob iliza tion of reso urce s fro m a vari ety of sour ces.. .	-	Techni cal Skills that match Industr &osul tancy Needs/ Soft Skills/S kill Develo pment

<b>BP 112RBP</b>	<b>Remedial Biology (Practical)</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Version 2.0</b>		<b>0</b>	<b>0</b>	<b>2</b>	<b>1</b>
<b>Total Contact Hours</b>	30 Hours				
<b>Pre-requisites/Exposure</b>	Remedial Biology				
<b>Co-requisites</b>	Biology				
<b>Course Objectives</b>					
<p><b>Upon completion of this course the student should be able to</b></p> <ol style="list-style-type: none"> <li>1. Microscopic study and identification of tissues pertinent to Stem, Root Leaf, seed, fruit and flower</li> <li>2. To knowledge of blood, their function and study of bones with special reference to human</li> <li>3. Understand the basic components of anatomy &amp; physiology of plant</li> <li>4. Know understand the basic components of anatomy &amp; physiology animal with special reference to human.</li> </ol>					
<b>Course Outcomes (CO)</b>					
<b>On completion of this course, the student will be able to:</b>					
CO1. To learn and understand the components of living world, structure and functional system of plant kingdom.					
CO2. It provides knowledge about blood, their composition, function and coagulation factor.					
CO3. To learn the about bones with special reference to human.					

CO4. Provide practical knowledge of biological system and human anatomy

**Programme and Course Mapping**

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2
CO1	3	3	2	2	3	2	-	2	2	2	3	3	3	3
CO2	3	2	3	2	2	2	-	1	2	2	3	3	3	3
CO3	3	3	2	2	3	2	-	2	2	2	3	3	3	3
CO4	3	2	2	2	3	2	-	2	2	2	3	3	3	3

1=lightly mapped

2= moderately mapped

3=strongly mapped

Unit	Relevance to the local, national, regional and global developmental needs	Relevance To the Employability/ Entrepreneurship/ Skill Development	Relevance to the Professional Ethics, Gender, Human Values, Environment & Sustainability	SD G	NE P	POE/4 <sup>t</sup> h IR

BP11 2RBT	Local	Regional	National	Global	Employability	Entrepreneurship	Skill Development	Professional Ethics	Gender	Human Values	Environment & Sustainability			
Unit I				The study of microscopy, including sample preparation, section cutting, mounting, staining, and permanent slide preparation, contributes to our understanding of various scientific disciplines . It enables researchers to investigate microscopic details, identify structures, analyze cellular and tissue components, and make important observations that impact global scientific			These experiments and techniques contribute to our knowledge of biology, have practical applications in healthcare and forensic investigations, and play a role		Remedial Biology provides a foundational understanding of the human body, including its structures and function for			(SDG 4.4)	(9.1 - 9.3)	Global Education Knowledge, Skill Development, Employability

				knowledge and advancements			in global research and understanding of living organisms.		both gender					
Unit II		-		These studies provide essential knowledge for advancing scientific research, addressing global challenges, improving human health, promoting sustainable practices, and ensuring the preservation of our natural world.								(SD G 4.4)	(9.1 - 9.3)	Global Education Knowledge, Skill Development, Employability
Unit III		-	-	By advancing our knowledge of plant tissues through microscopic study and identification, we gain insights into plant biology, ecology,								(SD G 4.4)	(9.1 - 9.3)	Global Education Knowledge, Skill Development, Employability
Unit IV		-	-	The determination of blood group has significant implications in various medical settings, forensic								(SD G 4.4)	(9.1 - 9.3)	Global Education Knowledge,



				investigations, and anthropological studies. It plays a crucial role in ensuring safe transfusions, successful organ transplantations, managing prenatal care, aiding forensic investigations, and advancing our knowledge of human populations globally.										Skill Development, Employability
Unit v				The determination of tidal volume is valuable in assessing respiratory health, guiding mechanical ventilation, understanding exercise physiology, monitoring occupational and environmental exposures, and enhancing sports performance. These applications have global relevance in healthcare, occupational safety, environmental protection, and sports							(SD G 4.4)	(9.1 - 9.3)		Global Education Knowledge, Skill Development, Employability

				medicine.										
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## Semester-II

<b>BP201T</b>	<b>Human Anatomy And Physiology-II (Theory)</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Version 2.0</b>		3	1	0	4
<b>Total Contact Hours</b>	45 Hours				
<b>Pre-requisites/Exposure</b>	Human Anatomy & Physiology-I				
<b>Co-requisites</b>	Pathophysiology and Biology				
<b>Course Objectives</b>					
<p><b>Upon completion of this course the student should be able to</b></p> <ol style="list-style-type: none"> <li>1. Explain the gross morphology, structure and functions of various organs of the human body.</li> <li>2. Describe the various homeostatic mechanisms and their imbalances.</li> <li>3. Identify the various tissues and organs of different systems of human body.</li> <li>4. Perform hematological tests like blood cell counts, hemoglobin estimation, bleeding/clotting time etc and record blood pressure, heart rate, pulse and respiratory volume.</li> <li>5. Appreciate coordinated working pattern of different organs of each system.</li> <li>6. Appreciate the interlinked mechanisms in the maintenance of normal functioning (homeostasis) of human body.</li> </ol>					
<b>Course Outcomes (CO)</b>					

**On completion of this course, the student will be able to:**

CO1. Understand fundamental knowledge related to the structure of brain and its functions in the human body.

CO2. Explain basic knowledge related to digestive system.

CO3. Explain basic knowledge required to understand the respiratory system.

CO4. Explain basic knowledge required to understand the reproductive system.

CO5. Explain the basic knowledge required to understand the hormonal system.

**Programme and Course Mapping**

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO 1	PSO 2
CO1	3	1			2	2		2		3	2	3	2	
CO2	3	1			2	2		2		2	2	3	2	
CO3	3	1			1	2		2		2	2	3	2	
CO4	3	1			2	2		2		2	2	3	2	
CO5	3	1			2	2		2		2	2	3	2	

1=lightly mapped

2= moderately mapped

3=strongly mapped

Unit	Relevance to the local, national, regional and global developmental needs				Relevance To the Employability/ Entrepreneurship/ Skill Development			Relevance to the Professional Ethics, Gender, Human Values, Environment & Sustainability				SDG	NEP	POE/4 <sup>th</sup> IR
Unit I	Local	Regional	National	Global	Employability	Entrepreneurship	Skill Development	Professional Ethics	Gender	Human Values	Environment & Sustainability			
Unit I	-	-	-	-	-	-	Enrichment of thinking ability and creativity as well a tool for building confidence in the	-	-	-	-	SDG 3: Ensure healthy lives and promote well-being	NEP (9.1-9.3)	Student centric Technical Skills that match Industry Needs

							students which is done by providing opportunities to students to give presentations and debates in the classroom					for all at all ages.  SDG 4.4: Skills for Decent Work		
Unit II	-	-	-	-	-	-	Enrichment of thinking ability and creativity as well a tool for building confidence in the students which is done by providing opportunities to students to give presentations and debates in the classroom	-	-	-	-	SDG 3: Ensure healthy lives and promote well-being for all at all ages.  SDG 4.4: Skills for Decent Work	NEP (9.1-9.3)	Student centric Technical Skills that match Industry Needs

Unit III	-	-	-	-	-	-	Enrichment of thinking ability and creativity as well a tool for building confidence in the students which is done by providing opportunities to students to give presentations and debates in the classroom	-	-	-	-	SDG 3: Ensure healthy lives and promote well-being for all at all ages.  SDG 4.4: Skills for Decent Work	NEP (9.1-9.3)	Student centric Technical Skills that match Industry Needs
Unit IV	-	-	-	-	-	-	Enrichment of thinking ability and creativity as well a tool for building confidence in the students which is done by	-	-	-	-	SDG 3: Ensure healthy lives and promote well-being for all at all ages.	NEP (9.1-9.3)	Student centric Technical Skills that match Industry Needs

							providing opportunities to students to give presentations and debates in the classroom					SDG 4.4: Skills for Decent Work		
Unit V	-	-	-	-	-	-	Enrichment of thinking ability and creativity as well a tool for building confidence in the students which is done by providing opportunities to students to give presentations and debates in the classroom	-	Gender Based knowledge will benefit the students to respect and understand the other gender in a better way	-	-	SDG 3: Ensure healthy lives and promote well-being for all at all ages.  SDG 4.4: Skills for Decent Work	NEP 21.1-21.10: Adult Education and Lifelong Learning	Student centric Technical Skills that match Industry Needs





<b>BP202T</b>	<b>Pharmaceutical Organic Chemistry –I (Theory)</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>									
<b>Version 2.0</b>		3	1	0	4									
<b>Total Contact Hours</b>	45 Hours													
<b>Pre-requisites/Exposure</b>	Organic chemistry													
<b>Co-requisites</b>	Chemistry													
<b>Course Objectives</b>														
<p><b>Upon completion of this course the student should be able to</b></p> <ol style="list-style-type: none"> <li>1. Write the structure, name and the type of isomerism of the organic compound.</li> <li>2. Write the reaction, name the reaction and orientation of reactions.</li> <li>3. Account for reactivity/stability of compounds.</li> <li>4. Identify/confirm the identification of organic compound.</li> </ol>														
<b>Course Outcomes (CO)</b>														
<p><b>On completion of this course, the student will be able to:</b></p> <p>CO1. Explain fundamental knowledge on isomerism.</p> <p>CO2. Explain fundamental knowledge of alkanes and alkenes and their stability.</p> <p>CO3. Explain the Structure, reactions and function of alkyl halides.</p> <p>CO4. Explain the nucleophilic addition reactions.</p> <p>CO5. Explain the structure, reaction and effect of various groups acid derivatives</p>														
<b>Programme and Course Mapping</b>														
<b>CO</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO 10</b>	<b>PO11</b>	<b>PO12</b>	<b>PSO 1</b>	<b>PSO 2</b>

<b>CO1</b>	<b>3</b>	<b>1</b>			<b>2</b>	<b>2</b>		<b>2</b>		<b>3</b>	<b>2</b>	<b>3</b>	<b>2</b>	<b>2</b>
<b>CO2</b>	<b>3</b>	<b>1</b>			<b>2</b>	<b>2</b>		<b>2</b>		<b>2</b>	<b>2</b>	<b>3</b>	<b>2</b>	<b>2</b>
<b>CO3</b>	<b>3</b>	<b>1</b>			<b>1</b>	<b>2</b>		<b>2</b>		<b>2</b>	<b>2</b>	<b>3</b>	<b>2</b>	<b>2</b>
<b>CO4</b>	<b>3</b>	<b>1</b>			<b>2</b>	<b>2</b>		<b>2</b>		<b>2</b>	<b>2</b>	<b>3</b>	<b>2</b>	<b>2</b>
<b>CO5</b>	<b>3</b>	<b>1</b>			<b>2</b>	<b>2</b>		<b>2</b>		<b>2</b>	<b>2</b>	<b>3</b>	<b>2</b>	<b>2</b>
1=lightly mapped                      2= moderately mapped                      3=strongly mapped														

Unit	Relevance to the local, national, regional and global developmental needs				Relevance To the Employability/ Entrepreneurship/ Skill Development			Relevance to the Professional Ethics, Gender, Human Values, Environment & Sustainability				SDG	NEP	POE/4 <sup>th</sup> IR
	Local	Regional	National	Global	Employability	Entrepreneurship	Skill Development	Professional Ethics	Gender	Human Values	Environment & Sustainability			
Unit I	-	-	-	To know standard	-	-	Knowledge of nomenclature will help in naming	-	-	-	-	Skills for Decent	Professional Education	Skill Development

				IUPAC nomenclature of compounds			unknown compounds					Work (SD G 4.4)	(17.1-17.5)	
Unit II		-	-	Fulfils understanding of basic Elimination, substitution reaction for further synthesis			Knowledge of basic Elimination, substitution reactions will help in synthesis of new unknown compounds	-	-	-	-	Skills for Decent Work (SD G 4.4)	Professional Education (17.1-17.5)	Skill Development
Unit III	-	-	-	Globally aware about synthesis of alkyl halide and alcohol	-		Study of alkyl halide and alcohol compound will help in synthesis of drugs containing alkyl halide and alcohol	-	-	-	-	Skills for Decent Work (SD G 4.4)	Promoting High-quality research (18.1-18.9)	Skill Development

							and their derivatives.							
Unit IV	-	-	-	Global awareness about synthesis of carbonyl compound and their determination	-		Study of carbonyl compound will help in synthesis of drugs containing carbonyl group and their derivatives.		-	-	-	Skills for Decent Work (SDG 4.4)	Promoting High-quality research (18.1-18.9)	Skill Development
Unit v	-	-	-	Global awareness about synthesis of carboxylic compound and	-		Study of carboxylic compound will help in synthesis of drugs containing carboxylic group and their derivatives.	-	-	-	-	Professional Education (17.1 - 17.5)	Promoting High-quality research (18.1-18.9)	Skill Development

				their determ ination															
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<b>BP203T</b>	<b>Biochemistry (Theory)</b>									<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>	
<b>Version 2.0</b>										3	1	0	4	
<b>Total Contact Hours</b>	45 Hours													
<b>Pre-requisites/Exposure</b>	Chemistry													
<b>Co-requisites</b>	Chemistry and biology													
<b>Course Objectives</b>														
<b>Upon completion of this course the student should be able to:</b>														
1. Understand the catalytic role of enzymes, importance of enzyme inhibitors in design of new drugs, therapeutic and diagnostic applications of enzymes.														
2. Understand the metabolism of nutrient molecules in physiological and pathological conditions.														
3. Understand the genetic organization of mammalian genome and functions of DNA in the synthesis of RNAs and proteins.														
<b>Course Outcomes (CO)</b>														
<b>On completion of this course, the student will be able to:</b>														
CO1. Explain fundamental information related to the structure, function and significance of bio molecules.														
CO2. Explain various metabolic pathways based on glucose.														
CO3. Explain lipids oxidation, catabolism, anabolism and related diseases.														
CO4. Explain biosynthesis and catabolism of purine and pyrimidine nucleotide.														
CO5. Explain enzyme kinetics and its various applications.														
<b>Programme and Course Mapping</b>														
<b>CO</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO 10</b>	<b>PO11</b>	<b>PO12</b>	<b>PSO 1</b>	<b>PSO 2</b>
<b>CO1</b>	<b>3</b>	<b>1</b>			<b>2</b>	<b>2</b>		<b>2</b>		<b>3</b>	<b>2</b>	<b>3</b>	<b>2</b>	<b>2</b>

CO2	3	1			2	2		2		2	2	3	2	2
CO3	3	1			1	2		2		2	2	3	2	2
CO4	3	1			2	2		2		2	2	3	2	2
CO5	3	1			2	2		2		2	2	3	2	2
1=lightly mapped                      2= moderately mapped                      3=strongly mapped														

Unit	Relevance to the local, national, regional and global developmental needs				Relevance To the Employability/ Entrepreneurship/ Skill Development			Relevance to the Professional Ethics, Gender, Human Values, Environment & Sustainability				SDG	NEP	POE/4 <sup>th</sup> IR
	Local	Regional	National	Global	Employability	Entrepreneurship	Skill Development	Professional Ethics	Gender	Human Values	Environment & Sustainability			
Unit I	-	-	-	Underst and the importa nce of nutrient molecu les in physiol	-	-	helps students to get familiar with real-world problems	-	-	-	-	Give basic knowledge about biomolecu les (SDG 4.2 & SDG 4.4); Subject	Profess ional Educat ion (17.1-17.5)	Hands-on Experie nce Employ ability Skill Develo

				ogical and pathological conditions.			so that they can brainstorm new ideas to address them					help to acquire basic idea about Relationship between free energy, enthalpy and entropy; Redox potentialE nergy rich compounds (SDG 7)		ment
Unit II	-	-	-	Carbohydrate metabolic pathways knowledge help to develop antidiabetic drug discovery and development	-	-	This basic knowledge helps, students would find themselves more confident and ready for their careers.	-	-	-	-	Ensure healthy lives and promote well-being for all at all ages (SDG 3) " Skills for Decent Work (SDG 4.4)	Professional Education (17.1-17.5)	Technical Skills that match Industry Needs; Skill Development



Unit III	Help to know about balance diet and importance	-	-	-	-	-	biochemists may work to develop new medical products that help prevent diseases such as atherosclerosis, heart diseases	-	-	-	-	Skills for Decent Work (SDG 4.4) (practical training in lab) "Ensure healthy lives and promote well-being for all at all ages (SDG 3)"	Professional Education (17.1-17.5)	Technical Skills that match Industry Needs; Skill Development
Unit IV	-	-	-	Understanding the structure and function of DNA has revolutionised the study of disease pathways, evaluation of a	-	-	Purine metabolic pathways knowledge help to develop gout drug discovery and development	-	-	-	-	Skills for Decent Work (SDG 4.4) (practical training in lab) "Ensure healthy lives and promote well-being for all at all ages (SDG 3)"	Professional Education (17.1-17.5)	Technical Skills that match Industry Needs; Skill Development

				person's genetic predisposition to particular diseases, diagnosis of genetic abnormalities, and development of new medications.										
Unit v	-	-	-	Help in drug discovery & development by inhibiting enzymes	-	-	Enzymes knowledge helps us in drug designing	-	-	-	-	Skills for Decent Work (SDG 4.4) (practical training in lab)	Professional Education (17.1-17.5)	Technical Skills that match Industry Needs; Skill Development

<b>BP204T</b>	<b>Pathophysiology (Theory)</b>									<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>	
<b>Version 2.0</b>										3	1	0	4	
<b>Total Contact Hours</b>	45 Hours													
<b>Pre-requisites/Exposure</b>	Cellular and molecular Biology													
<b>Co-requisites</b>	Chemistry and biology													
<b>Course Objectives</b>														
<b>Upon completion of this course the student should be able to</b>														
<ol style="list-style-type: none"> <li>1. Describe the aetiology and pathogenesis of the selected diseases.</li> <li>2. Understanding of various types of injuries encountered during life.</li> <li>3. Know the causatives organism of various diseases.</li> <li>4. Study about STDs</li> </ol>														
<b>Course Outcomes (CO)</b>														
<b>On completion of this course, the student will be able to:</b>														
CO1. Learn about the basic principles of Cell injury and Adaptation.														
CO2. Understand the Pathophysiology of heart disease and their complication.														
CO3. Understand the Pathophysiology of disease related to respiratory and endocrine system.														
CO4. Understand the Pathophysiology of Disease related to gastrointestinal, Alzheimer's and cancer disease.														
CO5. Understand the Pathophysiology of Sexually transmitted diseases.														
<b>Programme and Course Mapping</b>														
<b>CO</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO 10</b>	<b>PO11</b>	<b>PO12</b>	<b>PSO 1</b>	<b>PSO 2</b>
<b>CO1</b>	3	1			2	2		2		3	2	3	2	
<b>CO2</b>	3	1			2	2		2		2	2	3	2	
<b>CO3</b>	3	1			1	2		2		2	2	3	2	
<b>CO4</b>	3	1			2	2		2		2	2	3	2	

CO5	3	1		2	2		2		2	2	3	2	
1=lightly mapped                      2= moderately mapped                      3=strongly mapped													

Unit	Relevance to the local, national, regional and global developmental needs				Relevance To the Employability/ Entrepreneurship/ Skill Development			Relevance to the Professional Ethics, Gender, Human Values, Environment & Sustainability				SDG	NEP	POE/4 <sup>th</sup> IR
BP2 04T	Local	Regional	National	Global	Employability	Entrepreneurship	Skill Development	Professional Ethics	Gender	Human Values	Environment & Sustainability			
Unit I	-	-	-	To understand the studies related to basic principles of cell injury and adaptation of cell that helps in creating baseline knowledge	-	-	In gaining basic knowledge related to cell injury and its adaptation	-	-	-	-	Ensure healthy lives and promote well-being for all at all ages SDG 3	Promoting High-quality	Global education knowledge

														ity rese arch (18. 1- 18.9 ) Prof essi onal edu cati on (17. 1- 17.5 )	
Unit II	-	-	-	To emphasize on the pathophysiology of diseases of cardiovascular, respiratory and renal system	-	-	Understanding basics of pathophysiological mechanism of diseases of cardiovascular, respiratory and renal system	-	-	-	-	Ensure healthy lives and promote well-being for all at all ages SDG 3	Prof essi onal edu cati on (17. 1- 17.5 )	Global educati on knowle dge	
Unit III	-	-	-	The focus in understanding the pathophysiology of diseases of haematological, endocrine, nervous and gastrointestinal system	-	-	In gaining basic knowledge on pathophysiological mechanism of diseases of haematological, endocrine, nervous and	-	-	-	-	Ensure healthy lives and promote well-being for all at all ages SDG 3	Prof essi onal edu cati on (17. 1-	Global educati on knowle dge	

							gastrointestinal system						17.5 )	
Unit IV	-	-	-	To emphasize the pathophysiology of diseases of inflammatory bowel, bones and joints, and principles of cancer.	-	-	Understanding basics of pathophysiological mechanism of diseases of inflammatory bowel diseases, bones and joints, and principles of cancer.	-	-	-	-	Ensure healthy lives and promote well-being for all at all ages SDG 3	Professional education (17.1-17.5)	Global education knowledge
Unit v	-	-	-	To emphasize the pathophysiology of infectious diseases as well as sexually transmitted diseases.	-	-	In gaining basic knowledge of pathophysiological mechanism of infectious diseases as well as sexually transmitted diseases.	-	-	-	-	Ensure healthy lives and promote well-being for all at all ages SDG 3	Professional education (17.1-17.5)	Global education knowledge

<b>BP205T</b>	<b>Computer Applications in Pharmacy (Theory)</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Version 2.0</b>		3	0	0	3
<b>Total Contact Hours</b>	25 Hours				

<b>Pre-requisites/Exposure</b>	Computer sciences													
<b>Co-requisites</b>	Computer sciences													
<b>Course Objectives</b>														
<b>Upon completion of this course the student should be able to:</b>														
1. Know the various types of application of computers in pharmacy.														
2. Know various types of databases.														
3. Know various applications of databases in pharmacy.														
<b>Course Outcomes (CO)</b>														
<b>On completion of this course, the student will be able to:</b>														
CO1. Learn about the basics of computer applications in pharmacy.														
CO2. Understand various types of databases.														
CO3. Understand the applications of different types of databases in pharmacy.														
CO4. Explain the role of computers for data analysis in Pre clinical development.														
<b>Programme and Course Mapping</b>														
<b>CO</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO 10</b>	<b>PO11</b>	<b>PO12</b>	<b>PSO 1</b>	<b>PSO 2</b>
CO1	1	2	2		2	2				3	2	3	2	
CO2	1	1	2		2	2				2	2	3	2	
CO3	1	1	2		1	2				2	2	3	2	
CO4	1	2	2		2	2				2	2	3	2	
1=lightly mapped                      2= moderately mapped                      3=strongly mapped														





<b>BP206T</b>	<b>Environmental Sciences (Theory)</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Version 2.0</b>		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>
<b>Total Contact Hours</b>	30 Hours				
<b>Pre-requisites/Exposure</b>	Environment studies				
<b>Co-requisites</b>	Social and cultural factors				

### Course Objectives

**Upon completion of this course the student should be able to:**

1. Create the awareness about environmental problems among learners.
2. Impart basic knowledge about the environment and its allied problems.
3. Develop an attitude of concern for the environment.
4. Motivate learner to participate in environment protection and environment improvement.
5. Acquire skills to help the concerned individuals in identifying and solving environmental

### Course Outcomes (CO)

**On completion of this course, the student will be able to:**

- CO1. To study of the environmental system and the status of its inherent or induced changes on organisms.
- CO 2. Strive to attain harmony with Nature
- CO3. Motivate learner to participate in environment protection and environment improvement.
- CO 4. To Impart basic knowledge about the environment and its allied problems

### Programme and Course Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO 1	PSO 2
CO1	2						1							
CO2										3				1
CO3				3										
CO4							1					3	1	

1=lightly mapped

2= moderately mapped

3=strongly mapped

Unit	Relevance to the local, national, regional and global developmental needs				Relevance To the Employability/ Entrepreneurship/ Skill Development			Relevance to the Professional Ethics, Gender, Human Values, Environment & Sustainability				SDG	NEP	POE/4 <sup>th</sup> IR
	Local	Regional	National	Global	Employability	Entrepreneurship	Skill Development	Professional Ethics	Gender	Human Values	Environment & Sustainability			
Unit I	-	-	-	Awareness about different natural resources, i.e. renewable/n on-renewable energy resources & etc	-	-	Familiar and identification and knowledge of different environmental resources and their components.	-	-	-	Reduction of threat on natural resources.	Ensure healthy lives and promote well-being for all at all ages (SDG 3)  Ensure access to	Global Education Knowledge	Consulting Field Projects, Projects

													affordable, reliable, sustainable and modern energy for all (SDG 7) Promote sustainable, inclusive and sustainable economic growth, full and productive employment and decent work for all (SDG 8), Take urgent action to combat climate		
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													change and its impacts (SDG 13), Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss (SDG 15)		
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Unit II		-	-	knowledge of different ecological systems, their structure and functions	Best Commercial utilization of natural resources.							Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss (SDG 15)	Promoting High quality research (18.1-18.9)	Case Competitions
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Unit III		-	-	Know about factors affecting components of environment & their adverse effect on individual health. Introduction of Public awareness programmes . Introduce and implementation of Laws & Acts there on.								Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels (SDG 16) Revitalize the global partnership for sustainable	Teamwork , skill development, Case Competitions
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													development (Role of all Schools, KRMU) (SDG 17)		
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<b>BP207P</b>	<b>Human Anatomy And Physiology-I (Practical)</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Version 2.0</b>		<b>0</b>	<b>0</b>	<b>4</b>	<b>2</b>
<b>Total Contact Hours</b>	60 Hours				
<b>Pre-requisites/Exposure</b>	Pharmacology				
<b>Co-requisites</b>	Pathophysiology				
<b>Course Objectives</b>					
<b>Upon completion of this course the student should be able to:</b>					
<ol style="list-style-type: none"> <li>1. Practical physiology is complimentary to the theoretical discussions in Physiology.</li> <li>2. Practical allow the verification of physiological processes discusses in theory classes through experiments on living tissue, intact animals or normal human beings.</li> <li>3. This is helpful for developing an insight on the human anatomy and physiology subject.</li> </ol>					
<b>Course Outcomes (CO)</b>					
<b>On completion of this course, the student will be able to:</b>					
CO1. This subject is designed to impart practical knowledge on the in-theory classes through experiments on living tissue, intact animals or normal human beings.					
CO2. The subject provides the basic knowledge required to understand the digestive system					

CO3. The subject provides the basic knowledge required to understand the nervous system.

CO4. The subject provides the basic knowledge required to understand the respiratory system and endocrine system

CO5. The subject provides the basic knowledge required to understand reproductive system.

**Programme and Course Mapping**

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO 1	PSO 2
CO1	3	1			2	2		2		3	2	3	2	2
CO2	3	1			2	2		2		2	2	3	2	2
CO3	3	1			1	2		2		2	2	3	2	2
CO4	3	1			2	2		2		2	2	3	2	2
CO5	3	1			2	2		2		2	2	3	2	2

1=lightly mapped

2= moderately mapped

3=strongly mapped



<b>Unit</b>	<b>Relevance to the local, national, regional and global developmental needs</b>	<b>Relevance To the Employability/ Entrepreneurship/ Skill Development</b>	<b>Relevance to the Professional Ethics, Gender, Human Values, Environment &amp; Sustainability</b>	<b>SDG</b>	<b>NEP</b>	<b>POE/4<sup>th</sup> IR</b>
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BP207P	Local	Regional	National	Global	Employability	Entrepreneurship	Skill Development	Professional Ethics	Gender	Human Values	Environment & Sustainability			
Unit I Practical 1-3	-	-	The concepts once imbibed will help the students to use the practical information in providing better health services to the nation as a whole	-	-	-	Enrichment of thinking ability and creativity. The practical knowledge of the topic will help them to understand the physiology of skin and diseases related to the system in a better way and they will be able to	-	-	-	-	SDG 3: Ensure healthy lives and promote well-being for all at all ages.  SDG 4.4: Skills for Decent Work	NEP (9.1-9.3)	Student centric Technical Skills that match Industry Needs

							corelate the knowledge and information gathered in their day-to-day life and future job prospectives also							
Unit II Practical 4-6	-	-	The concepts once imbibed will help the students to use the practical information in providing better health services to the nation as a whole	-	-	-	Enrichment of thinking ability and creativity. The practical knowledge of the topic will help them to understand the physiology of skin and diseases related to the system in a better way and they will be able to correlate the knowledge and information	-	-	-	-	SDG 3: Ensure healthy lives and promote well-being for all at all ages.  SDG 4.4: Skills for Decent Work	NEP (9.1-9.3)	Student centric Technical Skills that match Industry Needs

							gathered in their day-to-day life and future job prospective also							
Unit III Practical 7-9	-	-	The concepts once imbibed will help the students to use the practical information in providing better health services to the nation as a whole	-	-	-	Enrichment of thinking ability and creativity. The practical knowledge of the topic will help them to understand the physiology of skin and diseases related to the system in a better way and they will be able to correlate the knowledge and information gathered in their day-to-day life and future job	-	-	-	-	SDG 3: Ensure healthy lives and promote well-being for all at all ages.  SDG 4.4: Skills for Decent Work	NEP (9.1-9.3)	Student centric Technical Skills that match Industry Needs

							prospective also							
Unit IV Practical 10-12	-	-	The concepts once imbibed will help the students to use the practical information in providing better health services to the nation as a whole	-	-	-	Enrichment of thinking ability and creativity. The practical knowledge of the topic will help them to understand the physiology of skin and diseases related to the system in a better way and they will be able to correlate the knowledge and information gathered in their day-to-day life and future job prospective also	-	The practical knowledge of the contraceptive methods and related topics will enrich the knowledge of the students in the field	-	-	SDG 3: Ensure healthy lives and promote well-being for all at all ages.  SDG 4.4: Skills for Decent Work	NEP (9.1-9.3)	Student centric Technical Skills that match Industry Needs

Unit V Practical 13-16	-	-	The concepts once imbibed will help the students to use the practical information in providing better health services to the nation as a whole	-	-	-	Enrichment of thinking ability and creativity. The practical knowledge of the topic will help them to understand the physiology of skin and diseases related to the system in a better way and they will be able to correlate the knowledge and information gathered in their day-to-day life and future job prospective also	-	The practical knowledge of the contraceptive methods and related topics will enrich the knowledge of the students in the field	-	-	SDG 3: Ensure healthy lives and promote well-being for all at all ages.  SDG 4.4: Skills for Decent Work	NEP (9.1-9.3)	Student centric Technical Skills that match Industry Needs
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<b>BP208P</b>	<b>Pharmaceutical Organic Chemistry –I (Practical)</b>							<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>			
<b>Version 2.0</b>								<b>0</b>	<b>0</b>	<b>4</b>	<b>2</b>			
<b>Total Contact Hours</b>	60 Hours													
<b>Pre-requisites/Exposure</b>	Organic chemistry (Practical)													
<b>Co-requisites</b>	Chemistry													
<b>Course Objectives</b>														
<b>Upon completion of this course the student should be able to:</b>														
<ol style="list-style-type: none"> <li>1. Write the reaction, name the reaction and orientation of reactions</li> <li>2. Account for reactivity/stability of compounds,</li> <li>3. Identify/confirm the identification of organic compound</li> </ol>														
<b>Course Outcomes (CO)</b>														
<b>On completion of this course, the student will be able to:</b>														
CO1. Explain fundamental knowledge on isomerism.														
CO2. Explain fundamental knowledge of alkanes and alkenes and their stability.														
CO3. Explain the nucleophilic addition reactions.														
<b>Programme and Course Mapping</b>														
<b>CO</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO 10</b>	<b>PO11</b>	<b>PO12</b>	<b>PSO 1</b>	<b>PSO 2</b>
<b>CO1</b>	<b>3</b>	<b>1</b>			<b>2</b>	<b>2</b>		<b>2</b>		<b>3</b>	<b>2</b>	<b>3</b>	<b>2</b>	<b>2</b>
<b>CO2</b>	<b>3</b>	<b>1</b>			<b>2</b>	<b>2</b>		<b>2</b>		<b>2</b>	<b>2</b>	<b>3</b>	<b>2</b>	<b>2</b>
<b>CO3</b>	<b>3</b>	<b>1</b>			<b>1</b>	<b>2</b>		<b>2</b>		<b>2</b>	<b>2</b>	<b>3</b>	<b>2</b>	<b>2</b>
1=lightly mapped                      2= moderately mapped                      3=strongly mapped														

Unit	Relevance to the local, national, regional and global developmental needs				Relevance To the Employability/ Entrepreneurship/ Skill Development			Relevance to the Professional Ethics, Gender, Human Values, Environment & Sustainability				SDG	NEP	POE/4 <sup>th</sup> IR
BP208 P	Local	Regional	National	Global	Employability	Entrepreneurship	Skill Development	Professional Ethics	Gender	Human Values	Environment & Sustainability			
Unit I	-	-	-	Fulfils the need for Drug Development globally	-	-	Knowledge of Physicochemical properties of Drugs helps in Preformulation studies	-	-	-	-	Skills for Decent Work (SDG 4.4)	Professional Education (17.1-17.5)	Skill Development
Unit II	-	-	-	Fulfils the need for determination of different groups	-	-	Knowledge of determination of unknown compounds will help in identification of new synthesized	-	-	-	-	Skills for Decent Work (SDG 4.4)	Professional Education (17.1-17.5)	Skill Development



							compounds							
Unit III	-	-	-	Fulfils the need for Drug Development globally	-	-	Knowledge of synthesis of different derivatives helps in synthesis of new moieties	-	-	-	-	Skills for Decent Work (SDG 4.4)	Promoting High-quality research (18.1-18.9),	Skill Development, Employability

BP209P	Biochemistry (Practical)	L	T	P	C
Version 2.0		3	1	0	4
Total Contact Hours	60 Hours				
Pre-requisites/Exposure	Chemistry				
Co-requisites	Chemistry and biology				
<b>Course Objectives</b>					
<b>Upon completion of this course the student should be able to:</b>					
1. Understand the catalytic role of enzymes, importance of enzyme inhibitors in design of new drugs, therapeutic and diagnostic applications of enzymes.					
2. Understand the metabolism of nutrient molecules in physiological and pathological conditions.					
3. Understand the genetic organization of mammalian genome and functions of DNA in the synthesis of RNAs and proteins.					
<b>Course Outcomes (CO)</b>					
<b>On completion of this course, the student will be able to:</b>					

CO1. Learn about the basic principles of Biochemistry  
 CO2. Understand the Pathophysiology of Urine.  
 CO3. Understand the basics about Protein Carbohydrate, Fats

**Programme and Course Mapping**

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO 1	PSO 2
CO1	3	1	-	-	2	2	-	2		3	2	3	2	
CO2	3	1	-	-	2	2		2		2	2	3	2	
CO3	3	1	-	-	1	2		2		2	2	3	2	

1=lightly mapped

2= moderately mapped

3=strongly mapped

Unit	Relevance to the local, national, regional and global developmental needs				Relevance To the Employability/ Entrepreneurship/ Skill Development			Relevance to the Professional Ethics, Gender, Human Values, Environment & Sustainability				SDG	NEP	POE/4 <sup>th</sup> IR	
Local					Employability	Entrepreneurship	Skill Development	Professional Ethics	Gender	Human Values	Environment & Sustainability				
Regional															
National															
Global															

Unit I			Experiments involving laboratory techniques like recrystallization, steam distillation is important part of pharmaceutical sciences experiment. These experiments are usually conducted all over the world.			A knowledge able individual in organic chemistry aids in the synthesis of drugs and their intermedia tes.	-	-	-	-	Sustai nable Devel opment and Globa l Citize nship (SDG 4.7)	Quality Universitie s and Colleges: A New and Forward-looking Vision for India's Higher Education System (9.1- 9.3)	Global Educati on Knowle dge Practic al Course s from Industr y/Alum ni
											Schol arship s for High er Educa tion (SDG 4.b)	Professiona l Education (17.1-17.5)	Techni cal Skills that match Industr y Needs
											Revita lize the global partne rship for sustai nable devel opment (SDG 17)	Promoting High-quality research (18.1-18.9)	Focus on Employ ability Skills (Local/ Region al and Global) Interns hip Progra ms Consult ing
												Technology Use & Integration (23.1- 23.13)	

													Field Project s Entrepr neursh ip Progra m through Innovat ion System	
Unit II				The determination of acid/ saponification/ iodine value of fats and oils has a significant global impact by ensuring quality, stability, and functionality in various industries, promoting sustainability, and facilitating international trade.			A knowledge able individual in organic chemistry aids in the synthesis of drugs and their intermedia tes	-	-	-	-	Sustai nable Devel opme nt and Globa l Citize nship (SDG 4.7) Schol arship s for Highe r Educa tion (SDG 4.b) Revita lize the	Quality Universitie s and Colleges: A New and Forward- looking Vision for India's Higher Education System (9.1- 9.3) Professiona l Education (17.1-17.5) Promoting Highj- quality research (18.1-18.9) Technology Use &	Global Educati on Knowle dge Practic al Course s from Industr y/Alum ni Techni cal Skills that match Industr y Needs Focus on Employ

											global partnership for sustainable development (SDG 17)	Integration (23.1-23.13)	ability Skills (Local/Regional and Global) Internship Programs Consulting Field Projects Entrepreneurship Program through Innovation System
Unit III			Chemical, drug, and intermediate preparation is a key part of the pharmaceutical sector globally.		A knowledgeable individual in organic chemistry aids in the synthesis of drugs and their intermedia	-	-	-	-	Sustainable Development and Global Citizenship (SDG 4.7)	Quality Universities and Colleges: A New and Forward-looking Vision for India's Higher Education	Global Education Knowledge Practical Courses from Industry/Alum	

						tes					Scholarships for Higher Education (SDG 4.b) Revitalize the global partnership for sustainable development (SDG 17)	System (9.1- 9.3) Professional Education (17.1-17.5) Promoting High-quality research (18.1-18.9) Technology Use & Integration (23.1-23.13)	Technical Skills that match Industry Needs Focus on Employability Skills (Local/Regional and Global) Internship Programs Consulting Field Projects Entrepreneurship Program through Innovation
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																			System
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## Semester-III

<b>BP 301T</b>	<b>Pharmaceutical Organic Chemistry –II (Theory)</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Version 2.0</b>		<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>
<b>Total Contact Hours</b>	45 Hours				
<b>Pre-requisites/Exposure</b>					
<b>Co-requisites</b>	-				
<b>Course Objectives</b>					
<b>Upon completion of this course the student should be able to:</b>					
1. Write the structure, name and the type of isomerism of the organic compound					
2. Write the reaction, name the reaction and orientation of reactions					
3. Account for reactivity/stability of compounds,					
4. Prepare organic compounds					
<b>Course Outcomes (CO)</b>					
<b>On completion of this course, the student will be able to:</b>					
CO1. This subject deals with general methods of preparation and reactions of some organic compounds.					
CO2. Reactivity and mechanism deal with organic compounds are studied here.					
CO3. The syllabus emphasizes on orientation of reactions and application.					

CO4. Chemistry of fats and oils are also described here.

CO5. Application and purity of fats and oils also discussed in this subjects.

**Programme and Course Mapping**

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO 1	PSO 2
CO1	-	1	1	-	-	-	-	-	-	-	1	1	1	-
CO2	-	1	1	-	-	-	-	-	-	-	1	1	1	-
CO3	-	1	1	-	-	-	-	-	-	-	1	1	1	-
CO4	-	1	1	-	-	-	-	-	-	-	1	1	1	-
CO5	-	1	1	-	-	-	-	-	-	-	1	1	1	-

1=lightly mapped                      2= moderately mapped                      3=strongly mapped

Unit	Relevance to the local, national, regional and global developmental needs	Relevance To the Employability/ Entrepreneurship/ Skill Development	Relevance to the Professional Ethics, Gender, Human Values, Environment & Sustainability	SDG	NEP	POE/4 <sup>th</sup> IR
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BP3 01T	Local	Regional	National	Global	Employability	Entrepreneurship	Skill Development	Professional Ethics	Gender	Human Values	Environment & Sustainability			
Unit I				The knowledge of general methods of preparation and reactions of Benzene and its derivatives has global importance			A knowledgeable individual in organic chemistry aids in the synthesis of drugs and their intermediates.	-	-	-	-	Sustainable Development and Global Citizenship (SDG 4.7) Scholarships for Higher Education (SDG 4.b) Revita	Quality Universities and Colleges: A Forward-looking Vision for India's Higher Education System (9.1- 9.3) Professional Education (17.1-17.5) Promoting High-quality research (18.1-18.9)	Global Education Knowledge Practical Courses from Industry/Alumni Technical Skills that match Industry Needs Focus

											lize the global partnership for sustainable development (SDG 17)	Technology Use & Integration (23.1-23.13)	on Employability Skills (Local/Regional and Global) Internship Programs Consulting Field Projects Entrepreneurship Program through Innovation System
Unit II			The exploration of qualitative analysis, general methods of preparation and reactions of phenols, acids and amines is an			A knowledgeable individual in organic	-	-	-	-	Sustainable Development	Quality Universities and Colleges: A	Global Education Knowledge

			essential part of the pharmaceutical sciences and has global importance.			chemistry aids in the synthesis of drugs and their intermediates					nt and Global Citizenship (SDG 4.7) Scholarship for Higher Education (SDG 4.b) Revitalize the global partnership for sustainable development (SDG 17)	New and Forward-looking Vision for India's Higher Education System (9.1- 9.3) Professional Education (17.1-17.5) Promoting High-quality research (18.1-18.9) Technology Use & Integration (23.1-23.13)	dge Practical Courses from Industry/Alumni Technical Skills that match Industry Needs Focus on Employability Skills (Local/Regional and Global) Internship Programs Consult
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													ing Field Project s Entrepr neursh ip Progra m through Innovat ion System
Unit III				The global importance of studying fats and oils lies in their role in human nutrition, food industry development, agriculture, industrial applications, and environmental sustainability.		A knowledge able individual in organic chemistry aids in the synthesis of drugs and their intermedia tes	-	-	-	-	Sustai nable Devel opme nt and Globa l Citize nship (SDG 4.7) Schol arship s for High er Educa	Quality Universitie s and Colleges: A New and Forward- looking Vision for India's Higher Education System (9.1- 9.3) Professiona l Education (17.1-17.5) Promoting	Global Educati on Knowle dge Practic al Course s from Industr y/Alum ni Techni cal Skills that match

											tion (SDG 4.b) Revita lize the global partne rship for sustai nable devel opme nt (SDG 17)	Highj- quality research (18.1-18.9) Technology Use & Integration (23.1- 23.13)	Industr y Needs Focus on Employ ability Skills (Local/ Region al and Global) Interns hip Progra ms Consult ing Field Project Entrepr neursh ip Progra m through Innovat ion System
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Unit IV			The knowledge of general methods of preparation and reactions of Polynuclear hydrocarbons has global importance.			A knowledgeable individual in organic chemistry aids in the synthesis of drugs and their intermediates	-	-	-	-	Sustainable Development and Global Citizenship (SDG 4.7) Scholarships for Higher Education (SDG 4.b) Revitalize the global partnership for sustainable development (SDG 17)	Quality Universities and Colleges: A New and Forward-looking Vision for India's Higher Education System (9.1- 9.3) Professional Education (17.1-17.5) Promoting High-quality research (18.1-18.9) Technology Use & Integration (23.1-23.13)	Global Education Knowledge Practical Courses from Industry/Alumni Technical Skills that match Industry Needs Focus on Employability Skills (Local/Regional and Global) Internship Programs Consulting
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													Field Project s Entrepr neursh ip Progra m through Innovat ion System	
Unit V				The knowledge of general chemistry, methods of preparation and reactions of Cyclo alkanes has global importance.			A knowledge able individual in organic chemistry aids in the synthesis of drugs and their intermedia tes	-	-	-	-	Sustai nable Devel opme nt and Globa l Citize nship (SDG 4.7) Schol arship s for Highe r Educa tion (SDG 4.b) Revita lize the	Quality Universitie s and Colleges: A New and Forward- looking Vision for India's Higher Education System (9.1- 9.3) Professiona l Education (17.1-17.5) Promoting Highj- quality research (18.1-18.9) Technology Use &	Global Educati on Knowle dge Practic al Course s from Industr y/Alum ni Techni cal Skills that match Industr y Needs Focus on Employ

											global partne rship for sustai nable devel opme nt (SDG 17)	Integration (23.1- 23.13)	ability Skills (Local/ Region al and Global) Interns hip Progra ms Consult ing Field Project s Entrepr neursh ip Progra m through Innovat ion System
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<b>BP 302T</b>	<b>Physical Pharmaceutics-I (Theory)</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Version 2.0</b>		<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>
<b>Total Contact Hours</b>	45 Hours				
<b>Pre-requisites/Exposure</b>					



<b>Co-requisites</b>		-												
<b>Course Objectives</b>														
<b>Upon completion of this course the student should be able to:</b>														
1. Understand various physicochemical properties of drug molecules in the designing the dosage forms														
2. Know the principles of chemical kinetics & to use them for stability testing and determination of expiry date of formulations														
3. Demonstrate use of physicochemical properties in the formulation development and evaluation of dosage forms.														
<b>Course Outcomes (CO)</b>														
<b>On completion of this course, the student will be able to:</b>														
<b>CO 1.</b> The course deals with the various physicochemical properties														
<b>CO 2.</b> This subject explains the principles involved in dosage forms/formulations.														
<b>CO 3.</b> The theory and practical components of the subject helps the student to get a better insight into various areas of formulation research and development.														
<b>CO 4.</b> It helps to understand the various techniques and methods involved in micromeretics.														
<b>CO 5.</b> It is also useful for the demonstration of physicochemical properties in the formulation development.														
<b>Programme and Course Mapping</b>														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO 1	PSO 2
CO1	2	-	1	-	2	2	-	-	-	-	-	1	2	2
CO2	2	-	1	-	2	2	-	-	-	-	-	1	2	2
CO3	2	-	1	-	2	2	-	-	-	-	-	1	2	2
CO4	2	-	1	-	2	2	-	-	-	-	-	1	2	2
CO5	2	-	1	-	2	2	-	-	-	-	-	1	2	2
1=lightly mapped					2= moderately mapped					3=strongly mapped				

Unit	Relevance to the local, national, regional and global developmental needs				Relevance To the Employability/ Entrepreneurship/ Skill Development			Relevance to the Professional Ethics, Gender, Human Values, Environment & Sustainability				SDG	NEP	POE/4 <sup>th</sup> IR
	Local	Regional	National	Global	Employability	Entrepreneurship	Skill Development	Professional Ethics	Gender	Human Values	Environment & Sustainability			
Unit I				Global Health care Needs. It will increase the solubility of poorly soluble drugs.			It will bring preformulation knowhow in the students	-	-	-	-	Ensure healthy lives and promote well	Professional Education (17.1-17.5)	Technical Skills that match Industry Needs

												being for all at all ages (SD G 3)		
Unit II		-	-	Global Health care Needs. It will detail physio chemical needs in the newly formulated drug products			It will create the analytical knowhow among the students	-	-	-	-	Ensure healthy lives and promote well-being for all at all ages (SD G 3)	Professional Education (17.1-17.5)	Technical Skills that match Industry Needs

Unit III	-	-	Global Health care Needs. It will create the dosage form development in different forms with different release properties.			It will improve the skill of developing different biphasic dosage forms and the remedies to overtake the problems.	-	-	-	-	Ensure healthy lives and promote well-being for all at all ages (SDG 3)	Professional Education (17.1-17.5)	Technical Skills that match Industry Needs
Unit IV	-	-	Global Health care Needs. It will increase the pharmacokinetics basis among the			It will generate the technical knowhow among the students towards the animal and human studies.	-	-	-	-	Ensure healthy lives and promote well-being	Professional Education (17.1-17.5)	Technical Skills that match Industry Needs

				clinical trials of different drugs among the students.								g for all at all ages (SD G 3)		
Unit v				Global Health care Needs. It will be highly helpful to students to prepare the different medias and buffers used in the industry.			It will bring the skill among the students to work in the research & development labs.	-	-	-	-	Ensure healthy lives and promote well-being for all at all ages (SD G 3)	Professional Education (17.1-17.5)	Technical Skills that match Industry Needs

<b>BP 303T</b>	<b>Pharmaceutical Microbiology (Theory)</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
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<b>Version 2.0</b>		<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>									
<b>Total Contact Hours</b>	45 Hours													
<b>Pre-requisites/Exposure</b>														
<b>Co-requisites</b>	-													
<b>Course Objectives</b>														
<b>Upon completion of this course the student should be able to:</b>														
1. Understand methods of identification, cultivation and preservation of various microorganisms														
2. To understand the importance and implementation of sterilization in pharmaceutical processing and industry														
3. Learn sterility testing of pharmaceutical products.														
4. Carried out microbiological standardization of Pharmaceuticals.														
5. Understand the cell culture technology and its applications in pharmaceutical industries.														
<b>Course Outcomes (CO)</b>														
<b>On completion of this course, the student will be able to:</b>														
CO1. This subject is designed to study the morphology, classification of microorganisms like bacteria, fungi and virus.														
CO2. This subject also helps the understanding of bacteria using staining techniques (simple, Gram's & Acid-fast staining) and biochemical tests (IMViC).														
CO3. It also helps in understanding of sterility testing of pharmaceutical products.														
CO4. The subject provides the designing of aseptic area and Methods for standardization of antibiotics, vitamins and amino acids.														
CO5. It also deals with the microbial spoilage, types, sources and methods in pharmaceutical industry.														
<b>Programme and Course Mapping</b>														
<b>CO</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO 10</b>	<b>PO11</b>	<b>PO12</b>	<b>PSO 1</b>	<b>PSO 2</b>
<b>CO1</b>	-	-	-	-	-	1	1	1	-	-	-	1	1	-
<b>CO2</b>	-	-	-	-	-	1	1	1	-	-	-	1	1	-
<b>CO3</b>	-	-	-	-	-	1	1	1	-	-	-	1	1	-
<b>CO4</b>	-	-	-	-	-	1	1	1	-	-	-	1	1	-

CO5	-	-	-	-	-	1	1	1	-	-	-	1	1	-
1=lightly mapped                      2= moderately mapped                      3=strongly mapped														

<b>Unit</b>	<b>Relevance to the local, national, regional and global developmental needs</b>	<b>Relevance To the Employability/ Entrepreneurship/ Skill Development</b>	<b>Relevance to the Professional Ethics, Gender, Human Values, Environment &amp; Sustainability</b>	<b>SDG</b>	<b>NEP</b>	<b>POE/4<sup>th</sup> IR</b>
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BP303T	Local	Regional	National	Global	Employability	Entrepreneurship	Skill Development	Professional Ethics	Gender	Human Values	Environment & Sustainability			
Unit I	-	-	Its shown a remarkable opportunity to improve the standard of national pharmacy practice.	Antibiotic control programs growing globally, essential to effective and forward-looking for society.	-	-	Many tools to facilitate, microbiology learning objects or lab-related and data-driven exercises.	-	-	No	-	"Make cities and human settlements inclusive, safe, resilient and sustainable	Promoting High-quality research (18.1-18.9)	Global Education Knowledge



												(SD G 11)"		
Unit II	-	-	Imparts knowledge in various aspects of marketing and its applications.	Current and future generation skilling globally requires staining and sterilization.	-	-	Apply to a wide variety of problems affecting the overall human condition.	-	-	-	-	"Ma ke citie s and hum an settl eme nts incl usiv e, safe , resil ient and sust aina ble (SD G 11)"	Pro mot ing Hig hj- qual ity rese arch (18. 1- 18.9 )	Global Educati on Knowle dge

Unit III		Aids in understanding the variety of microorganisms and fungus	Gives a fundamental understanding of the variety of creatures and forms of algae.	Develop the concepts of origin, continuity, complexity of molecular life activities, and cytological aspects of growth and development.	-	-	Recognise the significance of micro methods in plant anatomy.	-	-	-	-	"Make cities and human settlements inclusive, safe, resilient and sustainable (SDG 11)"	Promoting High-quality research (18.1-18.9)	Global Education Knowledge
Unit IV	Aids in learning about the biologic	Encourages physical and cognitive health	Offers national protection from food poisoning.	Provides protection against food poisoning globally.	-	-	Apply to a wide variety of problems affecting the overall human condition.	-	-	-	-	"Make cities and human settlements	Promoting High-quality research	Global Education Knowledge

	al, mechanical, and physical processes that maintain human health and wellbeing.												nts inclusive, safe, resilient and sustainable (SDG 11)"	(18.1-18.9)	
Unit v	-	-	Improves Human Health and wellbeing .	Environmental concerns, ecological preservation, sustainable living, and the defence of human rights.	-	-	Develops research aptitude	-	-	-	-	"Make cities and human settlements inclusive,	Promoting High-quality research (18.1-18.9)	Global Education Knowledge	

													safe , resilient and sustainable (SDG 11)"		
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<b>BP 304T</b>	<b>Pharmaceutical Engineering (Theory)</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Version 2.0</b>		<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>
<b>Total Contact Hours</b>	45 Hours				
<b>Pre-requisites/Exposure</b>					
<b>Co-requisites</b>	-				
<b>Course Objectives</b>					
<b>Upon completion of this course the student should be able to:</b>					
1. To know various unit operations used in pharmaceutical industries.					
2. To understand the material handling techniques.					
3. To perform various processes involved in pharmaceutical manufacturing process.					
4. To carry out various test to prevent environmental pollution.					
5. To appreciate and comprehend significance of plant lay out design for optimum use of resources					

6. To appreciate the various preventive methods used for corrosion control in pharmaceutical industries.

**Course Outcomes (CO)**

**On completion of this course, the student will be able to:**

**CO 1.** This course is designed to impart a fundamental knowledge on the art and science of various unit operations used in pharmaceutical industry.

**CO 2.** This subject also deals with the various manufacturing process and material handling techniques.

**CO 3.** It helps in understanding significance of plant layout design for optimum use of resources.

**CO 4.** It also dealt with various preventive methods for corrosion control in pharmaceutical industries.

**CO 5.** It also helps in understanding the different measures to prevent environmental pollution.

**Programme and Course Mapping**

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO 1	PSO 2
CO1	3	-	2	-	3	3	-	2	-	-	3	2	3	2
CO2	3	-	2	-	3	3	-	2	-	-	3	2	3	2
CO3	3	-	2	-	3	3	-	2	-	-	3	2	3	2
CO4	3	-	2	-	3	3	-	2	-	-	3	2	3	2
CO5	3	-	2	-	3	3	-	2	-	-	3	2	3	2

1=lightly mapped

2= moderately mapped

3=strongly mapped

Unit	Relevance to the local, national, regional and global developmental needs				Relevance To the Employability/ Entrepreneurship/ Skill Development	Relevance to the Professional Ethics, Gender, Human Values, Environment & Sustainability						SDG	NEP	POE/4 <sup>th</sup> IR
	Local	Regional	National	Global		Employability	Entrepreneurship	Skill Development	Professional Ethics	Gender	Human Values			
Unit I	--	--	--	It enables optimization of processes, quality control, and efficient utilization of resources, leading to improved product performance and operational efficiency.	Making individuals well-suited for roles in industries where fluid handling, particle analysis, and process optimization are critical.	--	--	--	--	--	--	--	--	Focus on Employability Skills (Local/ Regional and Global)
Unit II	--	--	--	This knowledge is valuable for designing efficient systems, optimizing processes, ensuring product quality, and improving energy efficiency.	It enhances employability in industries such as chemical engineering, process engineering, energy management, and manufacturing.	--	--	--	--	--	--	--	--	Focus on Employability Skills (Local/ Region

															al and Global)
Unit III	--	--	--	Helps working in industries where drying and mixing play a critical role in product development, quality control, and manufacturing efficiency.	Enhance employability in process engineering, product development, quality assurance, manufacturing, research and development, technical sales, and consulting roles across various industries.	--	--	--	--	--	--	--	--	--	Focus on Employability Skills (Local/Regional and Global)
Unit IV	--	--	--	Provides essential knowledge and skills applicable to industries involving separation processes, purification, particle removal, and fluid clarification	Valuable in sectors such as pharmaceuticals, biotechnology, chemical engineering, water treatment, and food processing, where efficient separation techniques are critical for product quality, safety, and process optimization	--	--	--	--	--	--	--	--	--	Focus on Employability Skills (Local/Regional and Global)
Unit v	--	--	--	Crucial for ensuring the selection of appropriate materials, preventing material degradation and failure, and optimizing material flow and handling processes in pharmaceutical plant operations. This knowledge contributes to the safe, efficient, and compliant functioning of pharmaceutical manufacturing facilities.	Provides diverse range of employment opportunities in the pharmaceutical industry, including roles in engineering, operations, quality assurance, research and development, and environmental health and safety.	--	--	--	--	--	--	--	--	--	Focus on Employability Skills (Local/Regional and Global)

<b>BP 305P</b>	<b>Pharmaceutical Organic Chemistry II – Practical</b>										<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Version 2.0</b>											<b>0</b>	<b>0</b>	<b>4</b>	<b>2</b>
<b>Total Contact Hours</b>	60 Hours													
<b>Pre-requisites/Exposure</b>														
<b>Co-requisites</b>														
<b>Course Objectives</b>														
<b>Upon completion of this course the student should be able to:</b>														
1. Write the structure, name and the type of isomerism of the organic compound														
2. Write the reaction, name the reaction and orientation of reactions														
3. Account for reactivity/stability of compounds, 4. prepare organic compounds														
4. Prepare organic compounds														
<b>Course Outcomes (CO)</b>														
<b>On completion of this course, the student will be able to:</b>														
<b>CO1</b> Recall the basic knowledge of method of preparation, reactions and properties of Benzene and its derivatives														
<b>CO2</b> Demonstrate a high-level understanding of method of preparation, reactions and properties of phenols, aromatic amines and aromatic acids														
<b>CO3</b> Develop basic knowledge of fats and oils and their analytical constants														
<b>CO4</b> Analyse the synthesis, different reactions, properties, structure and medicinal uses of polynuclear hydrocarbons and substituted alkanes														
<b>CO5</b> Assess the stabilities, theory of strain less rings and reactions of cyclo alkanes														
<b>Programme and Course Mapping</b>														
<b>CO</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO 10</b>	<b>PO11</b>	<b>PO12</b>	<b>PSO 1</b>	<b>PSO 2</b>
<b>CO1</b>	-	1	1	-	-	-	-	-	-	-	1	1	1	-
<b>CO2</b>	-	1	1	-	-	-	-	-	-	-	1	1	1	-
<b>CO3</b>	-	1	1	-	-	-	-	-	-	-	1	1	1	-



CO4	.	1	1	.	.	.	.	.	.	.	1	1	1	.
CO5	.	1	1	.	.	.	.	.	.	.	1	1	1	.
1=lightly mapped                      2= moderately mapped                      3=strongly mapped														

Unit	Relevance to the local, national, regional and global developmental needs				Relevance To the Employability/ Entrepreneurship/ Skill Development			Relevance to the Professional Ethics, Gender, Human Values, Environment & Sustainability				SDG	NEP	POE/4 <sup>th</sup> IR
	Local	Regional	National	Global	Employability	Entrepreneurship	Skill Development	Professional Ethics	Gender	Human Values	Environment & Sustainability			
Unit I				Experiments involving laboratory techniques like recrystallization, steam distillation is important part of pharmaceutical sciences experiment. These experiments are usually conducted all over the world.			A knowledgeable individual in organic chemistry aids in the synthesis of drugs and their	-	-	-	-	Sustainable Development and Global Citizenship (SDG	Quality Universities and Colleges: A New and Forward-looking Vision for India's Higher	Global Education Knowledge Practical Courses from Industr

						intermedia tes.					4.7) Scholarship s for Higher Educa tion (SDG 4.b) Revita lize the global partne rship for sustai nable devel opme nt (SDG 17)	Education System (9.1- 9.3) Professiona l Education (17.1-17.5) Promoting Highj- quality research (18.1-18.9) Technology Use & Integration (23.1- 23.13)	y/Alum ni Techni cal Skills that match Industr y Needs Focus on Employ ability Skills (Local/ Region al and Global) Interns hip Progra ms Consult ing Field Project s Entrepr neursh ip Progra m through Innovat
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													ion System	
Unit II				The determination of acid/saponification/ iodine value of fats and oils has a significant global impact by ensuring quality, stability, and functionality in various industries, promoting sustainability, and facilitating international trade.			A knowledgeable individual in organic chemistry aids in the synthesis of drugs and their intermediates	-	-	-	-	Sustainable Development and Global Citizenship (SDG 4.7) Scholarships for Higher Education (SDG 4.b) Revitalize the global partnership for sustainable development	Quality Universities and Colleges: A New and Forward-looking Vision for India's Higher Education System (9.1- 9.3) Professional Education (17.1-17.5) Promoting High-quality research (18.1-18.9) Technology Use & Integration (23.1-23.13)	Global Education Knowledge Practical Courses from Industry/Alumni Technical Skills that match Industry Needs Focus on Employability Skills (Local/Regional and Global) Internship

											nt (SDG 17)		Progra ms Consult ing Field Project s Entrepr neursh ip Progra m through Innovat ion System
Unit III			Chemical, drug, and intermediate preparation is a key part of the pharmaceutical sector globally.		A knowledgeable individual in organic chemistry aids in the synthesis of drugs and their intermediates	-	-	-	-	Sustai nable Devel opme nt and Globa l Citize nship (SDG 4.7) Schol arship s for Highe r Educa tion (SDG	Quality Universitie s and Colleges: A New and Forward- looking Vision for India's Higher Education System (9.1- 9.3) Professiona l Education (17.1-17.5) Promoting Highj- quality	Global Educati on Knowle dge Practic al Course s from Industr y/Alum ni Techni cal Skills that match Industr y	

											4.b) Revitalize the global partnership for sustainable development (SDG 17)	research (18.1-18.9) Technology Use & Integration (23.1-23.13)	Needs Focus on Employability Skills (Local/Regional and Global) Internship Programs Consulting Field Projects Entrepreneurship Program through Innovation System
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<b>BP 306P</b>	<b>Physical Pharmaceutics-I (Practical)</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Version 2.0</b>		<b>0</b>	<b>0</b>	<b>4</b>	<b>2</b>
<b>Total Contact Hours</b>	60 Hours				
<b>Pre-requisites/Exposure</b>					

<b>Co-requisites</b>		-												
<b>Course Objectives</b>														
<b>Upon completion of this course the student should be able to:</b>														
1. Understand various physicochemical properties of drug molecules involved in the designing of dosage forms														
2. Know the principles of chemical kinetics and to use them for stability testing and determination of expiry date of formulations.														
3. Demonstrate use of physicochemical properties in the formulation development and evaluation of dosage forms														
<b>Course Outcomes (CO)</b>														
<b>On completion of this course, the student will be able to:</b>														
<b>CO 1.</b> The course deals with the study of various physicochemical properties, and principles involved in manufacturing dosage forms/formulations.														
<b>CO 2.</b> Practical components of the subject help the student to get a better insight into various areas of formulation research and development,														
<b>CO 3.</b> It also helps in understanding principles of chemical kinetics and to use them in determining stability of pharmaceutical dosage forms.														
<b>CO 4.</b> Demonstrate use of physicochemical properties in the formulation development and evaluation of dosage forms.														
<b>CO 5.</b> This subject also helps in learning physiochemical properties of individual dosage forms.														
<b>Programme and Course Mapping</b>														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO 1	PSO 2
CO1	2	-	1	-	2	2	-	-	-	-	-	1	2	2
CO2	2	-	1	-	2	2	-	-	-	-	-	1	2	2
CO3	2	-	1	-	2	2	-	-	-	-	-	1	2	2
CO4	2	-	1	-	2	2	-	-	-	-	-	1	2	2
CO5	2	-	1	-	2	2	-	-	-	-	-	1	2	2

1=lightly mapped

2=moderately mapped

3=strongly mapped

Unit	Relevance to the local, national, regional and global developmental needs				Relevance To the Employability/ Entrepreneurship/ Skill Development			Relevance to the Professional Ethics, Gender, Human Values, Environment & Sustainability				SDG	NEP	POE/4 <sup>th</sup> IR
	Local	Regional	National	Global	Employability	Entrepreneurship	Skill Development	Professional Ethics	Gender	Human Values	Environment & Sustainability			
Unit I	-	-	-	Contribute globally in the field of solubility and pKa determination by conducting research, sharing knowledge, and collaborating with scientists worldwide to advance understanding and develop innovative methodologies.	-	-	Contribute to skill development in solubility and pKa determination using Half Neutralization/Henderson-Hasselbalch by conducting workshops and training programs to educate researchers and scientists on the principles, techniques, and applications of these methods, fostering their expertise and advancement in the field. Additionally, develop online resources and interactive	-	0	-	-	(SD G4.1)	(18.1-18.9)	Focus on Employability Skills (Local/Regional and Global)

							platforms to facilitate self-learning and knowledge sharing, promoting skill development globally.							
Unit II	--	--	--	Contribute globally in the field of partition coefficient and % composition determination of NaCl in a phenol-water solution by conducting research, developing accurate CST methods, and sharing findings to enhance scientific understanding and promote global collaboration in this area.	-	--	Contribute to skill development in the field of partition coefficient and % composition determination of NaCl in a phenol-water system by offering training programs, workshops, and hands-on practical sessions to empower researchers and scientists with the necessary techniques and expertise. Additionally, develop educational resources and online platforms for knowledge sharing to reach a wider audience and promote skill development in this area.	--	N o	--	--	(SD G4.1)	(18.1-18.9)	Focus on Employability Skills (Local/Regional and Global)
Unit III	--	--	--	By conducting research, creating standardised protocols, and working with scientists around the world, you can make a significant global contribution to the field of surface tension and the calculation of Hydrophilic-Lipophilic Balance (HLB), helping to advance knowledge, enhance measurement methods, and foster international harmony in surface tension and HLB determination.	-	--	Contribute to skill development in the field of surface tension and determination of Hydrophilic-Lipophilic Balance (HLB) by providing training programs, hands-on workshops, and educational resources that empower researchers and scientists with the necessary knowledge and techniques for accurate measurement and interpretation of surface tension and HLB values. Additionally, foster collaboration and	--	N o	--	--	(SD G4.1)	(18.1-18.9)	Focus on Employability Skills (Local/Regional and Global)



							knowledge-sharing platforms to enhance skill development and exchange of expertise in these areas.							
Unit IV	--	--	--	Contribute globally to the field of stability constant determination and donor-acceptor ratio calculation of PABA-Caffeine and Cupric-Glycine complexes by conducting research, developing standardized solubility and pH titration methods, and sharing findings to enhance global understanding, promote accurate characterization of complex formation, and facilitate collaboration among scientists worldwide.	-	--	By providing training programmes, workshops, and hands-on sessions that concentrate on the solubility method and pH titration method, you can help researchers and scientists develop their skills and advance in their field while also making a contribution to the field of stability constant determination and donor-acceptor ratio calculation of PABA-Caffeine and Cupric-Glycine complexes.	--	No	--	--	(SD G4.1)	(18.1-18.9)	Focus on Employability Skills (Local/Regional and Global)
Unit v	--	--	--	Important for guaranteeing the choice of suitable materials, avoiding material degradation and failure, and improving material flow and handling procedures in pharmaceutical plant operations. The safe, effective, and legal operation of pharmaceutical production facilities is facilitated by this information.	-	--	--	--	No	--	--	(SD G4.1)	(18.1-18.9)	Focus on Employability Skills (Local/Regional and Global)

<b>BP 307P</b>	<b>Pharmaceutical Microbiology (Practical)</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Version 2.0</b>		<b>0</b>	<b>0</b>	<b>4</b>	<b>2</b>
<b>Total Contact Hours</b>	60 Hours				

<b>Pre-requisites/Exposure</b>														
<b>Co-requisites</b>		-												
<b>Course Objectives</b>														
<b>Upon completion of this course the student should be able to:</b>														
1. Understand methods of identification, cultivation and preservation of various microorganisms														
2. To understand the importance and implementation of sterilization in pharmaceutical processing and industry														
3. Learn sterility testing of pharmaceutical products.														
4. Carried out microbiological standardization of Pharmaceuticals.														
5. Understand the cell culture technology and its applications in pharmaceutical industries.														
<b>Course Outcomes (CO)</b>														
<b>On completion of this course, the student will be able to:</b>														
CO1. These subjects deal with the study of all categories of microorganisms like bacteria and fungi and virus.														
CO2. It helps in learning of different techniques of sterilization, BOD detection.														
CO3. It deals the culture and microbial assay study.														
CO4. This subject deal with the study the mortality and isolation of culture.														
CO5. It also deals the sterility testing, Biochemical assay														
<b>Programme and Course Mapping</b>														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO 1	PSO 2
CO1	-	-	-	-	-	1	1	1	-	-	-	1	1	-
CO2	-	-	-	-	-	1	1	1	-	-	-	1	1	-
CO3	-	-	-	-	-	1	1	1	-	-	-	1	1	-
CO4	-	-	-	-	-	1	1	1	-	-	-	1	1	-
CO5	-	-	-	-	-	1	1	1	-	-	-	1	1	-
1=lightly mapped                      2= moderately mapped                      3=strongly mapped														

Unit	Relevance to the local, national, regional and global developmental needs				Relevance To the Employability/ Entrepreneurship/ Skill Development			Relevance to the Professional Ethics, Gender, Human Values, Environment & Sustainability				SDG	NEP	POE/4 <sup>th</sup> IR
	Local	Regional	National	Global	Employability	Entrepreneurship	Skill Development	Professional Ethics	Gender	Human Values	Environment & Sustainability			
Unit I	-	-	It has shown a wonderful chance to raise the bar for national pharmacy practise.	Antibiotic control programmes are expanding globally and are crucial for society to be effective and forward-thinking.	-	-	Apply to a wide range of issues affecting people's general well-being.	-	-	-	-	Sustainable Development and Global Citizenship (SD	Promoting High-quality research (18.1-18.9)	Global Education Knowledge

												G 4.7)		
Unit II		-	Imparts knowledge in various aspects of marketing and its applications.	Staining and sterilisation are necessary for current and future generations to be skilled globally.	-	-	Apply to a wide range of issues affecting people's general well-being.	-	-	-		Sust aina ble Dev elop men t and Glo bal Citi zens hip (SD G 4.7)	Pro mot ing Hig h- qual ity rese arch (18. 1- 18.9 )	Global Educati on Knowle dge
Unit III		Aids in understanding the variety of microorganisms and fungus	Gives a fundamental understanding of the variety of creatures and forms of algae.	Develop the concepts of origin, continuity, complexity of molecular life activities, and cytological aspects of growth and development.	-	-	Recognise the significance of micro methods in plant anatomy	-	-	-				

Unit IV	Helps students gain knowledge of the biological, mechanical, and physical systems that keep people healthy and happy.	Encourages physical and cognitive health	Provides nationwide protection from foodborne illness.	Provides protection against food poisoning globally.								Sustainable Development and Global Citizenship (SDG 4.7)	Promoting High-quality research (18.1-18.9)	Global Education Knowledge
Unit v	-	-	Improves Human Health and well being .	Human rights protection, ecological preservation, environmental issues,	-	-	Develops research aptitude	-	-	-	-	Sustainable Dev	Promoting Hig	Global Education Knowle

				and sustainable life.									elop men t and Glo bal Citi zens hip (SD G 4.7)	hj- qual ity rese arch (18. 1- 18.9 )	dge
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<b>BP 308P</b>	<b>Pharmaceutical Engineering (Practical)</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Version 2.0</b>		<b>0</b>	<b>0</b>	<b>4</b>	<b>2</b>
<b>Total Contact Hours</b>	60 Hours				
<b>Pre-requisites/Exposure</b>					
<b>Co-requisites</b>					
<b>Course Objectives</b>					
<b>Upon completion of this course the student should be able to:</b>					
1. To know various unit operations used in Pharmaceutical industries.					
2. To understand the material handling techniques.					
3. To perform various processes involved in pharmaceutical manufacturing process.					
4. To carry out various test to prevent environmental pollution.					
5. To appreciate and comprehend significance of plant lay out design for optimum use of resources					
6. To appreciate the various preventive methods used for corrosion control in Pharmaceutical industries					
<b>Course Outcomes (CO)</b>					
<b>On completion of this course, the student will be able to:</b>					
CO1. To imparts fundamental knowledge of various unit operations used in pharmaceutical industry.					

- CO2. It deals with the determination of radiation constant of different metals and paints.
- CO3. It also helps to understand the steam distillation process and heat transfer constant.
- CO4. It is also applicable for the construction of drying curves (Psychometric charts).
- CO5. This subject also useful for understanding size reduction methods, size analysis and study industrial instruments used in unit operation processes.

**Programme and Course Mapping**

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO 1	PSO 2
CO1	3	-	2	-	3	3	-	2	-	-	3	2	3	2
CO2	3	-	2	-	3	3	-	2	-	-	3	2	3	2
CO3	3	-	2	-	3	3	-	2	-	-	3	2	3	2
CO4	3	-	2	-	3	3	-	2	-	-	3	2	3	2
CO5	3	-	2	-	3	3	-	2	-	-	3	2	3	2
1=lightly mapped                      2= moderately mapped                      3=strongly mapped														

Unit	Relevance to the local, national, regional and global developmental needs	Relevance To the Employability/ Entrepreneurship/ Skill Development	Relevance to the Professional Ethics, Gender, Human Values, Environment & Sustainability	SDG	NEP	POE/4 <sup>th</sup> IR

	Local	Regional	National	Global	Employability	Entrepreneurship	Skill Development	Professional Ethics	Gender	Human Values	Environment & Sustainability			
Unit I	--	--	--	It provides process optimisation, quality assurance, and resource-efficient resource use, which improves product performance and operating efficiency.	Enabling people to perform well in positions in sectors where fluid handling, particle analysis, and process optimisation are essential.	--	--	--	No	--	--	SD G 6)	(18.1-18.9)	Focus on Employability Skills (Local/Regional and Global)
Unit II	--	--	--	This knowledge is valuable for designing efficient systems, optimizing processes, ensuring product quality, and improving energy efficiency.	It increases one's employability in sectors including manufacturing, energy management, chemical engineering, and process engineering.	--	--	--	--	--	--	SD G 6)	(18.1-18.9)	Focus on Employability Skills (Local/Regional and Global)



Unit III	--	--	--	Aids those who operate in fields where drying and mixing are essential for product development, quality assurance, and production effectiveness.	The improvement of employability in process engineering, product development, quality control, manufacturing, R&D, technical sales, and consulting professions across many industries.	--	--	--	--	--	--	SD G 6)	(18.1-18.9)	Focus on Employability Skills (Local/Regional and Global)
Unit IV	--	--	--	Provides essential knowledge and skills applicable to industries involving separation processes, purification, particle removal, and fluid clarification	Valuable in sectors such as pharmaceuticals, biotechnology, chemical engineering, water treatment, and food processing, where efficient separation techniques are critical for product quality, safety, and process optimization	--	--	--	--	--	--	SD G 6)	(18.1-18.9)	Focus on Employability Skills (Local/Regional and Global)
Unit v	--	--	--	Important for guaranteeing the choice of suitable materials, avoiding material degradation and failure, and improving material flow and handling procedures in pharmaceutical plant operations. The safe, effective, and legal operation of pharmaceutical production facilities is facilitated by this information.	Provides diverse range of employment opportunities in the pharmaceutical industry, including roles in engineering, operations, quality assurance, research and development, and environmental health and safety.	--	--	--	--	--	--	SD G 6)	(18.1-18.9)	Focus on Employability Skills (Local/Regional and Global)

# Semester-IV

<b>BP401T</b>	<b>Pharmaceutical Organic Chemistry-III (Theory)</b>						<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>				
<b>Version 2.0</b>							<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>				
<b>Total Contact Hours</b>	45 Hours													
<b>Pre-requisites/Exposure</b>	Organic Chemistry													
<b>Co-requisites</b>	Pharmaceutical Organic Chemistry-III													
<b>Course Objectives</b>														
<b>Upon completion of this course the student should be able to:</b>														
1. Understand the methods of preparation and properties of organic compounds														
2. Explain the stereo chemical aspects of organic compounds and stereo chemical reactions														
3. Know the medicinal uses and other applications of organic compounds														
<b>Course Outcomes (CO)</b>														
<b>On completion of this course, the student will be able to:</b>														
CO1. Able to explain chemistry of important heterocyclic compounds.														
CO2. To describe detailed mechanisms for common naming reactions.														
CO3. It imparts knowledge on stereo-chemical aspects of organic compounds and organic reactions.														
CO4. To acquire the knowledge and understanding of medicinal and other uses of organic compounds.														
<b>Programme and Course Mapping</b>														
<b>CO</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO 10</b>	<b>PO11</b>	<b>PO12</b>	<b>PSO 1</b>	<b>PSO 2</b>
<b>CO1</b>	<b>3</b>					<b>3</b>		<b>1</b>						
<b>CO2</b>			<b>3</b>									<b>1</b>		
<b>CO3</b>		<b>1</b>			<b>3</b>				<b>1</b>					
<b>CO4</b>										<b>1</b>				<b>1</b>

Unit	Relevance to the local, national, regional and global developmental needs				Relevance To the Employability/ Entrepreneurship/ Skill Development			Relevance to the Professional Ethics, Gender, Human Values, Environment & Sustainability			SDG	NEP	POE/4 <sup>th</sup> IR	
	Local	Regional	National	Global	Employability	Entrepreneurship	Skill Development	Professional Ethics	Gender	Human Values	Environment & Sustainability			
Unit I	-	-	-	Nomenclature of optical isomers and separation is used	Synthesis and separation of opti	-	There are four methods to separation of isomers. Which develop skills	Usage of any medicine especially isomers is based on	-	-	-	Skill for decent work SDG4.4.	Professional Education (17.1-17.5	It helps in developing technical skills that industry

				globally	cal isomer generate employment.			appropriate professional ethics.					)	requires and thus helps in creating employment.
Unit II	-	-	-	Geometrical isomerism Nomenclature of geometrical isomers (Cis Trans, EZ, Syn Anti systems	Production of Geometric isomers across the globe provides a lot of employment.	Product ion of Geometric isomers across the globe provides a lot of employment.	A Geometric isomer developed synthetically, helps in honing the technical skill and expertise in production	-	-	-	-	Skills for Decent Work (SDG 4.4)	Professional Education (17.1-17.5)	Skill Development

Unit III	-	-	-	Synthesis, reactions and medicinal uses of following compounds/derivatives Pyrrole, Furan, and Thiophene Relative aromaticity and reactivity of Pyrrole, Furan and Thiophene	Synthesis of drugs containing Pyrrole, furan and Thiophene globe provides a lot of employment.	-	Synthesis of furan thiophene and Pyrrole, helps in honing the technical skill and expertise in production	-		-	-	Skills for Decent Work (SDG 4.4)	Professional Education (17.1-17.5)	Skill Development
Unit IV	-	-	-	Pyrazole, Imidaz	Synthesis	-	Synthesis of furan Quinoline	-		-	-	Skills for	Professional	Skill Development

				ole, Oxazol e and Thiazo le. Pyridin e, Quinol ine, Iso quinoli ne, Acridi ne and Indole	of dru gs cont aini ng Pyri dine , Qui noli ne Iso qui noli ne acri dine glo be pro vide s a lot of emp loy men t.		Iso quinoline, acridine helps in honing the technical skill and expertise in production					Dec ent Wor k (SD G 4.4)	Edu cati on (17. 1- 17.5 )	
Unit v	-	-	-	Fulfils the need for Reacti ons of	Opp ena uer- oxi dati on	-	Docking techniques helps in acing technical skill,	-.	-	-		Skil ls for Dec ent Wor	Prof essi onal Edu cati on	Skill Develo pment

				synthetic importance globally coding docking techniques.	and Dakin reaction . Beckmanns rearrangement and Schmidt rearrangement. Claisen-Schmidt condensation of employment.		Oppenauer-oxidation and Dakin reaction. Beckmanns rearrangement and Schmidt rearrangement. Claisen-Schmidt condensation					k (SD G 4.4)	(17.1-17.5)	
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<b>BP402T</b>	<b>Medicinal Chemistry-I (Theory)</b>					<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>					
<b>Version 2.0</b>						<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>					
<b>Total Contact Hours</b>	45 Hours													
<b>Pre-requisites/Exposure</b>	Chemistry of drugs													
<b>Co-requisites</b>														
<b>Course Objectives</b>														
<b>Upon completion of this course the student should be able to:</b>														
1. Understand the chemistry of drugs with respect to their pharmacological activity														
2. Understand the drug metabolic pathways, adverse effect and therapeutic value of drugs														
3. Know the Structural Activity Relationship (SAR) of different class of drugs														
4. Write the chemical synthesis of some drugs														
<b>Course Outcomes (CO)</b>														
<b>On completion of this course, the student will be able to:</b>														
CO1. To understand the chemistry of drugs with respect to their pharmacological activity.														
CO2. To understand the drug metabolic pathways, adverse effect and therapeutic value of drugs														
CO3. To know the structural activity relationship of different class of drugs.														
CO4. Well acquainted with the synthesis of some important class of drugs.														
<b>Programme and Course Mapping</b>														
<b>CO</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO 10</b>	<b>PO11</b>	<b>PO12</b>	<b>PSO 1</b>	<b>PSO 2</b>
<b>CO1</b>	<b>1</b>													
<b>CO2</b>				<b>1</b>	<b>1</b>			<b>2</b>		<b>3</b>			<b>3</b>	



CO3		1						3	3				3
CO4		1	1		2		2		2				
1=lightly mapped                      2= moderately mapped                      3=strongly mapped													

Unit	Relevance to the local, national, regional and global developmental needs				Relevance To the Employability/ Entrepreneurship/ Skill Development			Relevance to the Professional Ethics, Gender, Human Values, Environment & SDG				NEP	POE/4 <sup>th</sup> IR	
	Local	Regional	National	Global	Employability	Entrepreneurship	Skill Development	Professional Ethics	Gender	Human Values	Environment & Sustainability			
Unit I	-	-	-	Fulfils the need for Drug Development globally	-	-	Knowledge of Physicochemical properties of Drugs helps in Preformulation studies	-	-	-	-	Skills for Decent Work (SDG 4.4)	Professional Education (17.1-17.5)	Skill Development

Unit II		-	-	Fulfils the need for Development of Drug acting on ANS (Sympathetic) globally	-	-	Study of SAR and synthesis of drugs acting on Sympathetic nervous system helps in New drug synthesis and Drug development process	-	-	-	-	Skills for Decent Work (SDG 4.4)	Professional Education (17.1-17.5)	Skill Development
Unit III		-	-	Fulfils the need for Development of Drug acting on ANS (parasympathetic) globally	-	-	Study of SAR and synthesis of drugs acting on Parasympathetic nervous system helps in new drug synthesis and Drug development process	-	-	-	-	Skills for Decent Work (SDG 4.4)	Professional Education (17.1-17.5)	Skill Development
Unit IV		-	-	Fulfils the need for Development of Drugs acting on CNS globally	-	-	Understand the chemistry of drugs with respect to their pharmacological activity	-	-	-	-	Youth and Adult Literacy (SDG 4.6)	Adult Education and Lifelong Learning (21.1-21.10)	Skill Development
Unit V	-	-	-	Globally Aware youth	-	-	It imparts fundamental knowledge on	-	-	-	-	Youth and Adult Literacy	Adult Education and Lifelong	Skill Development

				about uses and side effect of Narcotics			the structure, chemistry, SAR, Synthesis and therapeutic value of drugs acting on CNS which helps in generating new drug molecules.				(SDG 4.6)	Learning (21.1-21.10)	
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<b>BP403T</b>	<b>Physical Pharmaceutics-II (Theory)</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Version 2.0</b>		<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>
<b>Total Contact Hours</b>	45 Hours				
<b>Pre-requisites/Exposure</b>	Pharmaceutics				
<b>Co-requisites</b>	Physical Pharmaceutics				
<b>Course Objectives</b>					
<p><b>Upon completion of this course the student should be able to:</b></p> <ol style="list-style-type: none"> <li>1. Understand various physicochemical properties of drug molecules in the designing the dosage forms</li> <li>2. Know the principles of chemical kinetics &amp; to use them for stability testing and determination of expiry date of formulations</li> <li>3. Demonstrate use of physicochemical properties in the formulation development and evaluation of dosage forms.</li> </ol>					
<b>Course Outcomes (CO)</b>					
<p><b>On completion of this course, the student will be able to:</b></p> <p>CO1. State the physicochemical properties of drug molecules</p>					

- CO2. Analyze the chemical stability tests of various drug products and determination of expiry date of formulations.  
 CO3. Have basic knowledge of physicochemical properties in the formulation development and evaluation of dosage forms.

**Programme and Course Mapping**

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO 1	PSO 2
CO1	1				2									
CO2		1								3		3		
CO3			1			2		3					1	
1=lightly mapped                      2= moderately mapped                      3=strongly mapped														

Unit	Relevance to the local, national, regional and global developmental needs	Relevance To the Employability/ Entrepreneurship/ Skill Development	Relevance to the Professional Ethics, Gender, Human Values, Environment & Sustainability	SDG	NEP	POE/4 <sup>th</sup> IR
Local						
Regional						
National						
Global						
Employability						
Entrepreneurship						
Skill Development						
Professional Ethics						
Gender						
Human Values						
Environment & Sustainability						

Unit I				Knowledge about physicochemical properties colloidal dispersions enables pharmaceutical professionals to develop effective drug delivery systems, improve drug stability and bioavailability.			Knowledge about the physicochemical properties of colloidal dispersions skill development in areas of optimal drug delivery systems and contribute to the advancement of pharmaceutical technologies and patient care.				SDG 3 SDG 9	Professional Education (17.1-17.5)	Technical Skills that match Industry Needs/Skill Development
Unit II		-	-	Knowledge about rheology enables understanding of flow behaviour, stability, and bioavailability of pharmaceutical formulations globally.			Knowledge about rheology enhances skills in formulation development, process optimization, and quality control, enabling professionals to design effective drug delivery systems and ensure product stability and performance				SDG 3 SDG 9	Professional Education (17.1-17.5)	Technical Skills that match Industry Needs/Skill Development
Unit III		-	-	Learning the physicochemical properties of coarse dispersion is crucial for understanding and optimizing the formulation and delivery of suspensions, emulsions, and other coarse dispersions, ensuring effective drug delivery and stability of			Understanding the physicochemical properties of coarse dispersion develops skills in formulating stable suspensions and emulsions, optimizing drug delivery systems, and ensuring proper dosage administration, thereby enhancing expertise in pharmaceutical				SDG 3 SDG 9	Professional Education (17.1-17.5)	Technical Skills that match Industry Needs/Skill Development

				pharmaceutical products			formulation development and product quality control							
Unit IV		-	-	Learning the concept of micrometrics in is crucial for understanding and controlling particle size, shape, and surface properties, enabling formulation optimization and efficient drug delivery systems, ensuring product efficacy and patient safety.			Understanding the concept of micrometrics in pharmaceutical sciences develops skills in particle characterization, formulation optimization, and drug delivery system design, enhancing expertise in quality control and process development for effective pharmaceutical products.					SDG 3 SDG 12	Professional Education (17.1-17.5)	Technical Skills that match Industry Needs/Skill Development
Unit V				Having knowledge about drug stability is crucial for formulating safe and effective pharmaceutical products, ensuring their quality and shelf life, and minimizing the risk of drug degradation and loss of potency. It enables regulatory compliance and supports patient safety by providing reliable and stable medications.			Having knowledge about drug stability develops skills in formulating stable and reliable pharmaceutical products, conducting quality control tests to assess stability, and implementing strategies to mitigate degradation risks, enhancing expertise in ensuring product quality and patient safety.					SDG 3 SDG 9	Professional Education (17.1-17.5)	Technical Skills that match Industry Needs/Skill Development

<b>BP404T</b>	<b>Pharmacology-I (Theory)</b>									<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>	
<b>Version 2.0</b>										<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>	
<b>Total Contact Hours</b>	45 Hours													
<b>Pre-requisites/Exposure</b>	Human anatomy and Physiology													
<b>Co-requisites</b>	Pathophysiology													
<b>Course Objectives</b>														
<b>Upon completion of this course the student should be able to</b>														
1. Understand the pharmacological actions of different categories of drugs														
2. Explain the mechanism of drug action at organ system/sub cellular/macromolecular levels.														
3. Apply the basic pharmacological knowledge in the prevention and treatment of various diseases.														
4. Observe the effect of drugs on animals by simulated experiments.														
5. Appreciate correlation of pharmacology with other bio medical sciences.														
<b>Course Outcomes (CO)</b>														
<b>On completion of this course, the student will be able to:</b>														
CO1. Students would have understood the pharmacological actions of different categories of drugs														
CO2. They would have studied in detailed about mechanism of drug action at organ system/sub cellular/ macromolecular levels.														
CO3. They would have understood the application of basic pharmacological knowledge in the prevention and treatment of various diseases.														
CO4. They would get an idea about correlation of pharmacology with other bio medical sciences.														
<b>Programme and Course Mapping</b>														
<b>CO</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO10</b>	<b>PO11</b>	<b>PO12</b>	<b>PSO1</b>	<b>PSO2</b>
<b>CO1</b>	<b>1</b>													
<b>CO2</b>						<b>2</b>		<b>3</b>						
<b>CO3</b>		<b>1</b>												
<b>CO4</b>				<b>2</b>							<b>3</b>			
1=lightly mapped                      2= moderately mapped                      3=strongly mapped														

Unit	Relevance to the local, national, regional and global developmental needs				Relevance To the Employability/ Entrepreneurship/ Skill Development			Relevance to the Professional Ethics, Gender, Human Values, Environment & Sustainability				SD G	NE P	POE/4 <sup>t</sup> IR
	Local	Regional	National	Global	Employability	Entrepreneurship	Skill Development							
Unit I				Student will be able to understand General Pharmacology special context Pharmacokinetics which will help to understand disease mechanism and drug action			Pharmacology as a discipline has significantly contributed to skill development in various aspects of drug therapy. It					(SD G 4.4)	(9.1 - 9.3)	Global Education Knowledge, Skill Development, Employability
Unit II		-		Student will be able to know general pharmacology is crucial for ensuring the safe,								(SD G 4.4)	(9.1 - 9.3)	Global Education Knowledge



				effective, and rational use of drugs globally. It informs drug regulation, promotes rational drug use, contributes to pharmacovigilance efforts, supports global health initiatives, informs pharmaco-economic evaluations, and fosters international collaborations and research in pharmacology.			has provided the knowledge, education, and training necessary for healthcare professionals to understand drug actions, make informed therapeutic decisions, ensure drug safety, and contribute to patient care. Skill development in pharmacology continues through lifelong learning								dge, Skill Development, Employability
Unit III		-	-	The global impact of drugs targeting the peripheral nervous system is vast, with applications in treating autonomic disorders, anaesthesia, neuromuscular disorders and research, allowing healthcare professionals to optimize patient outcomes by leveraging their pharmacological properties.								(SD G 4.4)	(9.1 - 9.3)		Global Education Knowledge, Skill Development, Employability
Unit IV		-	-	The pharmacology of drugs acting on the central nervous system has profound various global applications such as neurological and								(SD G 4.4)	(9.1 - 9.3)		Global Education Knowledge, Skill

				psychiatric disorders, pain management sleep disorders, substance abuse, neuroprotection			and interdisciplinary collaboration, enabling professionals to adapt to new developments and improve patient outcomes.							Development, Employability
Unit V				The global impact of drugs acting on the central nervous system is vast, addressing neurological and psychiatric disorders								(SD G 4.4)	(9.1 - 9.3)	Global Education Knowledge, Skill Development, Employability

<b>BP405T</b>	<b>Pharmacognosy and Phytochemistry-I (Theory)</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Version 2.0</b>		<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>
<b>Total Contact Hours</b>	45 Hours				
<b>Pre-requisites/Exposure</b>	Pharmacognosy				
<b>Co-requisites</b>	Pharmacognosy				
<b>Course Objectives</b>					
<b>Upon completion of this course the student should be able to:</b>					
1. To know the techniques in the cultivation and production of crude drugs					
2. To know the crude drugs, their uses and chemical nature					
3. Know the evaluation techniques for the herbal drugs					
4. To carry out the microscopic and morphological evaluation of crude drugs					
<b>Course Outcomes (CO)</b>					
<b>On completion of this course, the student will be able to:</b>					
CO1. Student will be aware of the techniques in the cultivation and production of crude drugs					

- CO2. Have Knowledge of the crude drugs, their uses and chemical nature  
 CO3. Know the evaluation techniques for the herbal drugs  
 CO4. Able to carry out the microscopic and morphological evaluation of crude drugs

**Programme and Course Mapping**

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO 1	PSO 2
CO1														
CO2	1		2		3			3		3				1
CO3				2										
CO4		1	2			3	3							

1=lightly mapped                      2= moderately mapped                      3=strongly mapped

Unit	Relevance to the local, national, regional and global developmental needs	Relevance To the Employability/ Entrepreneurship/ Skill Development	Relevance to the Professional Ethics, Gender, Human Values, Environment & Sustainability	SDG	NEP	POE/4 <sup>th</sup> IR
Local						
Regional						
National						
Global						
Employability						
Entrepreneurship						
Skill Development						
Professional Ethics						
Gender						
Human Values						
Environment & Sustainability						

Unit I	-	-	-	Introduction to Pharmacognosy & Phytochemistry			Skills related to Pharmacognosy & Phytochemistry fields would be developed			Better Quality of herbal Drugs		Skills for Decent Work (SDG 4.4)	Professional Education (17.1-17.5)	Global Education Knowledge Technical Skills that match Industry Needs, Skill Development
Unit II	-	-	-	Knowledge of cultivation, collection, processing & storage of crude drugs			Skills related to production and storage of herbal drugs would be enhanced			Better yield		Skills for Decent Work (SDG 4.4)	Professional Education (17.1-17.5)	Global Education Knowledge Technical Skills that match Industry Needs, Skill Development

Unit III	-	-	-	knowledge of plant tissue culture			Skills related to production of plants through tissue culture technique would be enhanced.			Environment conservation		Skills for Decent Work (SDG 4.4)	Professional Education (17.1-17.5)	Global Education Knowledge Technical Skills that match Industry Needs, Skill Development
Unit IV	-	-	-	Role of Pharmacology in allopathy and traditional systems of medicine			Skills related to principle and practice of traditional medicines would be developed			Traditional knowledge		Skills for Decent Work (SDG 4.4)	Professional Education (17.1-17.5)	Global Education Knowledge Technical Skills that match Industry Needs, Skill Development
Unit v				knowledge of various			Skills related to production			New		Skills for	Professional	Global Education

				categories of secondary metabolites		and usage of secondary metabolites would be enhanced			er drugs from natural resources		Decent Work (SDG 4.4)	Education (17.1-17.5)	Knowledge Technical Skills that match Industry Needs, Skill Development
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<b>BP406P</b>	<b>Medicinal Chemistry-I (Practical)</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Version 2.0</b>		<b>0</b>	<b>0</b>	<b>4</b>	<b>2</b>
<b>Total Contact Hours</b>	60 Hours				
<b>Pre-requisites/Exposure</b>	Medicinal Chemistry				
<b>Co-requisites</b>	Medicinal Chemistry				
<b>Course Objectives</b>					
<b>Upon completion of this course the student should be able to:</b>					
1. Understand the chemistry of drugs with respect to their pharmacological activity					
2. Understand the synthetic procedure and therapeutic value of drugs					
3. Know the mechanism of reaction and Structural Activity Relationship (SAR) of different class of drugs					
4. Understand methods and basics required for the assay of some drugs.					
<b>Course Outcomes (CO)</b>					

**On completion of this course, the student will be able to:**

CO1. It imparts the knowledge of synthesizing, characterization and purification of medicinal compounds and intermediates.

CO2. To analyse the selected drugs, present in dosage forms and to determine the percentage purity.

CO3. Able to study physiochemical properties of drug.

**Programme and Course Mapping**

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO 1	PSO 2
CO1					1									
CO2														
CO3	2		2		3							1		

1=lightly mapped                      2= moderately mapped                      3=strongly mapped

Unit	Relevance to the local, national, regional and global developmental needs				Relevance To the Employability/ Entrepreneurship/ Skill Development			Relevance to the Professional Ethics, Gender, Human Values, Environment & SDG				NEP	POE/4 <sup>th</sup> IR	
Local														
Regional														
National														
Global														
Employability														
Entrepreneurship														
Skill Development														
Professional Ethics														
Gender														
Human Values														
Environment & Sustainability														

Unit I	-	-	To synthesise API to meet Nation need	To synthesise API for export purpose	-	-	Synthesis of Drugs and Intermediate helps to meet industry demand in production of API	-	-	-	-	Skills for Decent Work (SDG 4.4), Ensure sustainable consumption and production patterns (SDG 12)	Technical Skills that match Industry Needs	Employ ability
Unit II		-	To Perform Quality control of marketed formulations	To analyse the import sample by following different assay methods	-	-	Assay of Drugs helps in Quality control of Drugs	-	-	-	-	Skills for Decent Work (SDG 4.4)	Practical Courses from Industry/Alumni	Skill Development, Employ ability
Unit III		-	To determine Physicochemical properties, require in Research and development Department of Pharma Industries.		-	-	Determination of physicochemical properties of Drugs assist in Preformulation studies	-	-	-	-	Skills for Decent Work (SDG 4.4)	Promoting High-quality research (18.1-18.9), Practical Courses from Industry/Alumni	Skill Development, Employ ability



<b>BP407P</b>	<b>Physical Pharmaceutics-II (Practical)</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>									
<b>Version 2.0</b>		<b>0</b>	<b>0</b>	<b>4</b>	<b>2</b>									
<b>Total Contact Hours</b>	60 Hours													
<b>Pre-requisites/Exposure</b>	Physical Pharmaceutics- I													
<b>Co-requisites</b>	Pharmaceutics													
<b>Course Objectives</b>														
<b>Upon completion of this course the student should be able to:</b>														
1. Understand various physicochemical properties of drug molecules in the designing the dosage forms														
2. Know the principles of chemical kinetics & to use them for stability testing and determination of expiry date of formulations														
3. Demonstrate use of physicochemical properties in the formulation development and evaluation of dosage forms														
<b>Course Outcomes (CO)</b>														
<b>On completion of this course, the student will be able to:</b>														
CO1. State the physicochemical properties of drug molecules														
CO2. Analyse the chemical stability tests of various drug products and determination of expiry date of formulations														
CO3. Have basic knowledge of physicochemical properties in the formulation development and evaluation of dosage forms.														
<b>Programme and Course Mapping</b>														
<b>CO</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO 10</b>	<b>PO11</b>	<b>PO12</b>	<b>PSO 1</b>	<b>PSO 2</b>
<b>CO1</b>														
<b>CO2</b>	<b>1</b>	<b>2</b>												
<b>CO3</b>		<b>3</b>	<b>3</b>	<b>1</b>	<b>1</b>									
1=lightly mapped                      2= moderately mapped                      3=strongly mapped														

Unit	Relevance to the local, national, regional and global developmental needs				Relevance To the Employability/ Entrepreneurship/ Skill Development			Relevance to the Professional Ethics, Gender, Human Values, Environment & Sustainability				SDG	NEP	POE/4 <sup>th</sup> IR
	Local	Regional	National	Global	Employability	Entrepreneurship	Skill Development	Professional Ethics	Gender	Human Values	Environment & Sustainability			
Unit I				By providing essential knowledge and approaches for recognising and understanding the physical properties of particulate materials, such as particle size, shape, surface area, and porosity, micromeritics contributes to society. This information is crucial for the creation and optimisation of a wide range of products and processes in industries including medicine,	-	-	Micromeritics assists in the development of professional skills by instructing professionals in particle characterization techniques	-	-	-	-	Skills for Decent Work (SDG 4.4)	Promoting High-quality research (18.1-18.9)	Global Education Knowledge

				chemicals, and materials science, where innovation is promoted, and product performance is enhanced on a worldwide scale.		<p>, data interpretation, and particulate material optimisation. These skills allow individuals to participate in process optimisation, quality assurance, and product development</p> <p>Mastering these skills enables professionals to address complex formulation challenges and drive innovation in various industries.</p>								
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Unit II	-	-	-	Through a greater understanding of flow behaviour and viscosity management, rheology contributes to the world by enhancing the design and performance of many items and activities, including paints, cosmetics, food, and oil drilling. It provides effective production, quality control, and optimisation, which promotes improved product development and global economic progress.			Rheology fosters expertise in measuring and interpreting flow behaviour, viscosity, and deformation properties of materials, enabling professionals in sectors like cosmetics, polymers, and pharmaceuticals to optimise formulations, solve problems, and invent with advanced materials, improving	-	-	-	-	Skills for Decent Work (SDG 4.4)	Promoting High-quality research (18.1-18.9)	Global Education Knowledge
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						their career prospects and industry contributions.							
Unit III		-	-	To improve the functionality, appearance, and performance of diverse products including paints, coatings, and emulsions, coarse dispersions enable the integration of insoluble or immiscible components.		The ability to specialise in methods including mixing, emulsification, and particle size reduction through coarse dispersion allows professionals to advance their knowledge of formulation creation and process optimisation. By mastering	-	-	-	-	Skills for Decent Work (SDG 4.4)	Promoting High-quality research (18.1-18.9)	Global Education Knowledge

							these abilities, people can develop a variety of industries and contribute to the productive production of high-quality goods.							
Unit IV		-	-	By facilitating the administration of poorly soluble medications and increasing their bioavailability and therapeutic potency, colloidal dispersions benefit society. Additionally, colloidal dispersions are used in a variety of industries, such as food, cosmetics, and electronics, which promotes global technical development and economic expansion.	-	-	Micromeritics assists in the development of professional skills by instructing professionals in particle characterization techniques, data interpretation, and particulate material optimization. A	-	-	-	-	Skills for Decent Work (SDG 4.4)	Promoting High-quality research (18.1-18.9)	Global Education Knowledge

							person's career prospects, and industry contributions are improved by their ability to contribute to product development, quality assurance, and process optimisation. They are used in industries including materials engineering, cosmetics, and medicines.							
Unit v	-	-	-	Drug stability makes a difference by preserving the quality, safety, and efficacy of pharmaceutical products over the course of their shelf lives. It makes it possible for people all over the world to have	-	-	By giving professionals information and competence in	-	-	-	No	Skills for Decent Work	Promoting High-quality	Global Education Knowledge

			access to safe and effective pharmaceuticals, encourages regulatory compliance, and supports global standards, ultimately leading to an improvement in patient outcomes and public health globally.		stability testing procedures, degradation mechanisms, and formulation optimisation, understanding medication stability aids in the development of professional skills. These talents help individuals to improve their capabilities and contributions to the industry by ensuring					(SD G 4.4)	research (18.1-18.9)	
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						product quality, resolving stability problems, and making wise decisions in pharmaceutical research and development..								
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<b>BP408P</b>	<b>Pharmacology-I (Practical)</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Version 2.0</b>		<b>0</b>	<b>0</b>	<b>4</b>	<b>2</b>
<b>Total Contact Hours</b>	60 Hours				
<b>Pre-requisites/Exposure</b>	Pharmacology				
<b>Co-requisites</b>	Pathophysiology				
<b>Course Objectives</b>					
<b>Upon completion of this course the student should be able to</b>					
1. Understand the pharmacological actions of different categories of drugs.					
2. Explain the mechanism of drug action at organ system/sub cellular/macromolecular levels.					
3. Observe the effect of drugs on animals by simulated experiments.					
<b>Course Outcomes (CO)</b>					
<b>On completion of this course, the student will be able to:</b>					

CO1. Knowledge of the practical aspect of general pharmacological techniques.

CO2. Understand the effect of drugs acting on CNS and PNS using animal simulator.

**Programme and Course Mapping**

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO1 1	PSO 2
CO1														
CO2	2							3			3			

1=lightly mapped                      2= moderately mapped                      3=strongly mapped

Unit	Relevance to the local, national, regional and global developmental needs	Relevance To the Employability/ Entrepreneurship/ Skill Development	Relevance to the Professional Ethics, Gender, Human Values, Environment & Sustainability	SDG	NEP	POE/4 <sup>th</sup> IR
Local						
Regional						
National						
Global						
Employability						
Entrepreneurship						
Skill Development						
Professional Ethics						
Gender						
Human Values						
Environment & Sustainability						

Unit I				Pre-clinical studies are conducted world wide, and trained the students			In experimental pharmacology, covers the basic concepts of animal laboratories animals commonly instruments used thus helps in Skill development	Skill development				Skills for Decent Work (SDG 4.4) Skills for Decent Work (SDG 4.4)	Professional Education (17.1-17.5)	Skill Development
Unit II		-	-	In this, pharmacology instruments are discussed with basic principle and working, enable			This unit based commonly instrument and their application on research and developments and this helps in skill development	Skill development					Professional Education (17.1-17.5)	Employability

				d the students to fit for the professional workforce globally			nt							
Unit III		-	-	Globally, Blood withdrawal, serum and plasma separation, anaesthetics and euthanasia techniques used in research and development in the clinical and pre			In this, students learned and trained with Blood withdrawal, serum and plasma separation, anaesthetics and euthanasia techniques used for animal studies							Skill Development

				clinical studies											
Unit IV		-	-	Globally, Glaucoma, cataract and other eye disorders are increasing to many folds, thus trained the students and make them available as skilled researchers			In this, students will learn about the different drugs available and their effect on rabbit eye							Skill Development	
Unit v				Globally, Skeletal			In skeletal muscle relaxants						Skills for	Professional	Employability

				l Muscle s disorde rs over the age, their pathog enesis, and challen ges to overco me the disorde rs and develo pment in the clinical and pre- clinical studies			using rota- rod apparatus experimen t, students will learn the neurophar macology and helps in skill developme nt						Dec ent Wor k (SD G 4.4)	Edu cati on (17. 1- 17.5 )	
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<b>BP409P</b>	<b>Pharmacognosy and Phytochemistry-I (Practical)</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Version 2.0</b>		<b>0</b>	<b>0</b>	<b>4</b>	<b>2</b>
<b>Total Contact Hours</b>	60 Hours				

<b>Pre-requisites/Exposure</b>	Remedial Biology Practical													
<b>Co-requisites</b>	Pharmacognosy													
<b>Course Objectives</b>														
<b>Upon completion of this course the student should be able to:</b>														
1. Understand various physicochemical properties of drug molecules in the designing the dosage forms														
2. Know the principles of chemical kinetics & to use them for stability testing and determination of expiry date of formulations														
3. Demonstrate use of physicochemical properties in the formulation development and evaluation of dosage forms.														
<b>Course Outcomes (CO)</b>														
<b>On completion of this course, the student will be able to:</b>														
CO1. State the physicochemical properties of drug molecules														
CO2. Analyze the chemical stability tests of various drug products and determination of expiry date of formulations														
CO3. Have basic knowledge of physicochemical properties in the formulation development and evaluation of dosage forms.														
<b>Programme and Course Mapping</b>														
<b>CO</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO 10</b>	<b>PO11</b>	<b>PO12</b>	<b>PSO 1</b>	<b>PSO 2</b>
<b>CO1</b>	3	2	1											
<b>CO2</b>	3	2												
<b>CO3</b>	3	3	2											
1=lightly mapped                      2= moderately mapped                      3=strongly mapped														

<b>Unit</b>	<b>Relevance to the local, national, regional and global developmental needs</b>	<b>Relevance To the Employability/ Entrepreneurship/ Skill Development</b>	<b>Relevance to the Professional Ethics, Gender, Human Values, Environment &amp; Sustainability</b>	<b>SDG</b>	<b>NEP</b>	<b>POE/4<sup>th</sup> IR</b>
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	Local	Regional	National	Global	Employability	Entrepreneurship	Skill Development	Professional Ethics	Gender	Human Values	Environment & Sustainability			
Unit I				Globally it will in understanding the various modern analytical techniques to authenticate and quality control of crude drugs.			to know the crude drugs, their uses and chemical nature					Skill for decent work (SDG 4.4)	Professional education (17.1-17.5)	Global education knowledge



Unit II	-	-	-	-	-	Medicinal and aromatic plants is an approach of developing human resource and train the youth for.	To know the evaluation techniques for the herbal drugs	-	-	-	-	Quality primary/secondary education for all (SDG 4.1)	Professional education (17.1-17.5)	Technical skills that match Industry needs
Unit III	-	-	-	-	pharmacology help to test, define, and create novel medications for	-	to know the crude drugs, their uses and chemical nature	-	-	-	-	Skill for decent work (SDG 4.4)	Adult education and lifelong learning (21.1-21.10)	Global education knowledge

					the treatment of human illness									
Unit IV	-	-	-	Globally it will in understanding the various modern analytical techniques to authenticate and quality control of crude drugs.	-	-	to know the techniques in the cultivation and production of crude drugs	-	-	-	-	Quality primary/secondary education for all (SDG 4.1)	Equitable and Inclusive Education: Learning for all (6.1 - 6.20)	Technical skills that match Industry needs
Unit v	-	-	-	-	-	-	to know the crude drugs, their uses and	-	-	-	-	Skill for decent work	Adult education	Global education knowledge

							chemical nature					k (SD G 4.4)	and lifelong learning (21.1-21.10)	
Unit VI	-	-	-		-	-	to understand the microscopic and morphological evaluation of crude drugs	-	-	-	-	Quality primary/secondary education for all (SD G 4.1)	Professional education (17.1-17.5)	Global education knowledge
Unit VII	-	-	-	Globally it will in understanding the various modern analytical	-	-	To know the evaluation techniques for the herbal drugs	-	-	-	-	Skill for decent work (SD G 4.4)	Adult education and lifelong learning (21.	Global education knowledge

				techniques to authenticate and quality control of crude drugs.									1-21.10)	
Unit VIII	-	-	-	Pharmacognosy is used by pharmaceutical companies to test, characterise, and develop new drugs for the treatment of human sickness.	-	-	to know the crude drugs, their uses and chemical nature	-	-	-	-	Quality primary/secondary education for all (SDG 4.1)	Equitable and Inclusive Education: Learning for all (6.1 - 6.20)	Global education knowledge

Unit IX	-	-	-	It will help people comprehend the many contemporary analytical approaches to authenticate and control the quality of crude pharmaceuticals on a global scale.	-	-	to know the techniques in the cultivation and production of crude drugs	-	-	-	-	Skill for decent work (SDG 4.4)	Adult education and lifelong learning (21.1-21.10)	Technical skills that match Industry needs
Unit X	-	-	-	Globally it will in understanding the various moder	-	-	to understand the microscopic and morphological evaluation	-	-	-	-	Quality primary/secondary edu	Equitable and Inclusive Edu	Technical skills that match Industry needs

				n analyti cal techniq ues to authent icate and quality control of crude drugs.			of crude drugs					cati on for all (SD G 4.1)	cati on: Lea rnin g for all (6.1 - 6.20 )	
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## Semester-V

<b>BP501T</b>	<b>Medicinal Chemistry-II (Theory)</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Version 2.0</b>		<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>
<b>Total Contact Hours</b>	45 Hours				
<b>Pre-requisites/Exposure</b>	Medicinal Chemistry				
<b>Co-requisites</b>	Chemical Synthesis				

### Course Objectives

**Upon completion of the course the student shall be able to:**

1. Understand the chemistry of drugs with respect to their pharmacological activity
2. Understand the drug metabolic pathways, adverse effect and therapeutic value of drugs
3. Know the Structural Activity Relationship of different class of drugs
4. Study the chemical synthesis of selected drugs

### Course Outcomes (CO)

**On completion of this course, the student will be able to:**

- CO1. Get familiar with the chemistry and synthesis of medicinal substances.
- CO2. Understand the concept of structure activity relationships of drugs, importance of physicochemical properties and metabolism of drugs.
- CO3. Learn about hormone related drugs.
- CO4. To impart fundamental knowledge on the structure, chemistry, and therapeutic value of drugs.
- CO5. Acquire knowledge regarding Cardiovascular drugs and their structures

### Programme and Course Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO 1	PSO 2
CO1	1													
CO2		2												
CO3		1			2					2		2		
CO4	2		1											
CO5	2					2								

1=lightly mapped

2= moderately mapped

3=strongly mapped

Unit	Relevance to the local, national, regional and global developmental needs				Relevance To the Employability/ Entrepreneurship/ Skill Development			Relevance to the Professional Ethics, Gender, Human Values, Environment & Sustainability			SDG	NEP	POE/4 <sup>th</sup> IR	
Unit I	Local	Regional	National	Global	Employability	Entrepreneurship	Skill Development	Professional Ethics	Gender	Human Values	Environment & Sustainability			
				Antihistaminic agents and anti-cancer agents are used globally to tackle the menace	The production of these drugs can generate a lot		The production and quality control of these drugs helps in developing and honing technical skills.	Usage and quality control of these drugs requires a lot of professional ethics .	These types of drugs are used			The types of drugs ensure healthy lives and pro	-	The production and quality control of these drugs helps in developing a lot of technical skills and



				e of cancer , allergies ,cold cough etc.	of employment .				for every type of gender .			promotes well being of peoples across all ages .SD G3		generating a lot employment across the globe.
Unit II	-	-	-	Anti-anginal and anti-hypertensive drugs are used globally to tackle the attack of angina and blood pressure.	The production of these drugs can generate a lot of employment .	-	The production and quality control of these drugs helps in developing and honing technical skills.	Usage and quality control of these drugs requires a lot of professional ethics .	These types of drugs are used for every type of	-	-	The se type s of drug s ensure healthy lives and promotes well being of peoples across	-	The production and quality control of these drugs helps in developing a lot of technical skills and generating a lot employment across the globe.

									ge n de r			ss all ages .SD G3		
Unit III		-	-	Anti- arrhyth mic and anti- hyperli pidemi c drugs used globall y to treat the arrhym ia and high chloest erol disorde rs .	The pro duct ion of thes e dru gs c an gen erat e a lot of emp loy men t .	-	The pro duction and quality control of these drugs helps in develop ing and honing technical skills.	Usage and quality control of these drugs requires a lot of professi onal ethics .	T he se ty pe s of dr u gs ar e us ed fo r ev er y ty pe of ge n de r	-	-	The se ty pe s of drug s ensu re heal thy live s and pro mot es well bein g of peo ples acro ss all ages .SD G3	-	The pro duct ion and quality control of these drugs helps in develop ing a lot of technic al skills and generat ing a lot employ ment across the globe.
Unit IV	-	-	-	Steroid al and thyroid	The pro duct	-	The pro duction and	Usage and quality	T he se	-	-	The se ty pe	-	The pro duct ion and

				drugs are used globally as contraceptives, as anti-inflammatory agents and also used to cure thyroid cancer.	ion of these drugs can generate a lot of employment.		quality control of these drugs helps in developing and honing technical skills.	control of these drugs requires a lot of professional ethics.	types of drugs are used for every type of gender			s of drugs ensure healthy lives and promotes well being of people across all ages .SD G3		quality control of these drugs helps in developing a lot of technical skills and generating a lot employment across the globe.
Unit v	-	-	-	Anti - diabetic and local anaesthetics drugs are used globally to	The production of these drugs can gen	-	The production and quality control of these drugs helps in developing and honing	Usage and quality control of these drugs requires a lot of professional ethics .	The types of drugs are	-	-	The types of drugs ensure healthy live	-	The production and quality control of these drugs helps in developing a lot of

				treat diabetes which is called as a silent killer. Local anaesthetics are used to provide anaesthesia.	erate a lot of employment.		technical skills.		used for every type of gender			s and promotes well being of peoples across all ages .SD G3		technical skills and generating a lot employment across the globe.
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<b>BP502T</b>	<b>Industrial Pharmacy-I (Theory)</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Version 2.0</b>		<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>
<b>Total Contact Hours</b>	45 Hours				
<b>Pre-requisites/Exposure</b>	Pharmaceutics				
<b>Co-requisites</b>	Industrial Pharmacy				

### Course Objectives

**Upon completion of this course the student should be able to:**

1. Know the various pharmaceutical dosage forms and their manufacturing techniques.
2. Know various considerations in development of pharmaceutical dosage forms.
3. Formulate solid, liquid and semisolid dosage forms and evaluate them for their Quality.

### Course Outcomes (CO)

**On completion of this course, the student will be able to:**

CO1: To understand and appreciate the influence of pharmaceutical additives and various pharmaceutical dosage forms on the performance of the drug product.

CO2: To get familiar with Pre formulation studies

CO3: To know formulation and evaluation of solid dosage form like tablets, capsules

CO4: To get familiar with aseptic conditions and formulation of parenteral preparation.

CO5: To understand various considerations in development of cosmetics.

### Programme and Course Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO 1	PSO 2
CO1			1		1		3		3		3			
CO2	1													3
CO3		1				2						3		
CO4			1		2			3		3				
CO5														

1=lightly mapped

2= moderately mapped

3=strongly mapped

Unit	Relevance to the local, national, regional and global developmental needs				Relevance To the Employability/ Entrepreneurship/ Skill Development			Relevance to the Professional Ethics, Gender, Human Values, Environment & Sustainability				SDG	NEP	POE/4 <sup>th</sup> IR
	Local	Regional	National	Global	Employability	Entrepreneurship	Skill Development	Professional Ethics	Gender	Human Values	Environment & Sustainability			
Unit I	-	-	-	Preformulation studies play a vital role in drug development by investigating the physicochemical properties of drug substances, aiming to understand their behaviour and stability. By providing valuable data and insights, preformulation	Preformulation studies offer a valuable opportunity for skill development in the pharmaceutical industry, enhancing knowledge and expertise in the characterization and analysis of			-	-	-	-	"Ensure healthy lives and promote well-being	Promoting High-quality research (18.1-18.9)	Global Education Knowledge

				studies contribute globally to the development of safe and effective pharmaceutical products.	drug substances, formulation development, and optimization techniques. By actively engaging in preformulation studies, individuals can acquire practical skills that are highly relevant for a successful career in pharmaceutical research and development.							for all at all ages (SD G 3)"		
Unit II		-	-	Tablets contribute globally by providing a convenient, portable, and easily administered dosage form, facilitating widespread access to medication and improving patient compliance, thereby positively impacting public health on a global scale.	Tables can contribute to employability by providing a platform for organizing and presenting information in a structured manner, enabling individuals to showcase their skills, qualifications, and experiences effectively.	Tables can support entrepreneurship by aiding in business planning, financial analysis, and data organization, empowering entrepreneurs		-	-	N O	-	"Ensure healthy lives and promote well-being for all at	Promoting High-quality research (18.1-18.9)	Global Education Knowledge

						eurs to make informed decisions , communicate their ideas, and drive the growth of their ventures.						all ages (SD G 3) "		
Unit III	-	-	-	Liquid orals contribute globally by providing a more accessible and user-friendly medication option, especially for vulnerable populations like children and the elderly. Their ease of administration and accurate dosing improve patient compliance, leading to better health outcomes worldwide.		Liquid orals contribute to entrepreneurship by offering opportunities for formulation development, product innovation, and niche market creation, allowing entrepren		-	-	No	-	"Ensure healthy lives and promote well-being for all at all ages (SD G 3) "	Promoting High-quality research (18.1-18.9)	Global Education Knowledge



						eurs to tap into the growing demand for liquid medications and establish their own pharmaceutical ventures.								
Unit IV				<p>Capsules contribute globally by providing an efficient and versatile dosage form, allowing for precise and convenient drug delivery. They offer flexibility in formulation, ease of swallowing, and compatibility with various active ingredients, contributing to global access to medication and improved patient compliance.</p>	<p>Capsules contribute to employability by creating job opportunities in pharmaceutical manufacturing, formulation development, quality control, and regulatory affairs, requiring specialized skills and expertise. The widespread use of capsules also increases demand for professionals in sales, marketing, and distribution, further</p>	-	-	-	-	No	-	"Ensure healthy lives and promote well-being for all at all ages (SDG 3)"	Promoting High-quality research (18.1-18.9)	Global Education Knowledge

					enhancing employability in the pharmaceutical industry.										
Unit V	-	-	-	They play a critical role in emergency care, disease treatment, and patient management, thereby improving healthcare outcomes on a global scale.	The specialized knowledge and expertise required in parenteral preparation offer diverse career prospects in pharmaceutical manufacturing, clinical research, and healthcare settings, enhancing employability in the pharmaceutical industry.	-	-	-	-	No	-	"Ensure healthy lives and promote well-being for all at all ages (SDG 3)"	Promoting High-quality research (18.1-18.9)	Global Education Knowledge	

<b>BP503T</b>	<b>Pharmacology-II (Theory)</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Version 2.0</b>		<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>
<b>Total Contact Hours</b>	45 Hours				
<b>Pre-requisites/Exposure</b>	Pharmacology-I				
<b>Co-requisites</b>	HAP-II and Pathophysiology				

### Course Objectives

**Upon completion of this course the student should be able to:**

1. Understand the mechanism of drug action and its relevance in the treatment of different diseases
2. Demonstrate isolation of different organs/tissues from the laboratory animals by simulated experiments
3. Demonstrate the various receptor actions using isolated tissue preparation
4. Appreciate correlation of pharmacology with related medical sciences

### Course Outcomes (CO)

**On completion of this course, the student will be able to:**

- CO1. To impart the fundamental knowledge on various aspects (classification, mechanism of action, therapeutic effects, clinical uses, side effects and contraindications) of drugs acting on different systems of body.
- CO2. To emphasis on the basic concepts of bioassay.
- CO3. Apprise the students with the various effects of drugs on human body.
- CO4. Acquire knowledge about Metabolism & excretion of drugs, principles of Clinical Pharmacokinetics.
- CO5. Understand the pharmacology of CVS.

### Programme and Course Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO 1	PSO 2
CO1	1			2			3							
CO2		1				2					3			
CO3			1		2				3			3		3
CO4		1	1	2										

CO5												
1=lightly mapped      2= moderately mapped      3=strongly mapped												

Unit	Relevance to the local, national, regional and global developmental needs				Relevance To the Employability/ Entrepreneurship/ Skill Development			Relevance to the Professional Ethics, Gender, Human Values, Environment & Sustainability				SDG	NEP	POE/4 <sup>th</sup> IR
	Local	Regional	National	Global	Employability	Entrepreneurship	Skill Development	Professional Ethics	Gender	Human Values	Environment & Sustainability			
Unit I	-	-	-	Studies related to the mechanism of drug action and its relevance in the treatment of diseases related to cardiovascular system	-	-	Understanding basics of drug related to cardiovascular system	-	-	-	-	Ensure healthy lives and promote well-being for all at all ages SDG 3 and Skills for Decent	Professional education( 17.1 -	Global education knowledge

													Work SDG 4.4	17.5 )	
Unit II	-	-	-	Emphasize on general principles related to drugs used in therapy of shock, hemtinics, coagulants, anticoagulants, fibrinolytics, anti-platelet and plasma volume expanders as well as on urinary system	-	-	The basic pharmacology of drug therapy of shock, hemtinics, coagulants, anticoagulants, fibrinolytics, anti-platelet and plasma volume expanders as well as on urinary system	-	-	-	-	Ensure healthy lives and promote well-being for all at all ages SDG 3	Prof essional edu cation( 17.1 - 17.5 )	Global educati on knowle dge	
Unit III		-	-	Studies related to autocoids and related drugs plays an important role in creating awareness on mechanism and pharmacological action of these drugs			Understanding basics of drug related to autocoids and related drugs	-	-	-	-	Ensure healthy lives and promote well-being for all at all ages SDG 3 and Skills for Decent Work SDG 4.4	Prof essional edu cation( 17.1 - 17.5 )	Global educati on knowle dge	
Unit IV	-	-	-	Emphasize to drugs acting on endocrine system plays an important role in creating awareness on mechanism and pharmacological action of drugs			Understanding basics of drug acting on endocrine system	-	-	-	-	Ensure healthy lives and promote well-being for all at all ages SDG 3	Prof essional edu cation( 17.1	Global educati on knowle dge	

													- 17.5 )	
Unit v	-	-	-	Understanding of general principles, applications and principles related to bioassay			To understand the basic knowledge related to bioassay	-	-	-	-	Ensure healthy lives and promote well-being for all at all ages SDG 3 and Skills for Decent Work SDG 4.4	Prof essi onal edu cati on( 17.1 - 17.5 )	Global educati on knowle dge

<b>BP504T</b>	<b>Pharmacognosy and Phytochemistry II– Theory</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Version 2.0</b>		<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>
<b>Total Contact Hours</b>	45 Hours				
<b>Pre-requisites/Exposure</b>	Pharmacognosy & Phytochemistry-I				
<b>Co-requisites</b>	Remedial Biology				
<b>Course Objectives</b>					
<b>Upon completion of this course the student should be able to:</b>					
<ol style="list-style-type: none"> <li>1. To know the modern extraction techniques, characterization and identification of the herbal drugs and phytoconstituents</li> <li>2. To understand the preparation and development of herbal formulation.</li> <li>3. To understand the herbal drug interactions</li> <li>4. To carryout isolation and identification of phytoconstituents.</li> </ol>					
<b>Course Outcomes (CO)</b>					
<b>On completion of this course, the student will be able to:</b>					
CO1. Impart the students the knowledge of how the secondary metabolites are produced in the crude drugs.					

- CO2. Get familiar with isolation and identification and industrially production of secondary metabolites.  
 CO3. Understand study of producing the plants and phytochemicals through plant tissue culture.  
 CO4. To give knowledge about application of latest analytical techniques.  
 CO5. To understand basic principles of traditional system of medicine.

**Programme and Course Mapping**

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2
CO1	1			2				2						1
CO2									2					
CO3		1	1	2	2							2		2
CO4			1				2							
CO5														

1=lightly mapped                      2= moderately mapped                      3=strongly mapped

<b>Unit</b>	<b>Relevance to the local, national, regional and global developmental needs</b>	<b>Relevance To the Employability/ Entrepreneurship/ Skill Development</b>	<b>Relevance to the Professional Ethics, Gender, Human Values, Environment &amp; Sustainability</b>	<b>SDG</b>	<b>NEP</b>	<b>POE/4<sup>th</sup> IR</b>
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	Local	Regional	National	Global	Employability	Entrepreneurship	Skill Development	Professional Ethics	Gender	Human Values	Environment & Sustainability			
Unit I	-	-	-	Knowledge of Formation of Secondary metabolites			Skills enhanced with respect to production of secondary metabolites			Medicinal Value		Skills for Decent Work (SDG 4.4)	Professional Education (17.1-17.5)	Global Education Knowledge Technical Skills that match Industry Needs, Skill Development
Unit II	-	-	-	Knowledge of Medicinal import			Skills enhanced with respect to usage of			Medicinal		Skills for Decent	Professional Education	Global Education Knowledge



				ance of Second ary metabo lites			secondary metabolite s			V al ue		Wor k (SD G 4.4)	on (17. 1- 17.5 )	Techni cal Skills that match Industr y Needs, Skill Develo pment
Unit III	-	-	-	Knowl edge of Isolatio n, Identifi cation and analysi s of phytoc onstitu ents			Skills enhanced with respect to usage of phytoconst ituents			M ed ic in al V al ue		Skil ls for Dec ent Wor k (SD G 4.4)	Prof essi onal Edu cati on (17. 1- 17.5 )	Global Educati on Knowle dge Techni cal Skills that match Industr y Needs, Skill Develo pment
Unit IV	-	-	-	Knowl edge of Industr ial produc tion of Phytoc onstitu			Skills enhanced with respect to Industrial production of secondary			M ed ic in al I m p		Skil ls for Dec ent Wor k (SD	Prof essi onal Edu cati on (17. 1-	Global Educati on Knowle dge Techni cal Skills

				ents			metabolites			or ta nc e		G 4.4)	17.5 )	that match Industr y Needs, Skill Develop ment
Unit v				knowle dge of moder n method of extracti on & analysi s of Phytoc onstitu ents			Skills enhanced with respect to Extraction of secondary metabolite s			M ed ic in al V al ue		Skil ls for Dec ent Wor k (SD G 4.4)	Prof essi onal Edu cati on (17. 1- 17.5 )	Global Educati on Knowle dge Techni cal Skills that match Industr y Needs, Skill Develop ment

<b>BP505T</b>	<b>Pharmaceutical Jurisprudence (Theory)</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Version 2.0</b>		<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>
<b>Total Contact Hours</b>	45 Hours				
<b>Pre-requisites/Exposure</b>	Jurisprudence				
<b>Co-requisites</b>	Rules and Regulation				
<b>Course Objectives</b>					

**Upon completion of this course the student should be able to:**

1. The Pharmaceutical legislations and their implications in the development and marketing of pharmaceuticals.
2. Various Indian pharmaceutical Acts and Laws.
3. Regulatory authorities & agencies governing the manufacture & sale of Pharmaceuticals.
4. The code of ethics during the pharmaceutical practice

**Course Outcomes (CO)****On completion of this course, the student will be able to:**

CO1. This subject is designed to impart fundamental knowledge on Various Act.

CO2. The subject provides the basic knowledge required to understand the various disciplines of pharmacy.

CO3. This subject deals with MTP act.

CO4. Provide Knowledge about Indian Pharmacopoeia, British Pharmacopoeia and other Regulatory agencies.

CO5. Provide Knowledge about Narcotic and Psychotropic substance act.

**Programme and Course Mapping**

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2
CO1			2		2		2				3			
CO2	1		1	2		3			2		3			
CO3									2					
CO4	3		1			3					1	3		
CO5		2			2		1		1					

1=lightly mapped

2= moderately mapped

3=strongly mapped

Unit	Relevance to the local, national, regional and global developmental needs				Relevance To the Employability/ Entrepreneurship/ Skill Development			Relevance to the Professional Ethics, Gender, Human Values, Environment & Sustainability				SDG	NEP	POE/4 <sup>th</sup> IR
BP5 05T	Local	Regional	National	Global	Employability	Entrepreneurship	Skill Development	Professional Ethics	Gender	Human Values	Environment & Sustainability			
Unit I			To regulate the import, manufacture, distribution and sale of drugs & cosmetics through licensing. Manufacture, distribution and sale of drugs and cosmetics by qualified persons only. To prevent substandard in drugs, presumably for maintaining high		Pharmaceutical jurisprudence provides professionals with valuable legal and regulatory knowledge, enhancing employability in various sectors of the pharmaceutical industry.		--- --- ---	The integration of pharmaceutical jurisprudence and professional ethics enhances employa	- -	- -	---	(SDG 1.2, 4.4)	Professional Education (17.1-17.5), Transforming	Employability, Global Education Knowledge, <b>Technical Skills that match Indust</b>

			standards of medical treatment.		Understanding the legal frameworks, compliance requirements, and ethical considerations within the field positions individuals for success in roles that require adherence to regulations, protection of intellectual property, and ethical decision-making.			bility by equipping individuals with the knowledge, skills, and values necessary to make ethical decisions, comply with regulations, and prioritize patient welfare. Employers seek professionals who can navigate the complex ethical					the Regulatory System (20.1-20.15)	ry Needs
Unit II		-	Packaging and labelling directly impact sales and profits as they offer detailed information on the price, quality, quantity, usage, ingredients, and features of the products. They also display the brand logo and message that help the customer find the product easily by creating a recall value.											
Unit III		-	An Act to regulate the profession of pharmacy. Whereas it is expedient to make better provision for the regulation of the profession and practice of pharmacy and for that purpose to constitute Pharmacy Councils".											

Unit IV		-	<p>The global impact of these acts and regulations lies in promoting public health, ensuring the safety and efficacy of pharmaceutical products, protecting animal welfare, and enhancing access to essential medicines. They establish guidelines and standards that influence healthcare practices, research ethics, and pricing policies not only within the country of origin but also potentially in international contexts. These regulations contribute to the overall well-being of individuals, animals, and healthcare systems globally.</p>					<p>landscap e of the pharmac eutical industry, building trust, and maintain ing high standards of professi onalism.</p>							
Unit v			<p>The global impact of these legislations is significant. They ensure the safety, quality, and accessibility of</p>												

		pharmaceutical products, promote ethical practices, protect patient rights, influence healthcare policies, and stimulate research and development in the pharmaceutical sector. These legislations contribute to improved healthcare outcomes, innovation, and the overall well-being of individuals globally.												
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<b>BP506P</b>	<b>Industrial Pharmacy (Practical)</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Version 2.0</b>		<b>0</b>	<b>0</b>	<b>4</b>	<b>2</b>
<b>Total Contact Hours</b>	60 Hours				
<b>Pre-requisites/Exposure</b>	Pharmaceutics				
<b>Co-requisites</b>	Pharmaceutics				
<b>Course Objectives</b>					
<b>Upon completion of this course the student should be able to:</b>					
1. To get familiarize with technology and production of pharmaceutical dosage form.					
<b>Course Outcomes (CO)</b>					
<b>On completion of this course, the student will be able to:</b>					

CO1: Get familiarize with technology and production of pharmaceutical dosage form.

CO2: Learn Elementary Idea on Quality control test of (as per IP) marketed tablets and capsules Inorganic Qualitative Analysis.

CO3: Learn to prepare and evaluate tablets, capsule, cold / vanishing cream, ointment.

CO4: Learn to test containers.

CO5: Learn to prepare eye drops and eye ointment.

**Programme and Course Mapping**

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO1 2	PSO 1	PSO 2
CO1	1					1						3		
CO2		1		2				2						
CO3							1				3			
CO4		1			1								1	
CO5	2					3		2						
1=lightly mapped                      2= moderately mapped                      3=strongly mapped														

<b>U n i t</b>	<b>Relevance to the local, national, regional and global developmenta l needs</b>	<b>Relevance To the Employability / Entrepreneur ship/ Skill Development</b>	<b>Gender, Human Values,</b>	<b>SDG</b>	<b>NEP</b>	<b>POE/4<sup>th</sup> IR</b>
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LOCAL	REGIONAL	NATIONAL	Global	Employability	Entrepreneurship	Skill Development	PROFESSIONAL ETHICS	General	Human Values	Environment & Sustainability			
U n i t - I	-	-	<p>Preformulation studies play a vital role in drug development by investigating the physicochemical properties of drug substances, aiming to understand their behaviour and stability. By providing valuable data and insights, preformulation studies contribute globally to the development of safe and effective pharmaceutical products.</p>	<p>Preformulation studies offer a valuable opportunity for skill development in the pharmaceutical industry, enhancing knowledge and expertise in the characterization and analysis of drug substances, formulation development, and optimization techniques. By actively engaging in preformulation studies, individuals can acquire practical skills that are highly relevant for a successful career in pharmaceutical research and development.</p>	-	-	-	-	-	-	<p>SDG 3: Good Health and Well-being: Parenteral formulations, such as injections and infusions, play a critical role in delivering medications and treatments for various health conditions. They help ensure access to essential medicines and healthcare, contributing to the goal of achieving good health and well-being for all.</p>	<p>Promoting High-quality research (18.1-18.9) [Rheology being an important component in formulation development leads to conducti on of</p>	<p>Skill Embedded Courses Development</p>



I I I		precise and convenient drug delivery. They offer flexibility in formulation, ease of swallowing, and compatibility with various active ingredients, contributing to global access to medication and improved patient compliance.	quality and compliance with established standards. The quality control tests performed on marketed capsules help assess their employability and suitability for use in clinical practice.					production of parenteral formulations require robust pharmaceutical industry infrastructure and innovative manufacturing processes. Meeting the demand for parenteral formulations can drive technological advancements, promote research and development, and enhance manufacturing capabilities, thereby contributing to SDG 9.	research (18.1-18.9) [Rheology being a important component in formulation development leads to conduction of research work]	be dd ed Co urs es De vel op me nt
U n i t  I V		The global need for the preparation of eye drops and eye ointments is driven by the necessity to provide appropriate and effective treatments for ocular conditions, thereby improving patient comfort, visual health, and overall quality of life.	The role of Unit IV in the employability of individuals lies in providing them with specialized skills and knowledge related to the preparation of Calcium Gluconate injections, Ascorbic Acid injections, and Eye drops/Eye ointments. These skills					SDG 3: Good Health and Well-being: Parenteral formulations, such as injections and infusions, play a critical role in delivering medications and treatments for various health conditions. They help ensure access to essential medicines and healthcare, contributing to	Promoting High-quality research (18.1-18.9) [Rheology being a importa	Sk ill E m be dd ed Co urs es De

			open up opportunities for employment in various sectors of the pharmaceutical industry, ensuring a steady demand for professionals who can effectively and safely prepare these pharmaceutical formulations.					the goal of achieving good health and well-being for all.	nt compon ent in formulat ion develop ment leads to conducti on of research work]	vel op me nt
U n i t  V			Unit V addresses the global need for the preparation of creams (cold/vanishing cream) and the evaluation of glass containers. Professionals trained in these areas contribute to meeting the demand for effective skincare formulations and ensuring the safety and integrity of pharmaceutical products during storage and transportation.	Unit V enhances the employability of individuals by providing them with specialized skills and knowledge in the preparation of creams (cold/vanishing cream) and the evaluation of glass containers. The global need for effective skincare products and reliable pharmaceutical packaging creates numerous employment opportunities in various sectors of the pharmaceutical industry for individuals trained in				SDG 3: Good Health and Well-being: Parenteral formulations, such as injections and infusions, play a critical role in delivering medications and treatments for various health conditions. They help ensure access to essential medicines and healthcare, contributing to the goal of achieving good health and well-being for all.	Promoti ng High- quality research (18.1- 18.9) [Rheolo gy being a importa nt compon ent in formulat ion develop ment	Sk ill E m be dd ed Co urs es De vel op me nt

													these areas.							leads to conducti on of research work]
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<b>BP507P</b>	<b>Pharmacology-II (Practical)</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Version 2.0</b>		<b>0</b>	<b>0</b>	<b>4</b>	<b>2</b>
<b>Total Contact Hours</b>	60 Hours				
<b>Pre-requisites/Exposure</b>	Pharmacology-I (Practical)				
<b>Co-requisites</b>	HAP				
<b>Course Objectives</b>					
Upon completion of this course the student should be able to: This subject will apprise the students with the following: <ol style="list-style-type: none"> <li>1. To get familiar with various effects of drugs on human body.</li> <li>2. To demonstrate laboratory techniques and animal experiments by simulated experiments by softwares and videos</li> </ol>					
<b>Course Outcomes (CO)</b>					
On completion of this course, the student will be able to:  CO1. Apprise the students with the various effects of drugs on human body. CO2. Use of computer simulated CDs or Video cassettes for pharmacology practical. CO3. Learn about different routes of administration of drugs in mice/rats.  CO4. Learn to do bioassay of various drug.  CO5. Know about <i>in-vitro</i> pharmacology and physiological salt solutions.					

Programme and Course Mapping														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO 1	PSO 2
CO1	1													
CO2			1		3	2			2		3		3	
CO3				1										
CO4		1				2								
CO5	1				1					2				
1=lightly mapped                      2= moderately mapped                      3=strongly mapped														

Unit	Relevance to the local, national, regional and global developmental needs				Relevance To the Employability/ Entrepreneurship/ Skill Development			Relevance to the Professional Ethics, Gender, Human Values, Environment & Sustainability				SDG	NEP	POE/4 <sup>th</sup> IR
	Local	Regional	National	Global	Employability	Entrepreneurship	Skill Development	Professional Ethics	Gender	Human Values	Environment & Sustainability			
Unit I	-	-	-	To focus on studies related introduction to in-vitro	-	-	Understanding of basics of in-	-	-	-	-	Skills for Decent	Prof essi	Global educati

				pharmacology and physiology salt solutions as well as effect of drugs on frog heart, blood pressure and heart rate of dog			vitro pharmacology and physiology salt solutions as well as effect of drugs on frog heart, blood pressure and heart rate of dog					Work SDG 4.4	onal education( 17.1 - 17.5 )	on knowledge
Unit II	-	-	-	In elaboration of diuretic activity of drugs using rats/mice as well as DRC of acetylcholine using frog rectus abdominis muscle and effect of physostigmine and atropine on DRC of acetylcholine using frog rectus	-	-	To gain basic knowledge related to different models of DRC	-	-	-	-	Skills for Decent Work SDG 4.4	Professional education( 17.1 - 17.5 )	Global education knowledge
Unit III		-	-	To understand the basic studies related to bioassay of histamine using guinea pig ileum by matching method, bioassay of oxytocin using rat uterine horn by interpolation method and bioassay of serotonin using rat fundus strip by three point bioassay			To gain understanding basics of bioassay of histamine, oxytocin and serotonin.	-	-	-	-	Skills for Decent Work SDG 4.4	Professional education( 17.1 - 17.5 )	Global education knowledge
Unit IV	-	-	-	It emphasis on studies related to bioassay of acetylcholine using rat ileum/colon by four point			To understanding basics of bioassay and	-	-	-	-	Skills for Decent Work SDG 4.4	Professional education	Global education knowledge

				bioassay, determination of PA2 value of prazosin using rat anococcygeus muscle and determination of PD2 value using guinea pig ileum.			determination of PA2 and PD2 value using rat anococcygeus muscle and guinea pig ileum.						cati on( 17.1 - 17.5 )	dge
Unit v	-	-	-	It elaborates the effect of spasmogens and spasmolytics using rabbit jejunum, anti-inflammatory activity of drugs using carrageenan induced paw-edema model and analgesic activity of drug using central and peripheral methods			The basic knowledge related to effect spasmogens and spasmolytics and anti-inflammatory and analgesic activity of drug	-	-	-	-	Skills for Decent Work SDG 4.4	Prof essional edu cation( 17.1 - 17.5 )	Global educati on knowle dge

<b>BP508P</b>	<b>Pharmacognosy and Phytochemistry-II (Practical)</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Version 2.0</b>		<b>0</b>	<b>0</b>	<b>4</b>	<b>2</b>
<b>Total Contact Hours</b>	60 Hours				
<b>Pre-requisites/Exposure</b>	Pharmacognosy & Phytochemistry-I Practical				
<b>Co-requisites</b>	Remedial Biology Practical				
<b>Course Objectives</b>					
<b>Upon completion of this course the student should be able to:</b>					
1. To know the modern extraction techniques, characterization and identification of the herbal drugs and phytoconstituents					
2. To understand the preparation and development of herbal formulation.					



3. To understand the herbal drug interactions
4. To carryout isolation and identification of phytoconstituents

**Course Outcomes (CO)**

**On completion of this course, the student will be able to:**

- CO1. Get familiar with the practical aspects of characterization and identification of the herbal drugs and phytoconstituents
- CO2. Learn about isolation and identification of phytoconstituents
- CO3. Learn the preparation and development of herbal formulation.
- CO4. Understand Analysis of crude drugs by chemical tests.
- CO5. Get familiar with TLC of herbal extracts.

**Programme and Course Mapping**

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO 1	PSO 2
CO1	1		2			2					2			
CO2		3						1						
CO3	1				3			1			2			
CO4													2	
CO5	2			2						1				

1=lightly mapped                      2= moderately mapped                      3=strongly mapped

Unit	Relevance to the local, national, regional and global developmental needs	Relevance To the Employability/ Entrepreneurship/ Skill Development	Relevance to the Professional Ethics, Gender, Human Values, Environment & Sustainability	SDG	NEP	POE/4 <sup>th</sup> IR
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	Local	Regional	National	Global	Employability	Entrepreneurship	Skill Development	Professional Ethics	Gender	Human Values	Environment & Sustainability			
Unit I				Identification & extraction of crude drugs			Skills enhanced with respect to extraction of secondary metabolites			Medical value		Skills for Decent Work (SDG 4.4)	Professional Education (17.1-17.5)	Global Education Knowledge Practical Courses from Industry/Alumni Technical Skills that match Industry Needs, Skill

														Develo pment
Unit II	-	-	-	Isolation & Identification of phytonstituents			Skills enhanced with respect to isolation of secondary metabolites			Medicinal value		Skills for Decent Work (SDG 4.4)	Professional Education (17.1-17.5)	Global Education Knowledge Practical Courses from Industry/Alumni Technical Skills that match Industry Needs, Skill Development
Unit III	-	-	-	Chromatographic evaluation of crude drugs			Skills enhanced with respect to chromatographic analysis of			Medicinal value		Skills for Decent Work (17.	Professional Education (17.	Global Education Knowledge Practical

							crude drugs			e		(SD G 4.4)	1-17.5)	Courses from Industry/Alumni Technical Skills that match Industry Needs, Skill Development
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## Semester-VI

<b>BP601T</b>	<b>Medicinal Chemistry-III (Theory)</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Version 2.0</b>		<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>
<b>Total Contact Hours</b>	45 Hours				
<b>Pre-requisites/Exposure</b>	Medicinal Chemistry and Pharmacology				
<b>Co-requisites</b>	QSAR Drug design				
<b>Course Objectives</b>					

**Upon completion of this course the student should be able to:**

1. Understand the importance of drug design and different techniques of drug design.
2. Understand the chemistry of drugs with respect to their biological activity.
3. Know the metabolism, adverse effects and therapeutic value of drugs.
4. Know the importance of SAR of drugs.

**Course Outcomes (CO)****On completion of this course, the student will be able to:**

- CO 1. Understand fundamental knowledge on the structure, function and significance of Drugs.
- CO 2. discuss various mechanism of action of drugs
- CO 3. Provide knowledge of Synthesis and Metabolism of drugs.
- CO 4. Provide knowledge of Structure Activity Relationships (SAR) therapeutic uses of drugs.
- CO 5. Provide knowledge of marketed preparation.

**Programme and Course Mapping**

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO 1	PSO 2
CO1	3												3	
CO2					3									
CO3		2			3	3								1

CO4											3	3		
CO5	2											3		
1=lightly mapped                      2= moderately mapped                      3=strongly mapped														

Unit	Relevance to the local, national, regional and global developmental needs				Relevance To the Employability/ Entrepreneurship/ Skill Development			Relevance to the Professional Ethics, Gender, Human Values, Environment & Sustainability				SDG	NEP	POE/4 <sup>th</sup> IR
	Local	Regional	National	Global	Employability	Entrepreneurship	Skill Development	Professional Ethics	Gender	Human Values	Environment & Sustainability			
Unit I	-	-	-	Antibiotics are used globally	Production of anti	-	Antibiotics developed synthetically, helps	Usage of any medicine especially	Antibiotics	-	-	Ensure healthy lives	-	It helps in developing technic

				y to treat lethal infecti ons.	biot ics acro ss the glo be pro vide s a lot of emp loy men t.		in honing the technical skill and expertise in production .	y antibioti cs is based on appropri ate professi onal ehics .	cs ar e us ed fo r ev er y ty pe of ge n de r .			s for all and at all ages SD G3.		al skills that industr y require s .And thus helps in creatin g employ ment .
Unit II	-	-	-	Antibi otics and antimal arial drugs are used globall y to treat lethal infecti	Pro duct ion of anti biot ics acro ss the glo be pro	-	Antibiotic s developed synthetical ly , helps in honing the technical skill and expertise in production	Usage of any medicin e especiall y antibioti cs is based on appropri ate professi onal	A nt ib io ti cs an d an ti m al ar	-	-	Ens ure heal thy live s for all and at all ages SD G3.		It helps in develop ing technic al skills that industr y require s .And thus helps in

				ons caused by Plasmodium .	vide s a lot of employment.			ehics .	ia ls drugs are used for every type of gender					creatin g employment
Unit III	-	-	-	Antitubercular and antiviral drugs are used globally to	Production of antitubercular and	-	Antitubercular and antiviral drugs developed synthetically , helps in honing the	Usage of any medicine especially antibiotics is based on	Antitubercular	-	-	Ensure healthy lives for all and at	-	It helps in developing technical skills that industry



				treat lethal infections caused by Mycobacterium tuberculosis and AIDS virus .	anti viral drugs across the globe provide a lot of employment .		technical skill and expertise in production	appropriate professional ethics	d anti viral drugs are used for every type of gender			all ages SD G3.		requires .And thus helps in creating employment .
Unit IV	-	-	-	Anti fungal drugs are used	Production of anti	-	Anti fungal drugs developed synthetical	Usage of any medicine is based on	Antifun	-	-	Ensure healthy live	-	It helps in developing technic

				globally to treat lethal infections caused by various fungus like Candida and Trichomonas etc.	fungals across the globe provide a lot of employment		ly , helps in honing the technical skill and expertise in production	appropriate professional ethics	gald rugs are used for every type of gender			s for all and at all ages SD G3.		al skills that industry requires .And thus helps in creating employment.
Unit v	-	-	-	Concept of Drug design and Combinatorial chemistry is	Drug designing with the help of	-	Docking techniques helps in acquiring technical skill ,	Drug designing sector is complied with a huge professional ethics.	-	-		Ensure healthy lives for all and at all	-	It helps in developing technical skills that industry require

				used globally to develop new drug molecules including docking techniques.	documentation of employment.								ages SD G3.		s .And thus helps in creating employment.
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<b>BP602T</b>	<b>Pharmacology-III (Theory)</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Version 2.0</b>		<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>
<b>Total Contact Hours</b>	45 Hours				
<b>Pre-requisites/Exposure</b>	Pharmacology-II				
<b>Co-requisites</b>	HAP-II and Pathophysiology				

## Course Objectives

**Upon completion of this course the student should be able to:**

1. Get familiar with the basic biochemical aspects of human body and its relation to diseases.
2. Understand various drugs used for various ailments.
3. Understand mechanism of action adverse drug reactions.
4. Understand the basic strategies to manage the poisoning.

## Course Outcomes (CO)

**On completion of this course, the student will be able to:**

CO 1. Understand the mechanism of drug action and its relevance in the treatment of different infectious diseases

CO 2. Comprehend the principles of toxicology and treatment of various poisonings

CO 3. Appreciate correlation of pharmacology with related medical sciences

CO 4. Know the toxicity of the Drugs and their treatments.

CO 5. Know the Concepts of Chronopharmacology

## Programme and Course Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO 1	PSO 2
CO1	3												3	
CO2					3									
CO3			2		3	3								
CO4			1								3	3	2	
CO5														

1=lightly mapped

2=moderately mapped

3=strongly mapped

Unit	Relevance to the local, national, regional and global developmental needs				Relevance To the Employability/ Entrepreneurship/ Skill Development			Relevance to the Professional Ethics, Gender, Human Values, Environment & Sustainability				SDG	NEP	POE/4 <sup>th</sup> IR
	Local	Regional	National	Global	Employability	Entrepreneurship	Skill Development	Professional Ethics	Gender	Human Values	Environment & Sustainability			
Unit I	-	-	-	To focus on studies related to drugs acting on respiratory system and gastrointestinal tract plays an important role in creating awareness on mechanism and pharmacological action of drugs	-	-	Understanding basics of drug related to respiratory system and gastrointestinal tract	-	-	-	-	Ensure healthy lives and promote well-being for all at all ages SDG 3 and Skills for Decent Work SDG 4.4	Professional education( 17.1 - 17.5 )	Global education knowledge

Unit II	-	-	-	To emphasize general principles related to chemotherapy and antibiotics	-	-	The basic pharmacology of antibiotics and chemotherapy	-	-	-	-	Ensure healthy lives and promote well-being for all at all ages SDG 3	Professional education( 17.1 - 17.5 )	Global education knowledge
Unit III		-	-	To understand the studies related to drugs acting on anti-tubercular, anti-leprotic, anti-fungal, anti-viral, anthelmintics, anti-malarial and anti-amoebic agents plays an important role in creating awareness on mechanism and pharmacological action of drugs			Elaboration of basics of drug related to anti-tubercular, anti-leprotic, anti-fungal, anti-viral, anthelmintics, anti-malarial and anti-amoebic agents	-	-	-	-	Ensure healthy lives and promote well-being for all at all ages SDG 3 and Skills for Decent Work SDG 4.4	Professional education( 17.1 - 17.5 )	Global education knowledge
Unit IV	-	-	-	To emphasize Studies related to drugs acting in urinary tract infections, sexually transmitted diseases and as immunomodulators plays an important role in creating awareness on mechanism and pharmacological action of drugs			Understanding basics of drug related to urinary tract infections, sexually transmitted diseases and as immunomodulators	-	-	-	-	Ensure healthy lives and promote well-being for all at all ages SDG 3	Professional education( 17.1 - 17.5 )	Global education knowledge
Unit v	-	-	-	To gain knowledge related to general principles related to toxicology and			The basic knowledge related to	-	-	-	-	Ensure healthy lives and promote	Professional	Global education

				chronopharmacology			toxicity studies as well as chronopharmacology				well-being for all at all ages SDG 3 and Skills for Decent Work SDG 4.4	education( 17.1 - 17.5 )	knowledge
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<b>BP603T</b>	<b>Herbal Drug Technology (Theory)</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Version 2.0</b>		<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>
<b>Total Contact Hours</b>	45 Hours				
<b>Pre-requisites/Exposure</b>	Pharmacognosy & Phytochemistry – II (Theory)				
<b>Co-requisites</b>	Pharmacognosy & Phytochemistry – I (Theory)				
<b>Course Objectives</b>					
<b>Upon completion of this course the student should be able to:</b>					
<ol style="list-style-type: none"> <li>1. Know to evaluate the quality of raw material.</li> <li>2. Know the guidelines for quality of herbal drug.</li> <li>3. Know about herbal cosmetics, natural sweeteners etc.</li> <li>4. Know about modern concepts such as nutraceuticals</li> </ol>					
<b>Course Outcomes (CO)</b>					

**On completion of this course, the student will be able to:**

CO 1. Understand raw material as source of herbal drugs from cultivation to herbal drug product.

CO 2. Know the WHO and ICH guidelines for evaluation of herbal drugs.

CO 3. Know the herbal cosmetics, natural sweeteners, nutraceuticals.

CO 4. Appreciate patenting of herbal drugs, GMP.

CO 5. Know about the raw materials used in Herbal cosmetics, and the various excipients used in Herbal cosmetics and to know the significance of nutraceuticals.

**Programme and Course Mapping**

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO 1	PSO 2
CO1	3												1	
CO2					2								1	2
CO3					2	3							3	
CO4								2			3	3		
CO5	3											3		

1=lightly mapped

2= moderately mapped

3=strongly mapped



Unit	Relevance to the local, national, regional and global developmental needs				Relevance To the Employability/ Entrepreneurship/ Skill Development			Relevance to the Professional Ethics, Gender, Human Values, Environment & Sustainability				SDG	NEP	POE/4 <sup>th</sup> IR
BP6 03T	Local	Regional	National	Global	Employability	Entrepreneurship	Skill Development	Professional Ethics	Gender	Human Values	Environment & Sustainability			
Unit I				The study of "Herbs as a raw material" provides students with knowledge about the medicinal properties and applications of herbs, enabling them to contribute to the development of natural remedies. Understanding "Biodynamic agriculture" promotes sustainable farming practices, benefiting the environment and human health. Exploring the "Indian system of medicine" offers students insights into traditional healing methods, expanding their understanding of healthcare practices worldwide.			The study of "Herbs as a raw material" helps students develop skills in identifying, cultivating, and processing medicinal plants, enhancing their knowledge of herbal remedies. "Biodynamic agriculture" provides students with skills in sustainable farming practices, organic cultivation, and holistic approaches to agriculture. The study of "Indian system of medicine" equips students with knowledge of traditional healing					Revitalize the global partnership for sustainable dev	<b>Professional Education (17.1-17.5)</b> <b>Promoting</b>	Technical Skills that match Industry Needs, Entrepreneurship, Employability

			Overall, these studies equip students with diverse perspectives and skills for global health and sustainability.			methods, Ayurvedic principles, and herbal formulations, enhancing their understanding of holistic healthcare practices.					elop ment (Role of all Schools, KR MU ) (SD G 17)	<b>Hig h-qua lity rese arc h (18. 1- 18.9 )</b>	
Unit II		-	-	The study of nutraceuticals, herbs in food, and herbs-drugs can greatly benefit students globally by providing them with a comprehensive understanding of natural health and wellness. This knowledge equips students with insights into the potential therapeutic properties of certain foods and herbs, enabling them to make informed dietary choices and explore alternative approaches to healthcare. Such understanding can enhance personal well-being and support their future professional endeavors in fields related to nutrition and holistic medicine.		Studying "Nutraceuticals" and "Herbs-Food & Herbs-Drugs" can help students in skill development by enhancing their understanding of natural remedies and their effects on health. It cultivates knowledge in the fields of nutrition, pharmacology, and herbal medicine, fostering critical thinking, research skills, and the ability to assess the safety and efficacy of these products. This knowledge equips students with valuable expertise in the growing field of alternative medicine.							Global Educati on Knowle dge ,

Unit III	-	-	The study of herbal cosmetics, herbal excipients, and herbal formulations can benefit students globally by providing them with a comprehensive understanding of natural ingredients and their applications in the beauty and pharmaceutical industries. This knowledge equips students with the skills to develop and manufacture effective, safe, and sustainable herbal products, meeting the growing demand for natural alternatives worldwide.			The study of herbal cosmetics, herbal excipients, and herbal formulation helps students develop skills in natural product development, formulation design, and understanding of herbal ingredients. It enhances their knowledge of plant-based remedies, extraction techniques, and quality control. These skills enable students to excel in the field of cosmetic science, pharmaceuticals, and herbal product development, contributing to the growing demand for natural and sustainable beauty and healthcare solutions.							1.a Ensure significant mobilization of resources from a variety of sources..
Unit IV	-	-	The study of "Evaluation of Drug" helps students globally understand the process of testing and analysing the effectiveness and safety of drugs, ensuring their quality and efficacy. "Patenting and Regulatory requirements of natural products" educates students on legal aspects and protection of natural products. "Regulatory Issues" provides insight into the complex regulations governing pharmaceuticals, preparing students for careers in the global			Studying the evaluation of drugs, patenting and regulatory requirements of natural products, and regulatory issues helps students develop essential skills in the pharmaceutical and biotechnology fields. These subjects provide knowledge about the process of evaluating drug efficacy and safety, protecting intellectual property rights, and navigating regulatory frameworks. Such skills are							Ensure healthy lives and promote well-being Technology Use & Integration (23.1-23.13)

			healthcare industry.			crucial for careers in research, development, and compliance within the healthcare industry.					g for all at all ages (SD G 3) Ensure sustainable consumption and production patterns (SD G 12)		
Unit v			The study of "Schedule T - Good Manufacturing Practice of Indian systems of medicine" can help students globally by providing them with insights into the manufacturing practices and quality standards followed in the Indian systems of medicine. This knowledge can be beneficial for students pursuing			The study of "Schedule T – Good Manufacturing Practice of Indian systems of medicine" helps students in skill development by providing them with a comprehensive understanding of the manufacturing practices and quality standards specific to					Ensure sustainable consumption and	Technology Use & Integration (23.	Corporate Alliances to provide Big Sister/ Big Brother

			careers in pharmaceuticals, healthcare, or research, allowing them to understand and incorporate best practices from Indian medicine into their own work.			Indian systems of medicine. This knowledge equips them with the necessary skills to ensure the safety, efficacy, and quality of herbal medicines and traditional remedies, thereby enhancing their competence in the field.					production patterns (SDG 12)	1-23.13)	Connections
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<b>BP604T</b>	<b>Biopharmaceutics And Pharmacokinetics (Theory)</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Version 2.0</b>		<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>
<b>Total Contact Hours</b>	45 Hours				
<b>Pre-requisites/Exposure</b>	Pharmaceutics				
<b>Co-requisites</b>					
<b>Course Objectives</b>					
<b>Upon completion of this course the student should be able to:</b>					
1. Understand the basic concepts in Biopharmaceutics and Pharmacokinetics and their significance.					
2. Understand the use of plasma drug concentration-time data to calculate the pharmacokinetic parameters to describe the kinetics of drug absorption, distribution, metabolism, excretion, elimination.					
3. Understand the concepts of bioavailability and bioequivalence of drug products and their significance.					
<b>Course Outcomes (CO)</b>					

**On completion of this course, the student will be able to:**

**CO 1.** Understand the basic concepts in Biopharmaceutics and Pharmacokinetics and their significance.

**CO 2.** Understand the Use of plasma drug concentration-time data to calculate the pharmacokinetic parameters to describe the kinetics of drug absorption, distribution, metabolism, excretion, elimination.

**CO 3.** Understand the concepts of bioavailability and bioequivalence of drug products and their significance.

**CO 4.** Understand various pharmacokinetic parameters, their significance & applications

**Programme and Course Mapping**

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO 1	PSO 2
CO1	3												3	
CO2					3									2
CO3					3	3								
CO4	3											3		

1=lightly mapped                      2= moderately mapped                      3=strongly mapped

Unit	Relevance to the local, national, regional and global developmental needs	Relevance To the Employability/ Entrepreneurship/ Skill Development	Relevance to the Professional Ethics, Gender, Human Values, Environment & Sustainability	SDG	NEP	POE/4 <sup>th</sup> IR
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	Local	Regional	National	Global	Employability	Entrepreneurship	Skill Development	Professional Ethics	Gender	Human Values	Environment & Sustainability			
Unit I				Global Health care Needs. It will give the absorption of all the oral dosage forms, in order to make the better formulations	It will bring employability opportunities in the CROs	-	-	-	-	-	-	Ensure healthy lives and promote well-being for all at all ages (SDG 3)	Professional Education (17.1-17.5)	Technical Skills that match Industry Needs

				produc ts.										
Unit II		-	-	Global Health care Needs. It will give the distrib ution of all the oral dosage forms, in order to make the better formul ations produc ts.	It will brin g emp loya bilit y opp ortu niti es in the CR Os	-	-	-	-	-	-	Ens ure heal thy live s and pro mot e well - bein g for all at all ages (SD G 3)	Prof essi onal Edu cati on (17. 1- 17.5 )	Techni cal Skills that match Industr y Needs
Unit III		-	-	Global Health care Needs. It will give the	It will brin g emp loya bilit	-	-	-	-	-	-	Ens ure heal thy live s and	Prof essi onal Edu cati on (17.	Techni cal Skills that match Industr y



				elimination of all the oral dosage forms, in order to make the better formulations products.	opportunities in the CROs								promote well-being for all at all ages (SDG 3)	1-17.5)	Needs
Unit IV		-	-	Global Health care Needs. It will give the pharmacokinetics of all the oral dosage forms, in order to make the	It will bring employability opportunities in the CROs	-	-	-	-	-	-	-	Ensure healthy lives and promote well-being for all at all ages	Professional Education (17.1-17.5)	Technical Skills that match Industry Needs

				better formulations products.								(SD G 3)		
Unit v				Global Health care Needs. It will give the non-linear pharmacokinetics of all the oral dosage forms, in order to make the better formulations products.	It will bring employment opportunities in the CROs	-	-	-	-	-	-	Ensure healthy lives and promote well-being for all at all ages (SD G 3)	Professional Education (17.1-17.5)	Technical Skills that match Industry Needs

<b>BP605T</b>	<b>Pharmaceutical Biotechnology (Theory)</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Version 2.0</b>		<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>
<b>Total Contact Hours</b>	45 Hours				
<b>Pre-requisites/Exposure</b>	Pharmaceutical Microbiology				
<b>Co-requisites</b>	Pharmaceutics				
<b>Course Objectives</b>					
<p><b>Upon completion of this course the student should be able to:</b></p> <ol style="list-style-type: none"> <li>1. Understand the importance of Immobilized enzymes in Pharmaceutical Industries</li> <li>2. Genetic engineering applications in relation to production of pharmaceuticals</li> <li>3. Importance of Monoclonal antibodies in Industries</li> <li>4. Appreciate the use of microorganisms in fermentation technology.</li> </ol>					
<b>Course Outcomes (CO)</b>					
<p><b>On completion of this course, the student will be able to:</b></p> <p>CO1. Understanding the importance of Immobilized enzymes in Pharmaceutical Industries</p> <p>CO2. Applications of genetic engineering and protein engineering in relation to production of pharmaceuticals.</p> <p>CO3. Importance of Monoclonal antibodies in Industries.</p> <p>CO4. Appreciate the use of microorganisms in fermentation technology.</p>					

CO5. To know the about immunity and various immunoblotting techniques.

**Programme and Course Mapping**

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO 1	PSO 2
CO1	3												3	
CO2					3									
CO3					3	3								
CO4	3											3		
CO5											3	3		

1=lightly mapped

2= moderately mapped

3=strongly mapped

Unit	Relevance to the local, national, regional and global developmental needs	Relevance To the Employability/ Entrepreneurship/ Skill Development	Relevance to the Professional Ethics, Gender, Human Values, Environment & Sustainability	SDG	NEP	POE/4 <sup>th</sup> IR

	Local	Regional	National	Global	Employability	Entrepreneurship	Skill Development	Professional Ethics	Gender	Human Values	Environment & Sustainability			
Unit I	--	--	--	The relevance of immobilized enzymes and genetic engineering in pharmaceutical industries extends globally. Immobilized enzymes offer cost-effective and efficient solutions for pharmaceutical production, benefiting industries worldwide. Genetic engineering enables the development of advanced pharmaceutical products, personalized medicine, and innovative treatments, contributing to global healthcare advancements and addressing diverse patient needs on a global	--	--	Develop a range of skills, including scientific and technical skills, critical thinking, laboratory techniques, and knowledge in areas such as immunology, biotechnology, and clinical practices.	--	--	--	--	"Ensure healthy lives and promote well-being for all at all ages (SDG 3)"	Towards a More Holistic and Multidisciplinary Education (11.1- 11.13)	Technical Skills that match Industry Needs

				scale.										
Unit II	--	--	--	Globally genetic engineering has revolutionized the understanding and treatment of diseases, paving the way for personalized medicine, targeted therapies, and advancements in healthcare outcomes.	--	--	Recombinant DNA technology, and applications in medicine can develop skills in molecular biology techniques, genetic engineering, experimental design, and data analysis, which are valuable in various research, medical, and biotechnology fields.	--	--	--	--	"Ensure healthy lives and promote well-being for all at all ages (SDG 3)"	Towards a More Holistic and Multidisciplinary Education (11.1- 11.13)	Technical Skills that match Industry Needs
Unit III	--	--	--	Have various applications in research, diagnosis, and therapeutic interventions. Appropriate use of vaccines, toxoids, anti-toxins, blood products and plasma substitutes are crucial in healthcare systems worldwide to support patient care and improve outcomes in critical situations.	--	--	Interdisciplinary thinking, analytical techniques, experimental design, problem-solving, and knowledge of molecular biology and industrial biotechnology. These skills are valuable in research, development, and production roles in the pharmaceutical and biotechnology industries.	--	--	--	--	"Ensure healthy lives and promote well-being for all at all ages (SDG 3)"	Towards a More Holistic and Multidisciplinary Education (11.1- 11.13)	Technical Skills that match Industry Needs

Unit IV	--	--	--	It provides insights into gene regulation, evolutionary processes, biotechnological applications, and the development of diagnostic tools, contributing to advancements in research and disease diagnosis.	--	--	Develop a range of skills, including laboratory techniques, molecular biology, problem-solving, research design, and biotechnological applications, which are valuable in academic, research, and industry settings	--	--	--	--	"Ensure healthy lives and promote well-being for all at all ages (SDG 3)"	Towards a More Holistic and Multidisciplinary Education (11.1- 11.13)	Technical Skills that match Industry Needs
Unit v	--	--	--	Efficient and safe production of pharmaceuticals, optimizing fermentation processes, understanding the production of specific compounds, and maintaining the quality and availability of blood products for clinical use.	--	--	Technical proficiency, laboratory techniques, process optimization, quality assurance, problem-solving, attention to detail, research, and data analysis, which are valuable in pharmaceutical and biotechnology industries, research institutions, and regulatory bodies	--	--	--	--	"Ensure healthy lives and promote well-being for all at all ages (SDG 3)"	Towards a More Holistic and Multidisciplinary Education (11.1- 11.13)	Technical Skills that match Industry Needs

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BP606T	Pharmaceutical Quality Assurance (Theory)	L	T	P	C
Version 2.0		3	1	0	4
Total Contact Hours	45 Hours				
Pre-requisites/Exposure	Industrial Pharmacy - I				
Co-requisites	Pharmaceutics				
<b>Course Objectives</b>					
<p><b>Upon completion of this course the student should be able to:</b></p> <ol style="list-style-type: none"> <li>1. Understand the cGMP aspects in a pharmaceutical industry</li> <li>2. Appreciate the importance of documentation</li> <li>3. Understand the scope of quality certifications applicable to pharmaceutical</li> <li>4. Understand the responsibilities of QA □ □ Industries &amp; QC departments</li> </ol>					
<b>Course Outcomes (CO)</b>					
<p><b>On completion of this course, the student will be able to:</b></p> <p>CO 1. Understand the concept of Quality Control and Quality Assurance.</p> <p>CO 2. Appreciate the importance of documentation</p> <p>CO 3. Understand the scope of quality certifications applicable to pharmaceutical industries</p> <p>CO 4. Understand the responsibilities of QA &amp; QC departments</p> <p>CO 5. Understand the concept of validation and warehousing practices.</p>					
<b>Programme and Course Mapping</b>					



CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO 1	PSO 2
CO1	3	3											3	
CO2		3			3									3
CO3					3	3								
CO4	3							3				3		
CO5											3	3		
1=lightly mapped                      2= moderately mapped                      3=strongly mapped														

<b>Unit</b>	<b>Relevance to the local, national, regional and global developmental needs</b>	<b>Relevance To the Employability/ Entrepreneurship/ Skill Development</b>	<b>Relevance to the Professional Ethics, Gender, Human Values, Environment &amp; Sustainability</b>	<b>SDG</b>	<b>NEP</b>	<b>POE/4<sup>th</sup> IR</b>
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	Local	Regional	National	Global	Employability	Entrepreneurship	Skill Development	Professional Ethics	Gender	Human Values	Environment & Sustainability			
Unit I	-	-	-	Quality assurance and quality management concepts, along with Total Quality Management (TQM) principles, contribute globally by ensuring the consistent production of high-quality pharmaceutical products, improving patient safety, and meeting regulatory requirements. Adherence to ICH guidelines harmonizes global standards, facilitating international collaboration and ensuring the safety, efficacy, and quality of pharmaceuticals worldwide.	Professionals with expertise in ensuring compliance, quality control, and continuous improvement of pharmaceutical processes are in high demand in the pharmaceutical industry, enhancing employability and contributing to the success of pharmaceutical companies and their products. These professionals	-	-	Quality assurance and quality management concepts, Total Quality Management (TQM) principles, and adherence to ICH guidelines contribute to professional ethics by promoting a culture of transparenc	-	-	-	Skills for Decent Work (SDG 4.4)	Promoting High-quality research (18.1-18.9)	Technical Skills that match Industry Needs

					should also be familiar with ICH guidelines and Total Quality Management (TQM) principles.			y, accountability, and integrity in the pharmaceutical industry. They ensure the ethical production, testing, and distribution of pharmaceutical products, safeguarding patient safety and trust in the global healthcare system.						
Unit II	-	-	-	Efficient organization and personnel management contribute globally by fostering productivity, collaboration, and employee engagement across international teams, leading to streamlined operations, effective project execution, and a positive work culture, ultimately driving global business success and economic growth.	By fostering a structured and productive work environment, encouraging teamwork, skill development, and employee happiness, effective	-	-	Effective organization and personnel management contribute to professional ethics by establishing	-	-	-	Skills for Decent Work (SDG 4.4)	Promoting High-quality research (18.	Technical Skills that match Industry Needs

				organisation and personnel management contribute to employability and lead to improved productivity, professional progress, and job retention rates.			clear policies, promoting fair treatment, and fostering a culture of integrity, thereby ensuring ethical conduct, respect for diversity, and accountability in the workplace, enhancing trust and upholding ethical standards globally.					1-18.9)		
Unit III		-	-	Quality assurance and adherence to Good Laboratory Practices (GLP) contribute globally by ensuring reliable and accurate scientific data, promoting reproducibility and credibility in research, development, and regulatory assessments. This supports global harmonization, facilitates knowledge exchange, and enhances public trust in scientific	By giving professionals practical experience with analytical methods, data interpretation, and quality assurance principles, quality control and	-	-	Quality control and adherence to Good Laboratory Practices (GLP) contribute to professiona	-	-	-	Skills for Decent Work (SDG 4.4)	Promoting High-quality research (18.	Technical Skills that match Industry Needs

				findings, driving advancements in various fields and improving global scientific standards.	adherence to Good Laboratory Practises (GLP) contribute to skill development. These abilities promote competence and professional progression in the disciplines of laboratory science and quality management and are crucial for accurate testing, regulatory compliance, and maintaining product safety.			l ethics by promoting accuracy, reliability, and integrity in scientific testing and data reporting. They ensure compliance with ethical standards, prevent fraud and misconduct, and uphold the credibility and trustworthiness of research and laboratory practices globally.					1-18.9)	
Unit IV	-	-	-	Effective management of complaints and proper document maintenance in the pharmaceutical industry contributes globally by ensuring transparency, accountability, and continuous improvement in product	Professionals skilled in managing complaints and document maintenance in the	-	-	Proper management of complaints and thorough	-	-	-	Skills for Decent Work	Promoting High-quality	Technical Skills that match Industr

			<p>quality, safety, and regulatory compliance. It fosters customer satisfaction, regulatory compliance, and knowledge sharing, thereby enhancing global public health and trust in pharmaceutical products.</p>	<p>pharmaceutical industry are sought after as they contribute to effective customer relationship management, regulatory compliance, and process improvement, enhancing employability and career opportunities in quality assurance, regulatory affairs, and customer service roles.</p>			<p>document maintenance in the pharmaceutical industry contribute to professional ethics by ensuring transparency, accountability, and adherence to regulatory standards, promoting integrity, and trust in dealing with customer concerns and maintaining accurate records of product information and processes.-</p>				<p>k (SD G 4.4)</p>	<p>ity research (18.1-18.9)</p>	<p>y Needs</p>
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Unit v	-	-	-	Calibration and validation processes contribute globally by ensuring accurate and reliable measurement and testing results, which are crucial for maintaining quality standards, regulatory compliance, and global harmonization in various industries, including pharmaceuticals, manufacturing, and scientific research.	Professionals skilled in calibration and validation techniques are highly sought after in industries that require accurate measurements and reliable data, enhancing their employability and career prospects in quality control, laboratory management, and regulatory compliance roles.	-	-	Calibration and validation contribute to professional ethics by ensuring the integrity and accuracy of measurement and testing processes, promoting transparency, accountability, and adherence to regulatory standards, thereby upholding ethical standards and maintaining trust in scientific research and data analysis.	-	-	-	Skills for Decent Work (SDG 4.4)	Promoting High-quality research (18.1-18.9)	Technical Skills that match Industry Needs
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<b>BP607P</b>	<b>Medicinal Chemistry-III (Practical)</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Version 2.0</b>		<b>0</b>	<b>0</b>	<b>4</b>	<b>2</b>
<b>Total Contact Hours</b>	60 Hours				
<b>Pre-requisites/Exposure</b>	Medicinal Chemistry-III (Practical)				
<b>Co-requisites</b>	Medicinal Chemistry				
<b>Course Objectives</b>					
<p><b>Upon completion of this course the student should be able to:</b></p> <ol style="list-style-type: none"> <li>1. Understand the importance of drug design and different techniques of drug design.</li> <li>2. Understand the chemistry of drugs with respect to their biological activity.</li> <li>3. Know the metabolism, adverse effects and therapeutic value of drugs.</li> <li>4. Know the importance of SAR of drugs.</li> </ol>					
<b>Course Outcomes (CO)</b>					
<p><b>On completion of this course, the student will be able to:</b></p> <p>CO 1. Understand fundamental knowledge on the structure, function and significance of Drugs.</p>					



CO 2. Discuss various mechanism of action of drugs

CO 3. Provide knowledge of Synthesis and Metabolism of drugs.

CO 4. Provide knowledge of Structure Activity Relationships (SAR) therapeutic uses of drugs.

CO 5. Provide knowledge of marketed preparation.

**Programme and Course Mapping**

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO 1	PSO 2
CO1	3												3	
CO2					3									
CO3					3	3								
CO4											3	3		
CO5												3		1
1=lightly mapped                      2= moderately mapped                      3=strongly mapped														

Unit	Relevance to the local, national, regional and global developmental needs	Relevance To the Employability/ Entrepreneurship/ Skill Development	Relevance to the Professional Ethics, Gender, Human Values, Environment & Sustainability	SDG	NEP	POE/4 <sup>th</sup> IR
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	Local	Regional	National	Global	Employability	Entrepreneurship	Skill Development	Professional Ethics	Gender	Human Values	Environment & Sustainability			
Unit I				The aim of synthesizing medicinally important compounds is to advance drug discovery, development, and healthcare by identifying new therapeutic agents, optimizing drug properties, elucidating structure-activity relationships, and addressing unmet medical needs.	Employability in Research labs	Entrepreneurship in area of drug development and research	Hands on training of different techniques, so that students can learn the different synthetic techniques				Learning of chemical hazardous and handling help in environmental sustainability	Revitalize the global partnership for sustainable development (Role of all Schools, KRMU) (SDG 17)	Promoting High-quality research (18.1-18.9)	Skill Development
Unit II		-	-	Hands on training of Analytical techniques	Employability in Research labs	Entrepreneurship in area	Hands on training of Analytical techniques					-	- Promoting High-quality research (18.1-18.9)	Skill Development

						of drug development and research								
Unit III		-	-	Hands on training of Synthetic techniques	Employability in Research labs	Entrepreneurship in area of drug development and research	Hands on training of different techniques, s that students can learn the advanced synthetic techniques					Skills for Decent Work (SDG 4.4)	Effective Governance & Leadership (19.1- 19.5)	Skill Development
Unit IV		-	-	In silico drug designing Skill development	Employability in Research labs	Entrepreneurship in area of drug development and research	Hands on training of different <i>in silico</i> techniques					-	-	Skill Development

					ch								
Unit v				Designing of In silico studies helps the students to get the training on lead optimization development	Employability in Research labs	Entrepreneurship in area of drug development and research	Hands on training of different <i>in silico</i> techniques				Revitalize the global partnership for sustainable development (Role of all Schools, KRMU) (SDG 17)	Transforming the Regulatory System (20.1-20.15)	Skill Development

<b>BP608P</b>	<b>Pharmacology-III (Practical)</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Version 2.0</b>		<b>0</b>	<b>0</b>	<b>4</b>	<b>2</b>
<b>Total Contact Hours</b>	60 Hours				
<b>Pre-requisites/Exposure</b>	Pharmacology-II (Practical)				
<b>Co-requisites</b>	HAP-II and Pathophysiology				
<b>Course Objectives</b>					
<b>Upon completion of this course the student should be able to:</b>					
1. Get familiar with the pre-clinical studies in animals					

2. Know the animal handling techniques, methods of drugs administration.
3. Understand Dose calculation and administration of drug through IM,IV routes
4. Able to learn and understand CCSEA guidelines
5. Know about the various disease models in order to discover a new drug

**Course Outcomes (CO)**

**On completion of this course, the student will be able to:**

CO 1. Understanding pharmacology experiments demonstration by simulated experiments / videos.

CO 2. Understand knowledge of dose calculation and acute oral toxicity in pharmacology experiments

CO 3. Study various effects of drugs like anti-ulcer, GIT mobility and anti-allergic activity using various assay based on video recordings

CO 4. Know the biostatistics methods in experimental pharmacology like ANOVA, Chi square test, Wilcoxon Signed Rank test)

**Programme and Course Mapping**

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO 1	PSO 2
CO1	3												3	
CO2		3												2
CO3						3								
CO4												3		

1=lightly mapped

2= moderately mapped

3=strongly mapped

Unit	Relevance to the local, national, regional and global developmental needs				Relevance To the Employability/ Entrepreneurship/ Skill Development			Relevance to the Professional Ethics, Gender, Human Values, Environment & Sustainability				SDG	NEP	POE/4 <sup>th</sup> IR
	Local	Regional	National	Global	Employability	Entrepreneurship	Skill Development	Professional Ethics	Gender	Human Values	Environment & Sustainability			
Unit I	-	-	-	In gaining basic knowledge related to dose calculation, antiallergic activity by mast cell stabilization assay and anti-ulcer activity of a drug using pylorus ligand (SHAY) rat model and NSAIDS induced ulcer model which enhances basic mechanism of drugs	-	-	Understanding basics of dose calculation, antiallergic activity, anti-ulcer activity of a drug and NSAIDS	-	-	-	-	Skills for Decent Work SDG 4.4	Professional education( 17.1 - 17.5 )	Global education knowledge

Unit II	-	-	-	To understand the effect of drugs on gastrointestinal motility, agonist and antagonists on guinea pig ileum and estimation of serum biochemical parameters by using semi-autoanalyser which helps in basic understanding of experimental pharmacology	-	-	The basic knowledge related to drugs on gastrointestinal motility, agonist and antagonist as well as biochemical parameters	-	-	-	-	Skills for Decent Work SDG 4.4	Professional education( 17.1 - 17.5 )	Global education knowledge
Unit III		-	-	Emphasize on studies related to saline purgative on frog intestine, Insulin hypoglycemic effect in rabbit as well as test for pyrogens which enhances basic pharmacological knowledge			Gaining basics of purgative on frog intestine, insulin hypoglycemic effect and pyrogens	-	-	-	-	Skills for Decent Work SDG 4.4	Professional education( 17.1 - 17.5 )	Global education knowledge
Unit IV	-	-	-	To focus on studies related to determination of acute oral toxicity (LD50) of a drug and acute skin irritation / corrosion and acute eye irritation / corrosion of a test substance which help in understanding toxicity studies			Understanding basics of toxicity studies related to acute oral toxicity acute skin irritation and acute eye irritation	-	-	-	-	Skills for Decent Work SDG 4.4	Professional education( 17.1 - 17.5 )	Global education knowledge
Unit v	-	-	-	To elaborate the calculation of pharmacokinetic parameters from a given			The basic knowledge related pharmacokinetic	-	-	-	-	Skills for Decent Work SDG 4.4	Professional education	Global education knowledge

				data and biostatistics methods in experimental pharmacology which helps in understanding basis calculation			s							cati on( 17.1 - 17.5 )	dge
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<b>BP609P</b>	<b>Herbal Drug Technology (Practical)</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Version 2.0</b>		<b>0</b>	<b>0</b>	<b>4</b>	<b>2</b>
<b>Total Contact Hours</b>	60 Hours				
<b>Pre-requisites/Exposure</b>	Pharmacognosy & Phytochemistry – II (Practical)				
<b>Co-requisites</b>	Pharmacognosy & Phytochemistry – I (Practical)				
<b>Course Objectives</b>					
<b>Upon completion of this course the student should be able to:</b>					
<ol style="list-style-type: none"> <li>1. Know to evaluate the quality of raw material.</li> <li>2. Know the guidelines for quality of herbal drug.</li> <li>3. Know about herbal cosmetics, natural sweeteners etc.</li> <li>4. Know about modern concepts such as nutraceuticals</li> </ol>					
<b>Course Outcomes (CO)</b>					
<b>On completion of this course, the student will be able to:</b>					



CO 1. Gain Practical knowledge of Preliminary phytochemical screening of crude drugs.

CO 2. Carry out Preparation and standardization of Herbal extracts in cosmetic formulation.

CO 3. Understand & study the monograph of various Herbal drugs.

CO 4. Determine the content of components like Aldehyde and alcohol

CO 5. Prepare Ayurvedic formulations

**Programme and Course Mapping**

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO 1	PSO 2
CO1	3												3	
CO2						3								2
CO3									3					
CO4	3													
CO5	3													

1=lightly mapped

2= moderately mapped

3=strongly mapped

Unit	Relevance to the local, national, regional and global developmental needs				Relevance To the Employability/ Entrepreneurship/ Skill Development			Relevance to the Professional Ethics, Gender, Human Values, Environment & Sustainability			SDG	NEP	POE/4 <sup>th</sup> IR	
	Local	Regional	National	Global	Employability	Entrepreneurship	Skill Development	Professional Ethics	Gender	Human Values	Environment & Sustainability			
Unit I				The study of preliminary phytochemical screening of crude drugs helps students globally by providing a foundation for understanding the chemical composition of medicinal plants. This knowledge enables students to identify and isolate bioactive compounds, leading to the development of new drugs and treatments. It contributes to the field of natural medicine, supporting			The study of preliminary phytochemical screening of crude drugs helps students in skill development by enhancing their knowledge and understanding of plant-based compounds. It enables them to learn techniques for identifying and analyzing chemical constituents, fostering critical thinking, and developing laboratory skills necessary for pharmaceutical research and drug discovery.					Revitalize the global partnership for sustainable dev	<b>Professional Education (17.1-17.5)</b> <b>Promoting</b>	Technical Skills that match Industry Needs, Entrepreneurship, Employability

			global efforts to discover novel therapeutic options and promote sustainable healthcare practices.								elop men t (Rol e of all Sch ools , KR MU ) (SD G 17)	<b>Hig hj- qua lity rese arc h (18. 1- 18.9 )</b>	
Unit II		-	-	The study of "Evaluation of excipients of natural origin" benefits students globally by providing them with knowledge and understanding of natural excipients, which are substances used in pharmaceutical formulations. This knowledge allows students to develop safer and more effective drug formulations, promoting sustainable and eco-friendly practices in the pharmaceutical industry. Understanding natural excipients also enables students to explore new possibilities for drug delivery		The study of "Evaluation of excipients of natural origin" helps students in skill development by enhancing their understanding of natural excipients used in pharmaceutical formulations. It allows students to develop critical thinking, analytical skills, and knowledge of quality assessment methods. This knowledge equips them to evaluate, select, and formulate safer and more effective pharmaceutical products, contributing to their overall skill development in the field.							<b>Global Educat ion Knowl edge</b> ,

				and develop innovative pharmaceutical products.									
Unit III		-	-	The study of "Monograph analysis of herbal drugs" helps students globally by providing a comprehensive understanding of the medicinal properties, chemical composition, quality control, and therapeutic applications of herbal medicines. This knowledge equips students with the necessary skills to evaluate, formulate, and recommend herbal remedies, contributing to the advancement of traditional medicine and expanding healthcare options for diverse populations worldwide.			The study of "Monograph analysis of herbal drugs" helps students in skill development by enhancing their knowledge of medicinal plants, their properties, and potential uses. It fosters skills in research, critical thinking, and data analysis, while also promoting an understanding of drug formulation and quality control. This knowledge equips students with valuable expertise in the field of herbal medicine and supports their professional growth.						1.a Ensure significant mobilization of resources from a variety of sources ...
Unit IV		-	-	The study of prepared and standardized extracts helps students globally by providing a consistent and reliable basis for learning. These extracts ensure that students have access to			The study of prepared and standardized extracts helps students in skill development by providing them with consistent and reliable samples for analysis and experimentation. This enables them to understand the					Ensure healthylives and	Technology Use & Integration

			<p>accurate and uniform information, facilitating easier comprehension and comparability of results across different educational institutions. Additionally, standardized extracts promote transparency and reproducibility, fostering a shared understanding and enhancing collaboration among students worldwide.</p>		<p>principles and techniques involved in extracting and standardizing substances, enhancing their scientific knowledge and laboratory skills in a controlled and reproducible manner.</p>				<p>promote well-being for all at all ages (SD G 3)</p> <p><b>Ensure sustainable consumption and production patterns (SD G 12)</b></p>	<p><b>ion (23.1-23.13)</b></p>
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Unit v			<p>The study of prepared and standardized extract in cosmetic formulations helps students globally by providing them with a comprehensive understanding of the principles and techniques involved in formulating cosmetics. It equips them with knowledge of selecting and preparing standardized extracts for cosmetic products, ensuring quality, safety, and efficacy. This knowledge enables students to develop innovative and effective cosmetic formulations, contributing to the advancement of the global cosmetics industry.</p>		<p>Studying prepared and standardized extracts in cosmetic formulations helps in skill development by enhancing knowledge of ingredient selection, formulation techniques, and quality control processes. It cultivates expertise in developing effective and safe cosmetic products, optimizing product stability and efficacy, and meeting regulatory requirements. This knowledge contributes to the development of advanced formulation skills, ensuring high-quality and standardized cosmetic preparations.</p>					<p><b>Ensure sustainable consumption and production patterns (SDG 12)</b></p>	<p>Technology Use &amp; Integration (23.1-23.13)</p>	<p><b>Corporate Alliances to provide Big Sister/Big Brother Connections</b></p>
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## Semester-VII

<b>BP 701 T</b>	<b>Instrumental Methods of Analysis (Theory)</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Version 2.0</b>		<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>
<b>Total Contact Hours</b>	45 Hours				
<b>Pre-requisites/Exposure</b>	Analytical Chemistry				

<b>Co-requisites</b>														
<b>Course Objectives</b>														
<b>Upon completion of this course the student should be able to:</b>														
1. Understand the interaction of matter with electromagnetic radiations and its applications in drug analysis														
2. Understand the chromatographic separation and analysis of drugs.														
3. Perform quantitative & qualitative analysis of drugs using various analytical instruments.														
<b>Course Outcomes (CO)</b>														
<b>On completion of this course, the student will be able to:</b>														
CO1. This subject deals with the application of instrumental methods in qualitative analysis of drugs.														
CO2. This subject deals with the application of instrumental methods in quantitative analysis of drugs.														
CO3. This subject is designed to impart a fundamental knowledge on the principles and instrumentation of spectroscopic techniques.														
CO4. This subject is designed to impart a fundamental knowledge on the principles and instrumentation of chromatographic techniques.														
CO5. This also emphasizes on theoretical knowledge on modern analytical instruments that are used for drug testing.														
<b>Programme and Course Mapping</b>														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO 1	PSO 2
CO1	3	-	2	-	3	3	-	1	-	-	3	2	3	2
CO2	3	-	2	-	3	3	-	1	-	-	3	2	3	2
CO3	3	-	2	-	3	3	-	1	-	-	3	2	3	2
CO4	3	-	2	-	3	3	-	1	-	-	3	2	3	2
CO5	3	-	2	-	3	3	-	1	-	-	3	2	3	2
1=lightly mapped                      2= moderately mapped                      3=strongly mapped														

Unit	Relevance to the local, national, regional and global developmental needs				Relevance To the Employability/ Entrepreneurship/ Skill Development			Relevance to the Professional Ethics, Gender, Human Values, Environment & Sustainability				SDG	NEP	POE/4 <sup>th</sup> IR
	Local	Regional	National	Global	Employability	Entrepreneurship	Skill Development	Professional Ethics	Gender	Human Values	Environment & Sustainability			
<b>Unit I</b>	-	-	Characterization of Drugs help in drug discovery	-	-	-	With the aid of the UV-visible spectroscopy technique, scientists may easily ascertain the substance	-	-	-	-	Skills for Decent Work; Research-related skills (case study, seminars and hands on training) (SDG 4.4)	Professional Education (17.1-17.5); Promoting High-quality research (18.1-18.9)	Technical Skills that match Industry Needs/ Hands-on Experience



							e concentrations, examine reaction rates, and derive rate equations for reactions, which can then be used to suggest a mechanism.							
Unit II	-	-	-	Learning of Techniques help to discover drugs	-	-	To understand the crucial function that infrared spectroscopy plays in the investigation of the structure of	-	-	-	-	Skills for Decent Work; Research-related skills (case study, seminars and hands-on training) (SDG 4.4)	Professional Education (17.1-17.5); Promoting High-quality research (18.1-18.9)	Technical Skills that match Industry Needs/ Hands-on Experience

							organic molecules To improve one's ability to identify distinctive absorption bands To determine a substance's composition by analyzing its infrared spectrum							
Unit III	-	-	Boost the diagnosis, prognosis and treatment of medical condition	-	-	-	Chromatography allows for the purification, separation, and identification of a mixture's constituent	-	-	-	-	Skills for Decent Work; Research-related skills (case study, seminars and hands on training) (SDG 4.4)	Professional Education (17.1-17.5); Promoting High-quality research	Technical Skills that match Industry Needs/ Hands-on Experience

							nt parts for qualitative and quantitative examination.						(18.1-18.9)	
Unit IV	-	-	-	Help in drug designing	-	-	HPLC and GLC allows the components of a mixture to be separated, identified, and purified for qualitative and quantitative examination.	-	-	-	-	Skills for Decent Work; Research-related skills (case study, seminars and hands on training) (SDG 4.4)	Professional Education (17.1-17.5); Promoting High-quality research (18.1-18.9)	Technical Skills that match Industry Needs; Skill Development
Unit v	-	-	-	Ionizable compounds are separated using	-	-	Learning of analytical technique make the	-	-	-	-	Skills for Decent Work; Research-related skills (case study,	Professional Education (17.1-17.5); Promot	Technical Skills that match Industry

				ion exchange chromatography according to their overall charge.			learner industry ready					seminars and hands on training) (SDG 4.4)	ing High-quality research (18.1-18.9)	Needs/ Hands-on Experience
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<b>BP 702 T</b>	<b>Industrial Pharmacy-II (Theory)</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Version 2.0</b>		<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>
<b>Total Contact Hours</b>	45 Hours				
<b>Pre-requisites/Exposure</b>	Pharmaceutics				
<b>Co-requisites</b>					
<b>Course Objectives</b>					
<b>Upon completion of this course the student should be able to:</b>					
1. Know the process of pilot plant and scale up of pharmaceutical dosage forms					
2. Understand the process of technology transfer from lab scale to commercial batch					
3. Know different Laws and Acts that regulate pharmaceutical industry					
4. Understand the approval process and regulatory requirements for drug					
<b>Course Outcomes (CO)</b>					
<b>On completion of this course, the student will be able to:</b>					
CO1: This course is designed to impart fundamental knowledge on pharmaceutical product development.					
CO2: This course is designed to impart knowledge on final product translation from laboratory to market.					

CO3: This subject gives understanding and idea of various technologies applied to development of dosage forms from small scale to large scale.

CO4: This subject gives understanding and idea of Indian Regulatory Requirements.

CO5: This course imparts knowledge to quality management of pharmaceutical products.

**Programme and Course Mapping**

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO 1	PSO 2
CO1	3	-	3	-	3	3	-	1	1	-	3	2	3	2
CO2	3	-	3	-	3	3	-	1	1	-	3	2	3	2
CO3	3	-	3	-	3	3	-	1	1	-	3	2	3	2
CO4	3	-	3	-	3	3	-	1	1	-	3	2	3	2
CO5	3	-	3	-	3	3	-	1	1	-	3	2	3	2
1=lightly mapped                      2= moderately mapped                      3=strongly mapped														

Unit	Relevance to the local, national, regional and global developmental needs	Relevance To the Employability/ Entrepreneurship/ Skill Development	Relevance to the Professional Ethics, Gender, Human Values, Environment & Sustainability	SDG	NEP	POE/4 <sup>th</sup> IR
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BP702T	Local	Regional	National	Global	Employability	Entrepreneurship	Skill Development	Professional Ethics	Gender	Human Values	Environment & Sustainability			
Unit I	-	-	-	Aiming to understand the process of pilot plant and scale up of pharmaceutical dosage for By providing valuable data studies contribute globally to the development of safe and effective pharmaceutical products. Understand the process of technology transfer from lab scale to commercial batch.	Enhancing knowledge and expertise in the characterization and analysis of drug substances, formulation development, and optimization techniques.			-	-	-	-	(SD G 3)	(18.1-18.9)	Global Education Knowledge
Unit II		-	-	Technology transfer (TT) process of conveying results stemming from scientific and	Technology transfer is important to ensure that the company's			-	-	N O		(SD G 17)	(18.1-18.9)	<b>Dedicated Career Management</b>

				technological research to the market place and to wider society, along with associated skills and procedures, and is as such an intrinsic part of the technological innovation process.	innovation becomes commercialized. This helps early-stage intellectual property to become tools for research. It can also be used as a base for new products and services for public use.										<b>Centres</b>
Unit III	-	-	-	Globally Understand the approval process and regulatory requirements for drug The competent authority review the application and approve the drug for marketing only if the drug is found to be safe and effective in human being or the drug have more desirable effect as compare to the adverse effect.	Drug companies seeking to sell a drug in the United States must first test it. The company then sends CDER the evidence from these tests to prove the drug is safe and effective for its intended use. A team of CDER physicians, statisticians, chemists, pharmacologists, and other scientists reviews the	.		-	-	N o	-	(SD G 17)	(18. 1- 18.9 )		<b>Dedicated Career Management Centres</b>

					company's data and proposed labeling. If this independent and unbiased review establishes that a drug's health benefits outweigh its known risks, the drug is approved for sale.									
Unit IV				Pharmaceutical Quality Management System (QMS) is a comprehensive collection of policies, processes, and procedures designed to ensure and maintain uniform and high quality in the production of pharmaceutical products.	A QMS supports business leadership, promotes customer focus, improves company culture and the bottom line, manages new innovations, and helps you understand any issues.	-	-	-	-	No	-	(SD G 17)	(18.1-18.9)	<b>Dedicated Career Management Centres</b>
Unit v	-	-	-	Pharmaceutical regulations, or medicines regulations, have been defined as the combination of legal, administrative, and technical measures that governments take to ensure the safety,	Regulatory affairs is a profession within regulated industries such as pharmaceuticals, biopharmaceuticals, medical devices,	-	-	-	-	No	-	(SD G 17)	(18.1-18.9)	<b>Dedicated Career Management Centres</b>



				efficacy, and quality of medicines, as well as the relevance and accuracy of product information	cosmetics and consumer health, natural health, and veterinary products.										
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<b>BP 703T</b>	<b>Pharmacy Practice (Theory)</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Version 2.0</b>		<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>
<b>Total Contact Hours</b>	45 Hours				
<b>Pre-requisites/Exposure</b>	Pharmacology				
<b>Co-requisites</b>					
<b>Course Objectives</b>					
<b>Upon completion of this course the student should be able to:</b>					
1. Know various drug distribution methods in a hospital					
2. Appreciate the pharmacy stores management and inventory control					
3. Monitor drug therapy of patient through medication chart review and clinical review					
4. Obtain medication history interview and counsel the patients					
5. Identify drug related problems					
6. Detect and assess adverse drug reactions					
7. Interpret selected laboratory results (as monitoring parameters in therapeutics) of specific disease states					
8. Know pharmaceutical care services					
9. Do patient counseling in community pharmacy.					
10. Appreciate the concept of rational drug therapy.					

**Course Outcomes (CO)**

**On completion of this course, the student will be able to:**

CO1. The course imparts knowledge of drug distribution in hospitals.

CO2. The course imparts knowledge of drug store management in Hospitals.

CO3. The course imparts knowledge of therapeutic drug monitoring for improved patient care.

CO4. The course imparts knowledge of dispensing of drugs and responding to minor ailments by providing suitable safe medications.

CO5. The course highlights the importance of patient counseling for improved patient care in the community

**Programme and Course Mapping**

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO 1	PSO 2
CO1	3	-	3	-	3	3	-	2	-	-	-	3	3	1
CO2	3	-	3	-	3	3	-	2	-	-	-	3	3	1
CO3	3	-	3	-	3	3	-	2	-	-	-	3	3	1
CO4	3	-	3	-	3	3	-	2	-	-	-	3	3	1
CO5	3	-	3	-	3	3	-	2	-	-	-	3	3	1
1=lightly mapped                      2= moderately mapped                      3=strongly mapped														

<b>Unit</b>	<b>Relevance to the local, national, regional and global developmental needs</b>	<b>Relevance To the Employability/ Entrepreneurship/ Skill Development</b>	<b>Relevance to the Professional Ethics, Gender, Human Values, Environment &amp; Sustainability</b>	<b>SDG</b>	<b>NEP</b>	<b>POE/4<sup>th</sup> IR</b>
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	Local	Regional	National	Global	Employability	Entrepreneurship	Skill Development	Professional Ethics	Gender	Human Values	Environment & Sustainability				
Unit I				Trained the students for different function of hospitals and staffs			In this Unit , Classification of hospital-Primary, Secondary and Tertiary hospitals, Classification based on clinical and non-clinical basis using ppt and assignment					Skills for Decent Work (SDG 4.4)	Skills for Decent Work (SDG 4.4)	Professional Education (17.1-17.5)	Skill Development

Unit II	-	-	In this, Students will learn about the dispensing of drugs as per the standards harmonized globally			This unit based Dispensing of drugs to inpatients, types of drug distribution systems, charging policy and labelling, Dispensing of drugs to ambulatory patients, and Dispensing of controlled drugs	Skill development					Professional Education (17.1-17.5)	Employability
Unit III	-	-	Globally, Poisoning and suicides are challenges, students are trained to			In this, students learned and trained to Drug and Poison information centre, Sources of drug information							Skill Development

				work under the drug, poison and their storage , documentatio n			n, Computeri sed services, and storage and retrieval of informatio n							
Unit IV		-	-	Globall y , Glauco ma, catarac t and other eye disorde rs are increas ing to many folds, thus trained the student s and make them availab le as			In this, students will learn about the Concept of clinical pharmacy, functions and responsibil ities of clinical pharmacist , Drug therapy monitorin g - medicatio n chart review, clinical review, pharmacist							Skill Develo pment

				skilled researchers			intervention, Ward round participation, Medication history and Pharmaceutical care.							
Unit v							In this unit , students will learn Organisation of drug store, types of materials stocked and storage conditions, Purchase and inventory control: principles, purchase procedure, purchase order, procurement and stocking,					Skills for Decent Work (SDG 4.4)	Professional Education (17.1-17.5)	Employability

							Economic order quantity, Reorder quantity level, and Methods used for the analysis of the drug expenditure							
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<b>BP 704 T</b>	<b>Novel Drug Delivery System (Theory)</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Version 2.0</b>		<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>
<b>Total Contact Hours</b>	45 Hours				
<b>Pre-requisites/Exposure</b>	Pharmaceutics				
<b>Co-requisites</b>					
<b>Course Objectives</b>					
<b>Upon completion of this course the student should be able to:</b>					
1. To understand various approaches for development of novel drug delivery systems.					
2. To understand the criteria for selection of drugs and polymers for the development of Novel drug delivery systems, their formulation and evaluation					
<b>Course Outcomes (CO)</b>					
<b>On completion of this course, the student will be able to:</b>					
CO1: This subject is designed to impart basic knowledge on the area of various conventional drug delivery systems.					

CO2: The course imparts knowledge on sustained release drug delivery systems.

CO3: The course imparts knowledge on targeted drug delivery systems.

CO4: The course imparts knowledge on organ specific drug delivery systems.

CO5: The course imparts knowledge on newer drug delivery systems

**Programme and Course Mapping**

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO 1	PSO 2
CO1	3	2	3	-	3	3	-	2	-	-	2	3	3	1
CO2	3	2	3	-	3	3	-	2	-	-	2	3	3	1
CO3	3	2	3	-	3	3	-	2	-	-	2	3	3	1
CO4	3	2	3	-	3	3	-	2	-	-	2	3	3	1
CO5	3	2	3	-	3	3	-	2	-	-	2	3	3	1

1=lightly mapped                      2= moderately mapped                      3=strongly mapped

Unit	Relevance to the local, national, regional and global developmental needs	Relevance To the Employability/ Entrepreneurship/ Skill Development	Relevance to the Professional Ethics, Gender, Human Values, Environment & Sustainability	SDG	NEP	POE/4 <sup>th</sup> IR



BP704 T	Local	Regional	National	Global	Employability	Entrepreneurship	Skill Development	Professional Ethics	Gender	Human Values	Environment & Sustainability			
Unit I	This course is intended to provide fundamental information on different conventional drug delivery systems/controlled drug delivery systems with local relevance and developmental requirements. They can create novel dosage forms.	This course is intended to provide fundamental information on different conventional drug delivery systems/controlled drug delivery systems with regional relevance and developmental requirements. They can create novel dosage forms.	This course is intended to provide fundamental information on different conventional drug delivery systems/controlled drug delivery systems with national relevance and developmental requirements. They can create novel dosage forms.	This course is intended to provide fundamental information on different conventional drug delivery systems/controlled drug delivery systems with global relevance	Their pharmaceutical industry/research department (national/international) has a wide choice of career opportunities.	This course knowledge gives you the ability to build a pharmaceutical medication development firm on a nation	This course is designed to teach basic information on various conventional drug delivery systems/controlled drug delivery systems with local relevance and develop	This course is designed to teach on various conventional drug delivery systems/controlled drug delivery systems with local relevance and develop	-	-	-	Ensure healthy lives and promote well-being for all ages (SDG 3)	Institutional Restructuring and Consolidation (10.1-10.14)	Corporate/Company Trips/Projects

				e and develop mental requirements. They can create novel dosage forms.		al and world wide scale.	delive ry syste ms with local relevance and develo pment needs. They have the ability to develop unique dosage formulations.							
Unit II	This course is intended to provide fundamental information on different Mucosal Drug Delivery system /Microcapsul	This course is intended to provide fundamental information on different Mucosal Drug Delivery system /Microcapsulation/implantable drug delivery	This course is intended to provide fundamental information on different Mucosal Drug Delivery system /Microcapsulation/implantab	This course is intended to provide fundame ntal informati on on different Mucosal	Their pharm aceuti cal indust ry/res earch depart ment (natio nal/int	This course knowl edge gives you the ability to build a	This course is design ed to teach basic inform ation on variou	This course is designed to teach o n various conventi onal drug delivery	-	-	-	Ens ure heal thy lives and pro mote well	Insti tuti onal Rest ruct urin g and Con soli dati	Corpor ate/Co mpany Trips/P rojects

	ation/implantable drug delivery system with local relevance and developmental requirements. They can create novel dosage forms.	system with regional relevance and developmental requirements. They can create novel dosage forms.	le drug delivery system with national relevance and developmental requirements. They can create novel dosage forms.	Drug Delivery system /Microcapsulation /implantable drug delivery system with global relevance and developmental requirements. They can create novel dosage forms.	ernational) has a wide choice of career opportunities.	pharmaceutical medication development firm on a national and world wide scale.	s conventional drug delivery systems/controlle d drug delivery systems with local relevance and development needs. They have the ability to develop unique dosage formulations.					- being for all ages (SD G 3)	on (10.1-10.14)	
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Unit III	This course is intended to provide fundamental information on different Transdermal Drug Delivery Systems / Gastroretentive drug delivery systems/ Nasopulmonary drug delivery system with local relevance and developmental requirements. They can create novel dosage forms.	This course is intended to provide fundamental information on different Transdermal Drug Delivery Systems / Gastroretentive drug delivery systems/ Nasopulmonary drug delivery system with regional relevance and developmental requirements. They can create novel dosage forms.	This course is intended to provide fundamental information on different Transdermal Drug Delivery Systems / Gastroretentive drug delivery system with national relevance and developmental requirements. They can create novel dosage forms.	This course is intended to provide fundamental information on different Transdermal Drug Delivery Systems / Gastroretentive drug delivery systems/ Nasopulmonary drug delivery system with global relevance and developmental requirements. They can create	Their pharmaceu tical indust ry/res earch depart ment (natio nal/int ernati onal) has a wide choice of career opport unitie s.	This course knowl edge gives you the ability to build a pharm aceuti cal medic ation devel oping firm on a nation al and world wide scale.	This course is design ed to teach the basic inform ation on variou s conventi onal drug delive ry syste ms/co ntrolle d drug delive ry syste ms with local releva nce and develo pment needs. They have	This course is design ed to teach o n various conventi onal drug delive ry syste ms/co ntrolle d drug delive ry syste ms with local relevanc e and develop ment needs. They have the ability to develop unique dosage formulat ions.	-	-	-	Ens ure heal thy lives and pro mote well - bein g for all at ages (SD G 3)	Insti tuti onal Rest ruct urin g and Con soli dati on (10.1-10.14)	Corpor ate/Co mpany Trips/P rojects
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				novel dosage forms.			the ability to develop unique dosage formulations.							
Unit IV	This course is intended to provide fundamental information on different Targeted drug Delivery with local relevance and developmental requirements. They can create novel dosage forms.	This course is intended to provide fundamental information on different Targeted drug Delivery with regional relevance and developmental requirements. They can create novel dosage forms.	This course is intended to provide fundamental information on different Targeted drug Delivery with national relevance and developmental requirements. They can create novel dosage forms.	This course is intended to provide fundamental information on different Targeted drug Delivery with global relevance and developmental requirements. They can create novel dosage forms.	Their pharmaceutical industry/research department (national/international) has a wide choice of career opportunities.	This course knowledge gives you the ability to build a pharmaceutical medication development firm on a national and world wide scale.	This course is designed to teach basic information on various conventional drug delivery systems/controlled drug delivery systems with local relevance and development needs. They have the	This course is designed to teach on various conventional drug delivery systems/controlled drug delivery systems with local relevance and development needs. They have the	-	-	-	Ensure healthy lives and promote well-being for all ages (SDG 3)	Institutional Restructuring and Consolidation (10.1-10.14)	Corporate/Company Trips/Projects

				forms.			with local relevance and development needs. They have the ability to develop unique dosage formulations.	ability to develop unique dosage formulations.						
Unit v	This course is intended to provide fundamental information on different Ocular Drug Delivery Systems with local relevance and developmental requirements. They can	This course is intended to provide fundamental information on different Ocular Drug Delivery Systems with regional relevance and developmental requirements. They can create novel dosage forms.	This course is intended to provide fundamental information on different Ocular Drug Delivery Systems with national relevance and developmental requirements. They can	This course is intended to provide fundamental information on different Ocular Drug Delivery Systems with	Their pharmaceutical industry/research department (national/international) has a wide	This course knowledge gives you the ability to build a pharmaceutical medicinal	This course is designed to teach basic information on various conventional drug	This course is designed to teach on various conventional drug delivery systems/controlled drug delivery	-	-	-	Ensure healthy lives and promote well-being for	Institutional Restructuring and Consolidation (10.1-10.1	Corporate/Company Trips/Projects

	create novel dosage forms.		create novel dosage forms.	global relevance and developmental requirements. They can create novel dosage forms.	choice of career opportunities.	ation developing firm on a national and world wide scale.	delivery systems/control drug delivery systems with local relevance and development needs. They have the ability to develop unique dosage formulations.	systems with local relevance and development needs. They have the ability to develop unique dosage formulations.				all ages (SD G 3)	4)	
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<b>BP 705 P</b>	<b>Instrumental Methods of Analysis (Practical)</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>									
<b>Version 2.0</b>		<b>0</b>	<b>0</b>	<b>4</b>	<b>2</b>									
<b>Total Contact Hours</b>	60 Hours													
<b>Pre-requisites/Exposure</b>	Analytical Chemistry-I Practical													
<b>Co-requisites</b>														
<b>Course Objectives</b>														
<b>Upon completion of this course the student should be able to:</b>														
1. Quantitative & Qualitative Analysis of drugs using various analytical instruments.														
2. Demonstration of HPLC instrument														
3. Separations of sugars and amino acids by chromatography.														
<b>Course Outcomes (CO)</b>														
<b>On completion of this course, the student will be able to:</b>														
CO1. This subject deals with the practical knowledge of application of instrumental methods in qualitative analysis of drugs.														
CO2. This subject deals with the practical knowledge of application of instrumental methods in quantitative analysis of drugs.														
CO3. This subject is designed to impart a practical knowledge on the principles and instrumentation of spectroscopic techniques.														
CO4. This subject is designed to impart a practical knowledge on the principles and instrumentation of chromatographic techniques.														
CO5. This also emphasizes on practical knowledge on modern analytical instruments that are used for drug testing.														
<b>Programme and Course Mapping</b>														
<b>CO</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO 10</b>	<b>PO11</b>	<b>PO12</b>	<b>PSO 1</b>	<b>PSO 2</b>
<b>CO1</b>	3	-	2	-	3	3	-	1	-	-	3	2	3	2
<b>CO2</b>	3	-	2	-	3	3	-	1	-	-	3	2	3	2
<b>CO3</b>	3	-	2	-	3	3	-	1	-	-	3	2	3	2
<b>CO4</b>	3	-	2	-	3	3	-	1	-	-	3	2	3	2



CO5	3	-	2	-	3	3	-	1	-	-	3	2	3	2
1=lightly mapped                      2= moderately mapped                      3=strongly mapped														

Unit	Relevance to the local, national, regional and global developmental needs				Relevance To the Employability/ Entrepreneurship/ Skill Development			Relevance to the Professional Ethics, Gender, Human Values, Environment & Sustainability				SDG	NEP	POE/4 <sup>th</sup> IR
	Local	Regional	National	Global	Employability	Entrepreneurship	Skill Development	Professional Ethics	Gender	Human Values	Environment & Sustainability			
Unit I	-	-	Characterization of Drugs help in drug discovery	-	Knowledge of UV spectroscopy increase the emplo	-	-	-	-	-	-	Skills for Decent Work; Research-related skills (SDG 4.4)	Professional Education (17.1-17.5); Promoting High-	Technical Skills that match Industry Needs/ Hands-

					yability of the learner in analytical sector like QA department of Pharmaceutical companies								quality research (18.1-18.9)	on Experience
Unit II	-			Learning of Techniques help to discover drugs	Knowledge of Infra red and colorimetry spectroscopy increase the employability of	-	-	-	-	-	-	Skills for Decent Work; Research-related skills	Professional Education (17.1-17.5); Promoting High-quality research (18.1-18.9)	Technical Skills that match Industry Needs/ Hands-on Experience

					the learner in analytical sector like QA department of Pharmaceutical companies									
Unit III	-	-	Boost the diagnosis, prognosis and treatment of medical condition	-	Knowledge of HPLC and GLC increase the employability of the learner in analytical sector like	-	-	-	-	-	-	Skills for Decent Work; Research-related skills (SDG 4.4)	Professional Education (17.1-17.5); Promoting High-quality research (18.1-18.9)	Technical Skills that match Industry Needs/ Hands-on Experience

					QA department in method development and validation									
Unit IV	-	-	-	Help in drug estimation	Knowledge of HPLC increase the employability of the learner in analytical sector like QA department in method development	-	-	-	-	-	-	Skills for Decent Work; Research-related skills (SDG 4.4)	Professional Education (17.1-17.5); Promoting High-quality research (18.1-18.9)	Technical Skills that match Industry Needs; Skill Development

					opment and validation									
Unit v	-	-	Help in drug discovery & development by inhibiting enzymes	-	Knowledge of GLC increase the employability of the learner in analytical sector like QA department in method development and validation	-	-	-	-			Skills for Decent Work; Research-related skills (SDG 4.4)	Professional Education (17.1-17.5); Promoting High-quality research (18.1-18.9)	Technical Skills that match Industry Needs/ Hands-on Experience

# Semester-VIII

<b>BP801T</b>	<b>Biostatistics and Research Methodology (Theory)</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>									
<b>Version 2.0</b>		<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>									
<b>Total Contact Hours</b>	45 Hours													
<b>Pre-requisites/Exposure</b>														
<b>Co-requisites</b>	Any analytical Software													
<b>Course Objectives</b>														
<b>Upon completion of this course the student should be able to:</b>														
<ol style="list-style-type: none"> <li>1. Know the operation of M.S. Excel, SPSS, R and MINITAB ® , DoE (Design of Experiment)</li> <li>2. Know the various statistical techniques to solve statistical problems.</li> <li>3. Appreciate statistical techniques in solving the problems.</li> </ol>														
<b>Course Outcomes (CO)</b>														
<b>On completion of this course, the student will be able to:</b>														
CO1.To establish a formulation helping to predict one variable in terms of the other that is, correlation and linear regression.														
CO2. To understand of Parametric and Non-Parametric models for developing relevant inferences on associated parameters														
CO3. To know advanced level topics in statistical inference on testing of statistical hypotheses for both randomized and non-randomized tests														
CO4. To use appropriate experimental designs to analyze the experimental data														
<b>Programme and Course Mapping</b>														
<b>CO</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO 10</b>	<b>PO11</b>	<b>PO12</b>	<b>PSO 1</b>	<b>PSO 2</b>

CO1	2			2	2						2	2	
CO2			2					2	2		2		
CO3	2			2	2						2	2	
CO4		2	2					2					
1=lightly mapped                      2= moderately mapped                      3=strongly mapped													

U n i t	Relevance to the local, national, regional and global developmental needs	Relevance To the Employability / Entrepreneurship/ Skill Development	Professional Ethics, Gender, Human Values, Environment &	SDG	NEP	POE/4 <sup>th</sup> IR
U n i t  I	Global  By understanding these statistical concepts and their application in addressing global needs, policymakers, researchers, and organizations can make evidence-based decisions, develop	Employability Entrepreneurship  Skill Development  Overall, Unit I in skill development provides a solid foundation in statistical concepts, techniques, and their applications. These skills are transferable and can benefit individuals in various	Professional Ethics  Gender Human values Environment & Sustainability	SDG 9: Industry, Innovation, and Infrastructure:  The use of statistical techniques and concepts in pharmaceutical	Promoting High-quality research (18.1-18.9) By incorporating Unit 1 into the NEP, educational institutions can promote high-quality research by equipping students with robust research	

			targeted interventions, and monitor progress towards achieving global goals such as poverty reduction, improved healthcare, and sustainable development. Additionally, these concepts can contribute to improving data literacy and fostering critical thinking skills, enabling individuals to better understand and interpret information in an increasingly data-driven world.			professional domains, enabling them to analyze data effectively, make informed decisions, and contribute to evidence-based practices.			research and development supports innovation in the industry. Understanding measures of central tendency, dispersion, and correlation helps identify patterns, trends, and relationships in pharmaceutical data, leading to improved drug development processes, quality control, and innovation in healthcare.	methodologies, advanced data analysis techniques, and interdisciplinary problem-solving skills. This, in turn, fosters a research culture, promotes collaboration between academia and industry, and contributes to the achievement of SDG 18 by driving research excellence and innovation.			
Unit II	-	-	-	By applying these concepts in research, decision-making, and policy formulation, Unit II contributes to addressing global needs by enabling accurate predictions, quantifying uncertainty, making	-	-	Overall, Unit II in skill development enhances individuals' statistical literacy, data analysis skills, and critical thinking abilities. These skills are transferable and valuable in a wide range of professional	-	-	-	SDG 3: Good Health and Well-being: Biostatistics plays a crucial role in studying health-related outcomes, evaluating interventions, and	Promoting High-quality research (18.1-18.9) By incorporating Unit II into the NEP, educational institutions can promote high-quality research by equipping students with robust research	Skill Embedded Curriculum



			valid inferences, and facilitating effective comparisons. These statistical tools are essential in fields such as public health, medicine, social sciences, and environmental studies, helping tackle complex global challenges and improving the well-being of populations worldwide.		domains, including research, healthcare, finance, marketing, and policy analysis. Mastery of these concepts enables individuals to make evidence-based decisions, conduct rigorous analyses, and contribute to informed decision-making processes.				monitoring public health indicators. Research methodology helps in designing studies to assess health interventions, understand disease patterns, and improve healthcare delivery.	methodologies, advanced data analysis techniques, and interdisciplinary problem-solving skills. This, in turn, fosters a research culture, promotes collaboration between academia and industry, and contributes to the achievement of SDG 18 by driving research excellence and innovation.	se s De ve lo p m en t			
U n i t  I I I	-	-	-	By studying and applying the concepts covered in Unit III, individuals can contribute to addressing global needs through rigorous research, valid data analysis, effective data presentation, and the development of ethical and well-designed clinical trials. These skills are essential in fields such as healthcare, public	-	-	Unit III in skill development enhances individuals' research skills, data analysis and visualization abilities, critical thinking, and understanding of methodological considerations. These skills are transferable and valuable in various professional domains, including research, healthcare, academia, and policy analysis.	Maintaining the uniqueness and novelty in research is of importance and ensures ethical professionalism as it doesn't favour the manipulation and false	-	-	-	-	Promoting High-quality research (18.1-18.9) By incorporating Unit III into the NEP, educational institutions can promote high-quality research by equipping students with robust research methodologies, advanced data analysis techniques, and interdisciplinary problem-solving skills. This, in turn, fosters a	Sk ill E m be dd ed Co ur se s De ve lo p

			health, social sciences, and environmental studies, helping tackle global challenges and improve the well-being of individuals and communities worldwide.		Mastery of these concepts equips individuals to conduct rigorous research, effectively analyze and present data, and contribute to evidence-based decision-making processes.	representatio n of data.				research culture, promotes collaboration between academia and industry, and contributes to the achievement of SDG 18 by driving research excellence and innovation.	m en t
U n i t  I V	-	-	By studying and applying the concepts covered in Unit IV, individuals gain skills in experimental design, regression modeling, and statistical analysis using popular software tools. These skills are applicable across various industries and research fields, addressing global needs by enabling more efficient processes, reliable predictions, and evidence-based decision-making. The practical knowledge	-	Overall, Unit IV contributes to skill development by equipping individuals with the necessary tools and knowledge to design experiments, analyze data, and make evidence-based decisions. These skills have broad applicability across industries and research fields, enabling individuals to address global needs by improving processes, making accurate predictions, and contributing to	-	-	-	SDG 9: Industry, Innovation, and Infrastructure: Non-parametric tests and research methodology play a vital role in promoting innovation and improving infrastructure. By conducting research studies and analyzing data using non-parametric tests, industries can identify trends, patterns, and	Promoting High-quality research (18.1-18.9) By incorporating Unit IV into the NEP, educational institutions can promote high-quality research by equipping students with robust research methodologies, advanced data analysis techniques, and interdisciplinary problem-solving skills. This, in turn, fosters a research culture, promotes collaboration between academia and industry, and	Sk ill E m be dd ed Co ur se s De ve lo p m en t

			gained through this unit equips individuals to tackle complex challenges and contribute to advancements in fields such as manufacturing, healthcare, and environmental sustainability.					advancements in various domains.				relationships, leading to innovation in product development, process optimization, and infrastructure planning.	contributes to the achievement of SDG 18 by driving research excellence and innovation.	
U n i t  V	-	-	-	By studying and applying the concepts covered in Unit V, individuals gain skills in designing experiments, analyzing complex systems, and optimizing processes. These skills are valuable in addressing global needs by improving efficiency, reducing waste, enhancing product quality, optimizing resource utilization, and finding optimal solutions to complex problems in diverse fields such as manufacturing,	-	-	-	Overall, Unit V in skill development equips individuals with valuable skills in experimental design, analysis, and optimization. These skills are transferable and applicable across various industries and research fields, allowing individuals to address complex problems, optimize processes, and make data-driven decisions. Mastery of these concepts contributes to skill development by fostering critical	-	-	-	SDG 12: Responsible Consumption and Production:  The application of experimental design techniques promotes responsible consumption and production. By using factorial design and response surface methodology, industries can optimize resource utilization, reduce waste, and	Promoting High-quality research (18.1-18.9) By incorporating Unit V into the NEP, educational institutions can promote high-quality research by equipping students with robust research methodologies, advanced data analysis techniques, and interdisciplinary problem-solving skills. This, in turn, fosters a research culture, promotes collaboration between academia and industry, and contributes to the	Sk ill E m b e d d e d C o u r s e s D e v e l o p m e n t

	healthcare, agriculture, and environmental sustainability.	thinking, problem-solving, and efficiency in experimental design and analysis.			improve the quality and efficiency of production processes, aligning with the principles of sustainable consumption and production.	achievement of SDG 18 by driving research excellence and innovation.
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<b>BP 802 T</b>	<b>Social and Preventive Pharmacy (Theory)</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Version 2.0</b>		<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>
<b>Total Contact Hours</b>	45 Hours				
<b>Pre-requisites/Exposure</b>	Pharmacology				
<b>Co-requisites</b>	Remedial Biology				
<b>Course Objectives</b>					
<b>Upon completion of this course the student should be able to:</b>					
1. Acquire high consciousness/realization of current issues related to health and pharmaceutical problems within the country and worldwide.					
2. Have a critical way of thinking based on current healthcare development.					
3. Evaluate alternative ways of solving problems related to health and pharmaceutical issues					
<b>Course Outcomes (CO)</b>					
<b>On completion of this course, the student will be able to:</b>					
CO1. The purpose of this course is to introduce to students number of health issues and their challenges.					

CO2. Give information regarding Public health, preventive medicine, social medicine and community medicine their historical background. Giving information about the significance of food and its various components.

CO3. To understand the various principles for the prevention and control of various diseases.

CO4. In this course introduced various National health programs like HIV, AIDS, TB, IDSP, NLCP, NMHP etc. and its objectives, functioning and their outcome

CO5. The roles of the pharmacist in the Community services in rural, urban and school health awareness program.

**Programme and Course Mapping**

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2
CO1	2	2			2	2								2
CO2			2				2		2		2			
CO3	2	2			2	2							2	
CO4		2	2				2							
CO5	2	2			2	2								2
1=lightly mapped                      2= moderately mapped                      3=strongly mapped														

Unit	Relevance to the local, national, regional and global developmental needs	Relevance To the Employability/ Entrepreneurship/ Skill Development	Relevance to the Professional Ethics, Gender, Human Values, Environment & Sustainability	SDG	NEP	POE/4 <sup>th</sup> IR
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	Local	Regional	National	Global	Employability	Entrepreneurship	Skill Development	Professional Ethics	Gender	Human Values	Environment & Sustainability			
Unit I	--	--	Provides basic understanding of public health, epidemiology, preventive care, and other social health-related ideas.	Become well aware of current difficulties with pharmaceuticals and health worldwide.	--	--	Promote the functions played by health professionals in public health initiatives.	--	--	Improve public health by providing services that contribute to the prevention, treatment and management of the disease.	--	Ensure healthy lives and promote well-being for all at all ages (SD G3)	--	Global education policy, Skill development
Unit II	--	--	--	Impart the knowledge on prevention and control of diseases along with their preventive and curative medicines available.	--	--	Develops the knowledge, skills, abilities, to use medicines in society in a scientific way	--	--	Encouraging patients to have healthy lives, advice on stress management and mental health, and they recommend seeking the appropriate medical help when necessary.	--	Ensure healthy lives and promote well-being for all at all ages (SD G3)	--	Global education policy, Skill development

												being for all at all ages (SD G3)		
Unit III	--	--	Imparts knowledge about the aims, operations, and results of national health programmes to achieve the objective of Health for all	--	--	--	Brings the potential to solve new global health concerns like managing acute and chronic illnesses and health literacy	--	--	Provides patient care services that optimize the use of medication and promotes health, wellness, and disease prevention	--	Ensure healthy lives and promote well-being for all at all ages (SD G3)	--	Global education policy, Skill development
Unit IV	--	--	Create awareness of National health intervention programmes available in India	--	--	--	Develop a critical perspective based on recent advancements in healthcare.	--	--	Helps in equity, dignity, informed decision-making, health and well-being, and social justice	--	Ensure healthy lives and promote well-being	--	Global education policy, Skill development

												g for all at all ages (SD G3)		
Unit v	--	--	Examine other approaches to resolving difficulties with health and pharmaceuticals	---	--	--	Control/eradication of contagious diseases, improvement of environmental sanitation, improving the standard of nutrition, control of population and promotion of rural health	--	--	Ensure access to healthcare, provide dignified living conditions, and empower individuals with knowledge and skills for better health and well-being.	--	Ensure healthy lives and promote well-being for all at all ages (SD G3)	--	Global education policy, Skill development

<b>BP 803 ET</b>	<b>Pharmaceutical Marketing Management (Theory)</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Version 2.0</b>		<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>



<b>Total Contact Hours</b>	45 Hours
<b>Pre-requisites/Exposure</b>	Pharmaceutical Marketing
<b>Co-requisites</b>	Marketing

### Course Objectives

**Upon completion of this course the student should be able to:**

1. Understanding the marketing concepts and techniques and their applications in the pharmaceutical industry.
2. Explain the role of Industry competitive analysis, marketing mix and promotion strategy
3. To learn about price strategy, marketing distribution channel, sales distribution concepts in pharma marketing management
4. To learn and understand the principle and function of DPCO and NPPA authority for pharmaceutical product

### Course Outcomes (CO)

**On completion of this course, the student will be able to:**

CO1. In this topic is devoted the general questions of market concepts, including pharmaceutical, also understand the choice of physician and retail pharmacist.

CO2. To learn and understand the product line and product mix decisions, product life cycle stage, product portfolio analysis; product positioning, marketing mix and promotion mix strategy in companies.

CO3. To learn and understand the principle and function of DPCO and NPPA authority for better understanding essential commodities act.

CO4. The knowledge of theoretical based marketing pricing, prices classification, demand, supply and prices and establishment of the price for the goals.

### Programme and Course Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO 1	PSO 2
CO1	2	2			2	2								2
CO2	2	1	2			1	2		2		2			
CO3	2	2			2	2							2	
CO4		2	2				2							

1=lightly mapped

2= moderately mapped

3=strongly mapped

<b>BP 804 ET</b>	<b>Pharmaceutical Regulatory Science (Theory)</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Version 2.0</b>		<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>
<b>Total Contact Hours</b>	45 Hours				
<b>Pre-requisites/Exposure</b>	Pharmaceutics				
<b>Co-requisites</b>	Regulatory Sciences				
<b>Course Objectives</b>					
<p><b>Upon completion of this course the student should be able to:</b></p> <ol style="list-style-type: none"> <li>1. Know about the process of drug discovery and development</li> <li>2. Know the regulatory authorities and agencies governing the manufacture and sale of pharmaceuticals</li> <li>3. Know the regulatory approval process and their registration in Indian and International markets</li> </ol>					
<b>Course Outcomes (CO)</b>					
<p><b>On completion of this course, the student will be able to:</b></p> <p>CO1.This course is designed to impart the fundamental knowledge on the Origin, development, scope, objectives and nature of Pharmaceutical legislation in India.</p> <p>CO2.A study of regulatory aspects that affect drug product design, manufacture and distribution in India with special emphasis on the following Acts / Laws (with latest amendments)</p> <p>CO3.Need Product development stage documentation, factory procedures – Standard operating procedures (SOPs) and standard test Procedures (STPs).</p> <p>CO4. Regulatory requirements for approval of new drugs, and drug products in regulated markets of India &amp; other countries like US, EU, Japan, Australia, UK etc.</p>					

CO5.It prepares the students to learn in detail on the regulatory requirements, documentation requirements, and registration procedures for marketing the drug products

**Programme and Course Mapping**

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2
CO1	2	2		1	2	2		2		2			2	2
CO2	2	1	2			1	2		2		2			
CO3	2	2		2	2	2				2			2	
CO4			2	2		2	2	2				2		
CO5		2	2		2	2	2				2			2
1=lightly mapped                      2= moderately mapped                      3=strongly mapped														

<b>BP805ET</b>	<b>Pharmacovigilance (Theory)</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Version 2.0</b>		<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>
<b>Total Contact Hours</b>	45 Hours				
<b>Pre-requisites/Exposure</b>	Toxicology study				
<b>Co-requisites</b>	ADR				

**Course Objectives**

**Upon completion of this course the student should be able to:**

- 1 Why drug safety monitoring is important?
2. History and development of pharmacovigilance

3. National and international scenario of pharmacovigilance
4. Dictionaries, coding and terminologies used in pharmacovigilance
5. Detection of new adverse drug reactions and their assessment problems

### Course Outcomes (CO)

**On completion of this course, the student will be able to:**

CO1. International standards for classification of diseases and drugs

CO 2. Adverse drug reaction reporting systems and communication in pharmacovigilance

CO 3. Methods to generate safety data during pre-clinical, clinical and post approval phases of drugs' life cycle

CO 4. Drug safety evaluation in paediatrics, geriatrics, pregnancy and lactation

CO 5. Pharmacovigilance Program of India (PvPI) requirement for ADR reporting in India

### Programme and Course Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO 1	PSO 2
CO1	2	2		1	2	2		2		2			2	2
CO2	2	1	2			1	2		2		2			
CO3	2	2		2	2	2				2			2	
CO4	2	2		2	2	2				2			2	
CO5	2	3	2	2	2	2	1			2			2	

1=lightly mapped

2= moderately mapped

3=strongly mapped

Unit	Relevance to the local, national, regional and global developmental needs				Relevance To the Employability/ Entrepreneurship/ Skill Development			Relevance to the Professional Ethics, Gender, Human Values, Environment & Sustainability			SDG	NEP	POE/4 <sup>th</sup> IR	
	Local	Regional	National	Global	Employability	Entrepreneurship	Skill Development	Professional Ethics	Gender	Human Values	Environment & Sustainability			
Unit I				Students will be able to understand importance safety monitoring globally and also international terminologies used in this process.	By acquiring knowledge and experience in pharmacovigilance, individuals can position themselves for a wide range of rewarding career opportunities within the healthcare and pharmaceutical			.				SD G 3	(11.1-11.1.3)	Technical Skills that match Industry Needs/ Employability

					sectors.									
Unit II		-	-	Students will have understanding of International standards for classification of diseases and drugs, which is essential for pharmacovigilance professionals to effectively contribute to drug safety monitoring, regulatory processes, and public health protection on a global scale.	By acquiring proficiency in drug dictionaries, coding systems, and the establishment of pharmacovigilance programs, individuals can enhance their employability in the field of pharmacovigilance.							SD G 3	(17.1-17.5)	Technical Skills that match Industry Needs/Coding
Unit III		-	-	Students will gain necessary knowledge and skills, pharmacovigilance education which will contribute to the overall safety and effectiveness	Education and expertise in vaccine safety surveillance, pharmacovigilance methods, and communication can significantly							SD G 3	(17.1-17.5)	Technical Skills that match Industry Needs/Employability

				of vaccines, thereby protecting public health on a global scale.	enhance employability in the field								
Unit IV		-	-	. Students will expertise methods to generate safety data during pre clinical, clinical and post approval phases of drugs' life cycle & ICH guidelines for ICSR, PSUR, expedited reporting, pharmacovigilance planning	Education in safety data generation and ICH guidelines for pharmacovigilance enhances employability by ensuring regulatory compliance.			Students will understand ethical considerations related to patient confidentiality, data protection, and the responsible use of information			SDG 3	(17.1-17.5)	Technical Skills that match Industry Needs/ Project
Unit v			Students will have understanding CDSCO guidelines and pharmacovigilance at the national level in India.	Students will understand and will develop skills for Drug safety evaluation in special population, pharmacogenomics of ADRs, & and the CIOMS guidelines and forms.	By possessing expertise in pharmacogenomics, drug safety evaluation in special populations, CIOMS guidelines, CDSCO regulations, and understanding						SDG3	(17.1-17.5)	Technical Skills that match Industry Needs/ Internship

					the differences in Indian and global pharmacovigilance requirements, individuals can enhance their employability prospects in various sectors related to pharmacovigilance									
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<b>BP 806 ET</b>	<b>Quality Control And Standardization Of Herbals (Theory)</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Version 2.0</b>		<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>
<b>Total Contact Hours</b>	45 Hours				
<b>Pre-requisites/Exposure</b>	Herbal Drug Technology				
<b>Co-requisites</b>	Pharmacognosy & Phytochemistry				
<b>Course Objectives</b>					
<b>Upon completion of this course the student should be able to:</b>					
1. Know WHO guidelines for quality control of herbal drugs					



2. Know Quality assurance in herbal drug industry
3. Know the regulatory approval process and their registration in Indian and international markets
4. Appreciate EU and ICH guidelines for quality control of herbal drugs

### Course Outcomes (CO)

**On completion of this course, the student will be able to:**

CO1. In this subject the student learns about the various methods and guidelines for evaluation and standardization of herbs and herbal drugs like Moisture Content, Ash Values, Determination of Extractive Value, Swelling Index, Hemolytic Activity etc.

CO2. The subject also provides an opportunity for the student to learn the quality assurance of crude drugs in herbal industry and follow the following guide line cGMP, GAP and GLP in traditional system of medicines.

CO3. Knowledge about the Quality control of following guideline like EU and ICH guidelines.

CO4. Knowledge about the stability testing of herbal medicines and application of various chromatographic techniques for evaluation of crude drugs.

CO5. Regulatory requirement for development of herbal medicine as per WHO guide lines.

### Programme and Course Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2
CO1	2	2		1	2	2		2		2			2	2
CO2	2	1	2			1	2		2		2			2
CO3	2	2		2	2	2				2			2	
CO4	2	1	2			1	2		2		2		1	
CO5	2	1	2			1	2		2		2		2	2

1=lightly mapped

2= moderately mapped

3=strongly mapped

Unit	Relevance to the local, national, regional and global developmental needs				Relevance To the Employability/ Entrepreneurship/ Skill Development			Relevance to the Professional Ethics, Gender, Human Values, Environment & Sustainability				SDG	NEP	POE/4 <sup>th</sup> IR
	Local	Regional	National	Global	Employability	Entrepreneurship	Skill Development	Professional Ethics	Gender	Human Values	Environment & Sustainability			
BP8 06E T														
Unit I				The study of "Herbs as a raw material" provides students with knowledge about the medicinal properties and applications of herbs, enabling them to contribute to the development of natural remedies. Understanding "Biodynamic agriculture" promotes sustainable farming practices, benefiting the environment and human health. Exploring the "Indian system of medicine" offers students insights into traditional healing methods,			The study of "Herbs as a raw material" helps students develop skills in identifying, cultivating, and processing medicinal plants, enhancing their knowledge of herbal remedies. "Biodynamic agriculture" provides students with skills in sustainable farming practices, organic cultivation, and holistic approaches to agriculture. The study of "Indian system of					Revitalize the global partnership for sustainable	Professional Education (17.1-17.5) Promotion	Technical Skills that match Industry Needs, Entrepreneurship, Employ

			expanding their understanding of healthcare practices worldwide. Overall, these studies equip students with diverse perspectives and skills for global health and sustainability.			medicine" equips students with knowledge of traditional healing methods, Ayurvedic principles, and herbal formulations, enhancing their understanding of holistic healthcare practices.					ble dev elop ment (Rol e of all Sch ools , KR MU ) (SD G 17)	ing Hig hj- qual ity rese arch (18. 1- 18.9 )	ability
Unit II		-	-	The study of nutraceuticals, herbs in food, and herbs-drugs can greatly benefit students globally by providing them with a comprehensive understanding of natural health and wellness. This knowledge equips students with insights into the potential therapeutic properties of certain foods and herbs, enabling them to make informed dietary choices and explore alternative approaches to healthcare. Such understanding can enhance personal well-being and support their future professional endeavors in fields related to nutrition and holistic medicine.		Studying "Nutraceuticals" and "Herbs-Food & Herbs-Drugs" can help students in skill development by enhancing their understanding of natural remedies and their effects on health. It cultivates knowledge in the fields of nutrition, pharmacology, and herbal medicine, fostering critical thinking, research skills, and the ability to assess the safety and efficacy of these products. This knowledge equips students with valuable expertise in the growing field of alternative medicine.							Global Educati on Knowle dge ,

Unit III	-	-	The study of herbal cosmetics, herbal excipients, and herbal formulations can benefit students globally by providing them with a comprehensive understanding of natural ingredients and their applications in the beauty and pharmaceutical industries. This knowledge equips students with the skills to develop and manufacture effective, safe, and sustainable herbal products, meeting the growing demand for natural alternatives worldwide.			The study of herbal cosmetics, herbal excipients, and herbal formulation helps students develop skills in natural product development, formulation design, and understanding of herbal ingredients. It enhances their knowledge of plant-based remedies, extraction techniques, and quality control. These skills enable students to excel in the field of cosmetic science, pharmaceuticals, and herbal product development, contributing to the growing demand for natural and sustainable beauty and healthcare solutions.							1.a Ensure significant mobilization of resources from a variety of sources..
Unit IV	-	-	The study of "Evaluation of Drug" helps students globally understand the process of testing and analysing the effectiveness and safety of drugs, ensuring their quality and efficacy. "Patenting and Regulatory requirements of natural products" educates students on legal aspects and protection of natural products. "Regulatory Issues" provides insight into the complex regulations governing pharmaceuticals, preparing students for careers in the global			Studying the evaluation of drugs, patenting and regulatory requirements of natural products, and regulatory issues helps students develop essential skills in the pharmaceutical and biotechnology fields. These subjects provide knowledge about the process of evaluating drug efficacy and safety, protecting intellectual property rights, and navigating regulatory frameworks. Such skills are							Ensure healthy lives and promote well-being Technology Use & Integration (23.1-23.13)

			healthcare industry.			crucial for careers in research, development, and compliance within the healthcare industry.					g for all at all ages (SD G 3) Ensure sustainable consumption and production patterns (SD G 12)		
Unit v			The study of "Schedule T - Good Manufacturing Practice of Indian systems of medicine" can help students globally by providing them with insights into the manufacturing practices and quality standards followed in the Indian systems of medicine. This knowledge can be beneficial for students pursuing			The study of "Schedule T – Good Manufacturing Practice of Indian systems of medicine" helps students in skill development by providing them with a comprehensive understanding of the manufacturing practices and quality standards specific to					Ensure sustainable consumption and	Technology Use & Integration (23.	Corporate Alliances to provide Big Sister/ Big Brother

			careers in pharmaceuticals, healthcare, or research, allowing them to understand and incorporate best practices from Indian medicine into their own work.			Indian systems of medicine. This knowledge equips them with the necessary skills to ensure the safety, efficacy, and quality of herbal medicines and traditional remedies, thereby enhancing their competence in the field.					production patterns (SDG 12)	1-23.13)	Connections
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<b>BP 807 ET</b>	<b>Computer aided drug design (Theory)</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Version 2.0</b>		<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>
<b>Total Contact Hours</b>	45 Hours				
<b>Pre-requisites/Exposure</b>	Computer application				
<b>Co-requisites</b>	Medicinal Chemistry				
<b>Course Objectives</b>					
<b>Upon completion of this course the student should be able to:</b>					
1. Design and discovery of lead molecules 2. The role of drug design in drug discovery process 3. The concept of QSAR and docking 4. Various strategies to develop new drug like molecules. □ The design of new drug molecules using molecular modeling software					
<b>Course Outcomes (CO)</b>					
<b>On completion of this course, the student will be able to:</b>					
CO 1. The course offers to provide knowledge on history of computers in pharmaceutical research.					

- CO2. The course gives fundamental learning of basic computer skills required in pharmaceutical research and drug development.
- CO 3. This course is designed to impart knowledge on the principles of informatics as applicable to the drug development process.
- CO 4. The subject aims at imparting knowledge on computational modeling, and computer aided biopharmaceutical characterization.
- CO 5. The subject offers to develop an understanding of drug-product performance in

### Programme and Course Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO 1	PSO 2
CO1	2	2		1	2	2		2		2			2	2
CO2	2	1	2			1	2		2		2			2
CO3	2	2		2	2	2				2			2	
CO4	2	1	2			1	2		2		2		1	
CO5	2	1	2			1	2		2		2		2	2

1=lightly mapped                      2= moderately mapped                      3=strongly mapped

Unit	Relevance to the local, national, regional and global developmental needs	Relevance To the Employability/ Entrepreneurship/ Skill Development	Relevance to the Professional Ethics, Gender, Human Values, Environment & Sustainability	SDG	NEP	POE/4 <sup>th</sup> IR
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	Local	Regional	National	Global	Employability	Entrepreneurship	Skill Development	Professional Ethics	Gender	Human Values	Environment & Sustainability			
Unit I	-	-	Drug discovery boost the economy of country	-	-	-	Activities on online available computational soft wares like autodock	-	-	-	-	Skills for Decent Work; Research-related skills (case study, seminars and hands on training) (SDG 4.4)	Professional Education (17.1-17.5); Promoting High-quality research (18.1-18.9)	Technical Skills that match Industry Needs/ Hands-on Experience
Unit II	-	-	-	Learning of Techniques help to discover	-	-	Activities on online available computational soft wares	-	-	-	-	Skills for Decent Work; Research-	Professional Education (17.1-17.5); Promoting	Technical Skills that match Industry



				drugs			like schrodinger, discovery studio					related skills (case study, seminars and hands on training) (SDG 4.4)	Highj- quality research (18.1-18.9)	Needs/ Hands-on Experience
Unit III	-	-	-	Target identification and validation help in drug discovery	-	-	on online available computational soft wares like schrodinger, discovery studio	-	-	-	-	Skills for Decent Work; Research- related skills (case study, seminars and hands on training) (SDG 4.4)	Professional Education (17.1-17.5); Promoting Highj- quality research (18.1-18.9)	Technical Skills that match Industry Needs/ Hands-on Experience
Unit IV	-	-	Molecular docking fastens the drug discovery for the	-	-	on online available computational soft wares like schrodinger, discovery	-	-	-	-	Skills for Decent Work; Research- related skills	Professional Education (17.1-17.5); Promoting Highj- quality	Technical Skills that match Industry Needs; Skill Development	

			benefit of the country				studio					(case study, seminars and hands on training) (SDG 4.4)	research (18.1-18.9)	
Unit v	-	-	-	Help in drug discovery & development by inhibiting enzymes	-	-	on online available computational soft wares like QSAR toolbox	-	-	-	-	Skills for Decent Work; Research-related skills (case study, seminars and hands on training) (SDG 4.4)	Professional Education (17.1-17.5); Promoting High-quality research (18.1-18.9)	Technical Skills that match Industry Needs/ Hands-on Experience

<b>BP 808 ET</b>	<b>Cell and molecular biology (Theory)</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Version 2.0</b>		<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>

<b>Total Contact Hours</b>	45 Hours
<b>Co-requisites</b>	

**Course Objectives**

**Upon completion of this course the student should be able to:**

1. Explain the receptor signal transduction processes.
2. Explain the molecular pathways affected by drugs.
3. Appreciate the applicability of molecular pharmacology and biomarkers in drug discovery process.
4. Demonstrate molecular biology techniques as applicable for pharmacology

**Course Outcomes (CO)**

**On completion of this course, the student will be able to:**

CO1. The subject imparts a fundamental knowledge on the structure and functions of cellular components and help to understand the interaction of these components with drugs.

CO2. The subject also designed to impart knowledge about the various cell death pathways.

CO3. It helps in detail understanding of molecular biology techniques like western blotting and PCR

CO4. The students will be able to understand about the cell culture techniques.

CO5. This information will further help the student to apply the knowledge in drug discovery process.

**Programme and Course Mapping**

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2
CO1	2	2		1	2	2		2		2			2	2
CO2	2	1	2			1	2		2		2			3

<b>CO3</b>	<b>2</b>	<b>2</b>		<b>2</b>		<b>2</b>			<b>2</b>		<b>2</b>		
<b>CO4</b>		<b>1</b>			<b>2</b>	<b>1</b>	<b>2</b>		<b>2</b>		<b>2</b>		<b>1</b>
<b>CO5</b>	<b>2</b>	<b>1</b>	<b>2</b>			<b>1</b>	<b>2</b>		<b>2</b>		<b>2</b>		<b>3</b>
1=lightly mapped                      2= moderately mapped                      3=strongly mapped													

Unit	Relevance to the local, national, regional and global developmental needs				Relevance To the Employability/ Entrepreneurship/ Skill Development			Relevance to the Professional Ethics, Gender, Human Values, Environment & Sustainability				SDG	NEP	POE/4 <sup>th</sup> IR	
	Local	Regional	National	Global	Employability	Entrepreneurship	Skill Development								

Unit I				Student will able to know general pharmacology is crucial for ensuring the safe, effective, and rational use of drugs globally. It informs drug regulation, promotes rational drug use, contributes to pharmacovigilance efforts, supports global health initiatives, informs pharmacoeconomic evaluations, and fosters international collaborations and research in pharmacology.			Pharmacology as a discipline has significantly contributed to skill development in various aspects of drug therapy. It has provided the knowledge, education, and training necessary for healthcare professionals to understand drug actions, make informed therapeutic decisions, ensure drug safety, and contribute to patient care. Skill development				(SD G 4.4)	(9.1 - 9.3)	Global Education Knowledge, Skill Development, Employability
Unit II				The global impact of drugs targeting the peripheral							(SD G 4.4)	(9.1 - 9.3)	Global Education Knowledge, Skill

			nervous system is vast, with applications in treating autonomic disorders, anesthesia, neuromuscular disorders and research, allowing healthcare professionals to optimize patient outcomes by leveraging their pharmacological properties.			in pharmacology continues through lifelong learning and interdisciplinary collaboration, enabling professionals to adapt to new developments and improve patient outcomes.													Development, Employability
Unit III			The pharmacology of drugs acting on the central nervous system has profound various global applications such as neurological and psychiatric disorders, pain management									(SD G 4.4)	(9.1 - 9.3)						Global Education Knowledge, Skill Development, Employability

				sleep disorders, substance abuse, neuro-protection										
Unit IV				Cardiovascular drugs have extensive global applications and are utilized in the management of hypertension, ischemic heart disease, heart failure, arrhythmias, thromboembolic diseases, dyslipidemia, pulmonary hypertension, valvular heart disease, and secondary prevention strategies. They play a critical role in improving cardiovascular health, reducing							(SD G 4.4)	(9.1 - 9.3)	Global Education Knowledge, Skill Development, Employability	

				morbidity and mortality rates associated with cardiovascular conditions											
Unit v				Autacoids used to address inflammatory disorders, manage pain, treat cardiovascular disorders, alleviate gastrointestinal and respiratory conditions, control allergic and immune responses, address reproductive health issues, and manage renal disorders							(SD - 4.4)	(9.1 - 9.3)	Global Education Knowledge, Skill Development, Employability		

					<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
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<b>BP 809 ET</b>	<b>Cosmetic science (Theory)</b>													
<b>Version 2.0</b>											<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>
<b>Total Contact Hours</b>	45 Hours													
Herbal Drug Technology														
<b>Co-requisites</b>														
<b>Course Objectives</b>														
<b>Upon completion of this course the student should be able to:</b>														
1. Key ingredients used in cosmetics and cosmeceuticals.														
2. Key building blocks for various formulations.														
3. Current technologies in the market														
4. Various key ingredients and basic science to develop cosmetics and cosmeceuticals														
5. Scientific knowledge to develop cosmetics and cosmeceuticals with desired Safety, stability, and efficacy.														
<b>Course Outcomes (CO)</b>														
<b>On completion of this course, the student will be able to:</b>														
CO1: To make the student know about the various cosmetics products, their principles & formulation.														
CO2: To make the student understand the functioning of natural herbs using in cosmetics and cosmeceuticals														
CO3: To enable the student with the knowledge of cosmetics as per Indian and EU regulations.														
CO4: To make the student know about Principles of Cosmetic Evaluation.														
<b>Programme and Course Mapping</b>														
<b>CO</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO 10</b>	<b>PO11</b>	<b>PO12</b>	<b>PSO 1</b>	<b>PSO 2</b>

CO1	2	2		1	2	2		2		2		2	2
CO2	2	1	2			1	2		2		2		3
CO3	2	2		2		2				2		2	
CO4		1			2	1	2		2		2		1
1=lightly mapped                      2= moderately mapped                      3=strongly mapped													

Unit	Relevance to the local, national, regional and global developmental needs				Relevance To the Employability/ Entrepreneurship/ Skill Development			Relevance to the Professional Ethics, Gender, Human Values, Environment & Sustainability				SDG	NEP	POE/4 <sup>th</sup> IR
	Local	Regional	National	Global	Employability	Entrepreneurship	Skill Development	Professional Ethics	Gender	Human Values	Environment & Sustainability			
Unit I	-	-	-	Individual know Regulation/ provisions for import,			Individual know well about nation & international Regulations for					Revitalize the global partnership for sustainable development	Professional Education (17.1-17.5) Promoting High-quality	Technical Skills that match Industry Needs, Entrepreneurship, Employability

				manufacture and sale of different cosmetics product			import , export, manufacture & sales of cosmoceuticals				(Role of all Schools, KRMU) (SDG 17)	research (18.1-18.9)		
Unit II		-	-	know different health related issues, their preventive requirement & their improvement.			scientific knowledge, of different body conditions and their preventive requirements.						Global Education Knowledge	
Unit III		-	-	Individual may know different ingredients used in cosmetic formulation and their properties cosmetics and their requirements			Scientific Knowledge about ingredients, their properties and use in cosmeceuticals.					1.a Ensure significant mobilization of resources from a variety of sources...		
Unit IV		-	-	Proper & best utilization of natural resources in formulating different cosmeceutical			Increase in skill of an individual and personals.					Ensure healthy lives and promote well-being for all at all ages (SDG 3) Ensure	Technology Use & Integration (23.1-23.13)	Focus on Employability Skills (Local/Regional and Global)

				products							sustainable consumption and production patterns (SDG 12)		
Unit v				Proper & best utilization of natural resources in cosmeceutical.			Better utilization of different Natural resources in health and beauty care.				Ensure sustainable consumption and production patterns (SDG 12)	Technology Use & Integration (23.1-23.13)	Corporate Alliances to provide Big Sister/Big Brother Connections

<b>BP 810 ET</b>	<b>Experimental Pharmacology (Theory)</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Version 2.0</b>		<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>
<b>Total Contact Hours</b>	45 Hours				
<b>Pre-requisites/Exposure</b>	Pharmacology and Toxicology				
<b>Co-requisites</b>	HAP-I				
<b>Course Objectives</b>					
<b>Upon completion of this course the student should be able to:</b>					
1. Appreciate the applications of various commonly used laboratory animals.					

2. Appreciate and demonstrate the various screening methods used in preclinical research
3. Appreciate and demonstrate the importance of biostatistics and research methodology
4. Design and execute a research hypothesis independently

**Course Outcomes (CO)**

**On completion of this course, the student will be able to:**

CO1. This subject is designed to impart fundamental knowledge about the pharmacological experiments, animal's handlings and about different animals used in the experimental pharmacology.

CO2. It imparts the practical knowledge on molecular biology techniques

CO3. It helps the students to learn about different routes a drug administration and methods of blood withdrawal

CO4. The subject also designed to impart knowledge about the regulatory bodies governing experiments on animals like CPCSEA.

**Programme and Course Mapping**

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO 1	PSO 2
CO1	2	2		1	2	2		2		2			2	2
CO2	2	1	2			1	2		2		2			2
CO3	2	2		2	2	2				2			2	
CO4	2	1	2			1	2		2		2		1	

1=lightly mapped

2= moderately mapped

3=strongly mapped

Unit	Relevance to the local, national, regional and global developmental needs	Relevance To the Employability/ Entrepreneurship/ Skill Development	Relevance to the Professional Ethics, Gender, Human Values, Environment & Sustainability	SDG	NEP	POE/4 <sup>th</sup> IR
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	Local	Regional	National	Global	Employability	Entrepreneurship	Skill Development	Professional Ethics	Gender	Human Values	Environment & Sustainability			
Unit I				This unit covers the practical approaches of animal experimentation in labs Skill development			Hands on training of different techniques, s that students can learn the in vivo, ex vivo and in vitro techniques					Skills for Decent Work (SDG 4.4)	Promoting High-quality research (18.1-18.9)	Soft Skills
Unit II		-	-	Different instruments are used n measurement of BP, Skill development			Hands on training of different techniques					-	-	Soft Skills

Unit III	-	-	Hands on training of different techniques			Hands on training of different techniques					Skills for Decent Work (SDG 4.4)	Effective Governance & Leadership (19.1- 19.5)	Skill Development
Unit IV	-	-	Skill development								-	-	Skill Development
Unit v			Designing of In silico studies helps the students to get the training on lead optimization Skill development			Hands on training of different techniques					Revitalize the global partnership for sustainable development (Role of all Schools, KRMU) (SDG 17)	Transforming the Regulatory System (20.1-20.15)	Soft Skills

<b>BP 811 ET</b>	<b>Advanced Instrumentation Techniques (Theory)</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Version 2.0</b>		<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>
<b>Total Contact Hours</b>	45 Hours				
<b>Pre-requisites/Exposure</b>	Pharmaceutical Analysis				
<b>Co-requisites</b>					
<b>Course Objectives</b>					

**Upon completion of this course the student should be able to:**

1. Appreciate the applications of various commonly used laboratory animals.
2. understand the advanced instruments used and its applications in drug analysis
3. Understand the chromatographic separation and analysis of drugs.
4. Understand the calibration of various analytical instruments
5. Know analysis of drugs using various analytical instruments.

**Course Outcomes (CO)****On completion of this course, the student will be able to:**

CO1: Theory and practical knowledge of UV spectrophotometer and IR spectrophotometer.

CO2: The analysis of various drugs in single and combination dosage forms by various spectroscopic and chromatographic techniques.

CO3: Understanding NMR and Mass spectroscopy.

CO4: Theoretical and practical skills of the instruments.

**Programme and Course Mapping**

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2
CO1	2	2		1	2	2		2		2			2	2
CO2	2	1	2			1	2		2		2			2
CO3	2	2		2	2	2				2			2	
CO4	2	1	2			1	2		2		2		1	

1=lightly mapped

2= moderately mapped

3=strongly mapped



Unit	Relevance to the local, national, regional and global developmental needs				Relevance To the Employability/ Entrepreneurship/ Skill Development			Relevance to the Professional Ethics, Gender, Human Values, Environment & Sustainability				SDG	NEP	POE/4 <sup>th</sup> IR
	Local	Regional	National	Global	Employability	Entrepreneurship	Skill Development	Professional Ethics	Gender	Human Values	Environment & Sustainability			
Unit I	-	-	-	identification, characterization and quantification of drugs using UV-Visible spectroscopy, IR, Spectrofluorimetry and Flame emission spectroscopy and Atomic absorption	-	-	Theoretical and practical skills of the instruments	-	-	Right Conduct, Truth – Contains values like accuracy, fairness, honesty, justice, quest for knowledge, determination	-	Skills for Decent Work (SDG 4.4)	Professional Education (17.1-17.5)	Skill Development

				spectroscopy										
Unit II		-	-	Identification, characterization and quantification of drug using NMR Spectroscopy.	-	-	The analysis of various drugs in single and combination dosage form, Theoretical and practical skills of the instruments	-	-	Right Conduct and Truth	-	Skills for Decent Work (SDG 4.4)	Professional Education (17.1-17.5)	Skill Development
Unit III		-	-	Identification, characterization and quantification of drug using Mass Spectroscopy.	-	-	Theoretical and practical skills of the instruments	-	-	Right Conduct and Truth	-	Skills for Decent Work (SDG 4.4)	Professional Education (17.1-17.5)	Skill Development
Unit IV		-	-	Quantitative and Qualitative analysis of Drugs using Chromatographic techniques.	-	-	The analysis of various drugs in single and combination dosage form using Chromatographic techniques.	-	-	Right Conduct, accuracy, fairness, honesty, justice	-	Skills for Decent Work (SDG 4.4)	Professional Education (17.1-17.5)	Employability
Unit v	-	-	-	Use of Electrophoresis in		-	Quantitative analysis of	-	-	Right Conduct and	-	Skills for	Professional Education	Skill Development

			separation and Quantitative analysis of Drugs			Drugs			Truth		Decent Work (SDG 4.4)	(17.1-17.5)	, Employability
Unit -VI			Immunological assays in diagnosis of diseases, therapeutic drug monitoring, clinical pharmacokinetic and bioequivalence studies in drug discovery and pharmaceutical industries.			Develop skills for diagnosis of diseases, therapeutic drug monitoring, clinical pharmacokinetic and bioequivalence studies in drug discovery and pharmaceutical industries					Skills for Decent Work (SDG 4.4)	Professional Education (17.1-17.5)	Skill Development

<b>BP 812 ET</b>	<b>Dietary supplements and Nutraceuticals (Theory)</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Version 2.0</b>		<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>
<b>Total Contact Hours</b>	45 Hours				
<b>Pre-requisites/Exposure</b>	Herbal Drug Technology				

<b>Co-requisites</b>														
<b>Course Objectives</b>														
Upon completion of this course the student should be able to: 1. Understand the need of supplements by the different group of people to maintain Healthy life.														
<b>Course Outcomes (CO)</b>														
On completion of this course, the student will be able to: 1. Understand the need of nutrients by the different group of people to maintain Healthy life. 2. Understand the outcome of deficiencies in dietary supplements. 3. Appreciate the components in dietary supplements and the application. 4. Appreciate the regulatory and commercial aspects of dietary supplements including health claims														
<b>Programme and Course Mapping</b>														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2
CO1	2	2		1	2	2		2		2			2	2
CO2	2	1	2			1	2		2		2			2
CO3	2	2		2	2	2				2			2	
CO4	2	1	2			1	2		2		2		1	
1=lightly mapped                      2= moderately mapped                      3=strongly mapped														

Unit	Relevance to the local, national, regional and global developmental needs				Relevance To the Employability/ Entrepreneurship/ Skill Development			Relevance to the Professional Ethics, Gender, Human Values, Environment & Sustainability			SDG	NEP	POE/4 <sup>th</sup> IR
Unit I	Local	Regional	National	Global	Employability	Entrepreneurship	Skill Development	Professional Ethics	Gender	Human Values	Environment & Sustainability		
				Understand the need of nutrients by the different group of people to maintain			Skills related to Appreciate the components in dietary supplements and the application		Better Quality of herbal Drug		Skills for Decent Work (SDG 4.4)	Professional Education (17.1-17.5)	Global Education Knowledge Technical Skills that match Industry Needs, Skill

				n Health y life					gs				Develo pment
Unit II	-	-	-	regulat ory and comme rcial aspects of dietary supple ments includi ng health claims			-		B e t t e r y i e l d		Skil ls for Dec ent Wor k (SD G 4.4)	Prof essi onal Edu cati on (17. 1- 17.5 )	Global Educati on Knowle dge Techni cal Skills that match Industr y Needs, Skill Develo pment
Unit III	-	-	-	-			-.		E n v i r o n m e n t c o n s e r v a t i o		Skil ls for Dec ent Wor k (SD G 4.4)	Prof essi onal Edu cati on (17. 1- 17.5 )	Global Educati on Knowle dge Techni cal Skills that match Industr y Needs, Skill

										n				Develo pment
Unit IV	-	-	-							Tr ad iti o na l k n o w le d ge		Skil ls for Dec ent Wor k (SD G 4.4)	Prof essi onal Edu cati on (17. 1- 17.5 )	Global Educati on Knowle dge Techni cal Skills that match Industr y Needs, Skill Develo pment
Unit v										N e w er dr u gs fr o m na tu ra		Skil ls for Dec ent Wor k (SD G 4.4)	Prof essi onal Edu cati on (17. 1- 17.5 )	Global Educati on Knowle dge Techni cal Skills that match Industr y Needs,

										l re so ur ce s				Skill Develo pment
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<b>BP 813 PW</b>	<b>Project work</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Version 2.0</b>		<b>0</b>	<b>0</b>	<b>12</b>	<b>6</b>
<b>Total Contact Hours</b>	45 Hours				
Herbal Drug Technology					
<b>Co-requisites</b>					