PRAVARA RURAL EDUCATION SOCIETY'S

PRAVARA RURAL COLLEGE OF PHARMACY, PRAVARANAGAR

A/P. LONI, TAL- RAHATA, DIST-AHMEDNAGAR (413736)

(Accredited with "A" grade by NAAC)

SECOND YEAR B-PHARMACY

Academic Booklet2022-23

INDEX

I. VISION, MISSION AND GOALS OF INSTITUTE

- : VISION: -

To become a center of excellence in pharmaceutical education, training, research and continuous professional development of pharmacists in rural India.

- : MISSION: -

1. Our mission is to introduce excellence in Pharmacy education through quality education, infrastructure and learning resources to meet the needs of students in pursuit of knowledge.
2. To develop, promote and nurture research activities in pharmaceutical sciences
3. To make professionally competent and ethical pharmacists of international standard to cater the needs of rural to global healthcare.

-: GOALS:-

1. To educate and train pharmacists to cater for the needs of society.

2. To promote use of indigenous resources for pharmacy industry.

3. To create excellent research center at college to provide many innovative research methods to develop Institute-Industrial linkages.

4. To develop consortium for consultancy service in education, training, health care with reference to pharmacy profession.

5. To increase the global linkages by attracting international scientific forums for Collaborative educational programmes.

II. PROGRAMME OUTCOMES

PROGRAMME OUTCOMES (B. Pharm)

The Program Outcomes of Bachelor in Pharmacy course are:

1. Pharmacy Knowledge: An ability to acquire, demonstrate, core and basic knowledge of Pharmaceutical and Life Sciences

2. Planning Abilities: An ability to develop, implement, effectively plan and organize work using time management, resource management, delegation skills and Organizational skills to achieve goals in specified timeline.

3. Problem Analysis: An ability to identify, analyze, interpret data and take appropriate decision to solve problems related to routine Pharmacy Practices by applying acquired knowledge.

4. Modern Tool Usage: An ability to understand, choose and utilize Modern techniques and computing tools for Pharmacy practices by considering constraints.

5. Leadership Skills: An understanding of pharmaceutical management principles and apply these to one's own work, as a member and leader in a team, to manage projects to facilitate improvement in social health and well-being.

6. Professional Identity: An ability to recognize, analyze and communicate Pharmacy professional values as a healthcare promoter.

7. Pharmaceutical Ethics: An ability to understand and use professional, ethical, legal, social issues and responsibilities for wellbeing of the society.

8. Communication: An ability to comprehend, write reports, present and document to communicate effectively for exchange of professional information to Pharmacy community and society.

9. The Pharmacist and Society: An ability to overcome the societal, health and legal problems by providing better pharmaceutical care relevant to the Pharmacy profession.

10. Environment and Sustainability: An ability to recognize the impact of the professional Pharmaceutical solutions in social and environmental circumstances for sustainable development.

11. Life-Long Learning: An ability to recognize the need to engage in continuous Professional development by taking in consideration timely feedback and technological changes for lifelong learning process.

III. GOVERNING BODY

Sr. No.	Name	Designation
1	Hon. Shri. Radhakrishna Eknathrao Vikhe Patil Chairman, Pravara Rural Education Society	Chairman
2	Hon. Shri. Annasaheb Sarangdhar Mhaske Patil Trustee, PRES	Member
3	Hon.Shri Bhaskarrao N.Kharde Patil Director PRES Loni	Member
4	Hon Shri Kailas S.Tambe Patil Director PRES Loni	Member
5	Shri Bharat Ghogare, Joint Secretary, PRES	Member
6	Dr. Sambhaji Nalkar Chief Scientist, KVK Babhaleshwar	Member
7	Ex- officio Member	Nominee, All India Council for Technical Education (AICTE)- Regional officer
8	Nominee of affiliating University	Nominee of affiliating University- Savitribai Phule Pune University
9	Ex-officio Member	Nominee of the State Government- Director of Technical Education (DTE) (Ex-officio) represented by Joint Director DTE office, Nashik
10	Dr.B.M.Patil, Representative of Teacher	Member
11	Dr. Santosh B. Dighe , Representative of Teacher	Member
12	Mr.Chetan Patni	Managing Director at Kaytross ACG Lifesciences Ltd.Nashik

13	Dr.Rahul Kunklol	Director Research PIMS Loni
14	Dr.Suhas S.Siddheshwar, Representative of Teacher	Member
15	Dr. Sanjay B. Bhawar Principal, Pravara Rural College of Pharmacy, Loni	Member Secretary

IV. COLLEGE DEVELOPMENT COMMITTEE

Sr.No.	Name	Designation
1	Hon. Shri Radhakrishna Vikhe Patil Chairman PRES Loni	Chairman
2	Shri Bharat V.Ghogare Patil Joint secretary PRES Loni	Member
3	Dr. Suhas S.Siddheshwar HOD, Pharmaceutics	Member
4	Dr. B.M.Patil Senior professor	Member
5	Dr. Someshwar D.Mankar Training and Placement Officer	Member
6	Mrs.Hemlata S.Bhawar HOD, Pharmaceutical Chemistry	Member
7	Mr. Ramakant A.Vikhe Non - Teaching Staff Representative	Member
8	Hon.Shri Bhaskarrao N.Kharde Patil Educationist, Director PRES Loni	Member
9	Dr.S.N.Hiremath Principal PRES COP(Diploma) Loni	Member
10	Dr.Sambhaji Nalkar Chief Scientist KVK Babeleshawar	Member
11	Mr. Prashant B.Gagare Entrepreneur and Alumnus	Member
12	Dr.Santosh B. Dighe IQAC Co-Ordinator	Member
13	Mr. Pratik Malwade Student Representative	Member
14	Mr. Vipul Karnjekar Student Representative	Member
15	Dr. Sanjay B.Bhawar	Principal & Member secretary

V. LIST OF COMMITTEES AND MEETINGS

Sr.No	**Name of the committee/Cell**	Convener	**Date of Meeting**
1	Academic/ Program Committee	Dr.S R Vikhe	Every month of 5 th
2	Admission Committee	Mr.D NVikhe	17/3/23, 3/6/23
3	Affiliations Cell (SPPU/PCI/AICTE/DTE)	Dr.A P Patel	8/8/22, 27/12/22
4	Alumni Cell	Mrs.H.S Bhawar	8/8/22, 3/1/23
5	Antiragging Committee/Antiragging squad	Dr.R J Bhor	2/8/22, 8/11/22, 14/2/23, 16/5/23& As case arrives
6	Student Development/ Welfare Committee	Dr.RJ Bhor	17/8/22, 4/10/22 19/12/22, 15/2/23
7	Career Guidance /Training & Placement Cell	Dr.S D Mankar	18/8/22, 10/10/22 5/1/23,10/4/23
8	Sports & Extracurricular activity Committee	Dr.A P Patel	8/8/22, 7/1/23, 13/2/23, 16/5/23
9	Code of Conduct & Discipline Committee	Dr.S R Vikhe	3/10/22, 8/2/23& As case arrives
10	Skill & Entrepreneurship Development Cell	Mr.G S Shinde	2 2/8/22, 12/12/22
11	Student Council	Dr.R J Bhor	8/8/22, 3/10/22, 12/12/22, 13/2/23, 17/4/23
12	Examination Committee	Mr.AS Dighe	12/9/22, 14/11/22
13	Grievance Redressal Cell	Mr.S D Magar	30/8/22, 3/3/23& As case arrives
14	Hostel Committee	Mrs.S AVikhe	13/8/22, 26/11/22, 28/1/23, 25/3/23& As case arrives
15	IAEC	Dr.S B Dighe	5/9/22, 15/2/23
16	Institute-Industry Interaction cell		13/9/22, 24/1/23, 20/4/23
17	IQAC	Dr. S B Dighe	26/8/2022,28/11/22 27/2/23,31/5/23

18	Library Committee	Dr.R K Godage	2/6/22, 6/9/22, 9/12/22, 6/3/22
19	Purchase &Maintenance Committee	Mr.S D Magar	15/6/22 15/12/22
20	Student Mentoring Committee	Dr.R K Godage	7/10/22, 25/1/23,28/3/23
21	Equal Opportunity Cell (SC/ST/OBC/Minority &Divyangan)	Mrs.H S Bhawar	18/8/22, 15/12/22
22	NSS	Mr.M S Bhosale	22/8/22, 14/10/22, 7/12/22, 17/3/23
23	Publicity Committee	Mr.D N Vikhe	1/7/222, 24/4/23
24	Women Empowerment Cell	Mrs. K V Dhamak	27/8/22, 25/2/23
25	Internal Complaints Committee & Antiharassment Squad	Mrs. K V Dhamak	24/12/22, 22/4/23
26	CDC	Dr.S B Bhawar	15/9/22, 11/1/23
27	GB	Dr.S B Bhawar	6/10/22, 8/2/23
28	Research Committee (Promotion & Evaluation)	Dr.S S Siddheshwar	17/8/22, 15/11/22, 28/1/23, 11/4/23
29	Innovation & Incubation Cell	Dr.S S Siddheshwar	17/8/22, 15/11/22, 13/2/23
30	DIC	Dr. S B Dighe	28/8/22, 23/1/23
31	Parent Teacher Association	Mrs.T S Nirmal	25/9/22, 16/2/23
32	Website Committee	Mr.M H Kolhe	12/8/22, 18/1/23
33	Scholarship Committee (Non-Government)	Mr.G S Shinde	13/9/22, 23/1/23

VI. ACADEMIC CALENDAR UNIPUNE 2022-23

Savitribai Phule Pune University
(Formerly University of Pune)

Circular No.38 of 2023

Dates of Commencement and Conclusion of terms for the Academic Year 2022-23 for University Department / Affiliated Colleges / Recognised Institutes.

It is hereby informed that, the revised dates of commencement and conclusion of the First and Second term of University Courses, under various faculties, for the academic year 2022-23 shall be as under.

Sr No	Name of the Courses , Faculties & Year	2022 - 2023			
		First Term		Second Term	
		Commencement	Conclusion	Commencement	Conclusion
1	**Science & Technology**				
	B.Pharmacy : I	27/12/2022	25/04/2023	15/05/2023	31/08/2023
	M.Pharmacy : I	27/12/2022	25/04/2023	15/05/2023	31/08/2023
2	**Interdisciplinary Studies**				
	M. S. W.	12/07/2022	20/12/2022	04/01/2023	13/05/2023
3	**Commerce & Management**				
	M.B.A./ M.C.A.: I	01/11/2022	03/03/2023	05/04/2023	07/07/2023
	M.B.A. : II	01/09/2022	30/01/2023	05/04/2023	07/07/2023
	M.C.A. : II	01/09/2022	16/12/2022	05/04/2023	07/07/2023
4	**Humanities**				
	L.L.B. / B.A. L.L.B.- II	31/10/2022	25/02/2023	18/03/2023	11/07/2023

NOTE :

1. In case, the Principal of the Affiliated Colleges require to give additional holiday in exceptional circumstances, he/she may do so by compensating the same by keeping the College working on Sunday.

Deputy Registrar
(P.G.Admission)

Ref. No. PGS/1188
Date: 06/03/2023

Copy to: for Information and necessary action

The Members of the Management Council.
The Deans of Faculties.
The Registrar, Savitribai Phule Pune University, Pune.
The Director, Examinations & Evaluation, Savitribai Phule Pune University, Pune.
The Heads of all University Departments.
The Principals of all Affiliated Colleges.
The Directors of all Recognized Institutes.
The Heads of all the Administrative Sections of the University Office.
Asstt. Registrar, office of the Hon. Vice-Chancellor, Savitribai Phule Pune University
Asstt. Registrar, office of the Hon. Pro-Vice-Chancellor, Savitribai Phule Pune University

PRAVARA RURAL EDUCATION SOCIETY'S
PRAVARA RURAL COLLEGE OF PHARMACY
LONI

VII. ACTIVITY CALENDAR 2022-23

Sr. No.	Date- Day	Name of the activity
1	August-2022	
	2-Tuesday	Anti-ragging committee meeting
	5-Friday	NSS Cell -Selection of NSS volunteers
	8-Monday	Student council meeting
	8-Monday	Affiliation cell meeting
	8-Monday	Sport and extracurricular activity committee meeting
	12-Friday	Web site committee meeting
	13-Saturday	Academic Committee meeting
	13-Saturday	Hostel committee meeting
	15-Monday	NSS Cell -Har Ghar Tiranga , cleaning drive & celebration of Independence day
	17-Wednesday	Student welfare committee
	17-Wednesday	Innovation & incubation cell meeting
	17-Wednesday	Research committee meeting
	18-Thursday	TPC Cell- Expert lecture to T.Y.B.and Final Y.B.Pharm student
	18-Thursday	Career guidance/Training placement cell meeting
	20-Saturday	TPC Cell- Industrial visit of S.Y.B.Pharm at SciTech Sinnar
	22-Monday	TPC Cell- Industrial visit of T.Y.B.Pharm at Sahyadri Farms, Nashik
	22-Monday	NSS cell meeting
	25-Thursday	TPC Cell- Industrial visit of Final .Y.B.Pharm at Premium Serum, Narayangaon
	26-Friday	IQAC Meeting
	27-Saturday	Women Empowerment cell meeting
	27-Saturday	TPC Cell- GPAT / NIPER training Session by Dr. Machhindra Bochare
	29-Monday	DIC meeting
	29-Monday	National Sport Day celebration
	30-Tuesday	Grievance Redressal committee meeting
	30-Tuesday	TPC Cell- Training session by IRA Research Consultancy
	31-Wednesday To 6- Tuesday	Cultural Dept - Ganapati Festival celebration
2	September-2022	
	3-Saturday	TPC Cell- GPAT / NIPER training Session Mr.Pratap Pawar
	5-Monday	IAEC meeting

	5-Monday	Blood donation camp
	6-Tuesday	Library committee meeting
	7-Wednesday	TPC Cell-Expert session by Dr. Rahul Kumar Garg
	10-Saturday	Academic Committee meeting
	10-Saturday	TPC Cell- Expert session by Mr. Vikrant Dhamak
	12-Monday	Examination committee meeting
	14-Wednesday	TPC Cell- Workshop on Pharmacovigilance by Kite-Ai
	19- Monday	TPC Cell- NSS Awareness Rally "Road Safety Program" with Traffic Police Department, Loni
	19- Monday To 23-Friday	S.Y. T.Y.& Final Y.B.Pharm first Practical continuous assessment examination
	24-Saturday	First Progress review presentation of M. Pharm students
	24-Saturday	Alumni Cell -Expert lecture by Alumni
	26- Monday	TPC Cell- One Day Workshop for students. Lecture on "NSS and Personality Development". Essay Competition on NSS Day Celebration.
	26- Monday To 30-Friday	S.Y. T.Y.& Final Y.B.Pharm first Theory continuous assesement examination
	29-Tuesday	NSS Cell-Body check-up program on occasion of World Heart day.
	30-Friday	NSS Cell-Rain Water Harvesting Program in College Campus
3	October-2022	
	1-Saturday	TPC Cell- Soft skill Training by GTT Foundation
	2-Sunday	NSS Cell-Gandhi Jayanti" Communal Harmony Day & International Day of Non-Violence. Cleaning program in college campus. Quiz and Debate competition
	3-Monday	Code of conduct meeting
	3-Monday	Student council meeting
	4-Tuesday	Student development committee meeting
	5-Wednesday	TPC Cell-Expert session by Dr.Parivallal Padbnabhan
	7-Friday	Student Mentoring Committee meeting
	8-Saturday	Academic Committee meeting
	8-Saturday	IQAC Cell-Seminar on molecular Docking
	10-Monday	Career guidance/Training placement cell meeting
	10-Monday	TPC Cell- GPAT / NIPER training Session by Mr.Harshad Jadhav
	14-Friday	NSS cell meeting
	14-Friday	TPC Cell- Expert session by Mr. Machindra Patare
	15-Saturday	Alumni Cell- Expert lecture by Alumni
	20-Thursday	TPC Cell- Expert session by Dr.Rahul Rahane
	25-Tuesday	TPC Cell- Expert session by Mr.Shivprasad Khose

	27-Thursday	TPC Cell- Training session by CLINI INDIA
4	November-2022	
	5-Saturday	TPC Cell- One day workshop by Shodh Advantech
	5-Saturday	TPC Cell- Expert session by Dr.R.T.Dolas
	7-Monday	NSS Cell-Swaccha Wari-Swasth WariNirmal Wari-HaritWari Program
	7-Monday	Sports & Extracurricular activity Committee meeting
	7-Monday To 9-Wednesday	Cultural Dept- Induction Day program (B.Pharm & M.Pharm)
	7-Monday	Grievance Redressal committee meeting
	8-Tuesday	Antiragging Committee/Antiraggingsquad
	10-Thursday	TPC Cell- Workshop on Research Methodology Dr.Abhay Gandhi
	12-Saturday	Academic Committee meeting
	12-Saturday	Fresher's party (Genesis)
	14-Monday	Examination committee meeting
	15-Tuesday	TPC Cell- Training Session by Rubicon India
	15-Tuesday	Research Committee (Promotion & Evaluation) meeting
	15-Tuesday	Innovation & Incubation Cell meeting
	16-Wednesday	Second Progress review presentation & Journal club of M.Pharm students
	18-Friday	IQAC Cell- Workshop on Application of Network Pharmacology
	19-Saturday	Alumni Cell -Expert lecture by Alumni
	20-Sunday	TPC Cell- GPAT training session by Mr.Vikrant Dhamak
	21- Monday To 25- Friday	F.Y.S.Y. T.Y.& Final Y.B.Pharm Second Practical continuous assessment examination
	26- Saturday	NSS Cell-Constitution Day (Savidhan Din) Lecture on Importance of Constitution.
	28- Monday To 3- Saturday	F.Y S.Y. T.Y.& Final Y.B.Pharm Second Theory continuous assesement examination
	26- Saturday	Hostel Committee meeting
	28- Monday	IQAC meeting
	30-Wednesday	NSS Cell-Cleaning Program at "Dudheshwar temple" Nimgaonjali under Swacchata Abhiyan Program
5	December-2022	
	1-Thursday	NSS Cell-AIDS awareness rally in Loni village on occasion of World AIDS Day Celebration
	2-Friday	Odd semester SPPU Semester Theory & Practical Exam

	7-Wednesday	NSS meeting
	9-Friday	Library Committee meeting
	10-Saturday	Academic Committee meeting
	10-Saturday	IQAC Cell- Hands on Training on Design expert software
	12-Monday	Alumni Cell-Expert lecture by Alumni
	12-Monday	Student council meeting
	15-Thursday	Purchase committee meeting
	12-Monday To 18-Sunday	NSS special camp
	24-Saturday	Women Empowerment Cell meeting
	24-Saturday	Internal Complaints Committee & Anti-harassment Squad Meeting
6	January-2023	
	3-Monday	Alumni Cell meeting
	3-Monday	Third Progress review presentation & Journal club of M. Pharm Students
	5-Thursday	Career guidance/Training placement cell meeting
	5-Thursday	TPC Cell- Industrial visit final year B.Pharm
	6-Friday	Parents meet
	7-Saturday	TPC Cell- Industrial visit Third year B. Pharm
	10-Tuesday	IQAC Cell-Workshop on scientific publication
	10-Tuesday	TPC Cell- Industrial visit Second year B. Pharm
	12-Thursday	NSS Cell-Lecture on self-confidence on occasion of national youth day
	13-Friday	Academic Committee meeting
	15-Sunday	NSS Cell- Swacchata Abhiyan at College
	18-Wednesday	Website Committee meeting
	18-Wednesday	TPC Cell- Industrial visit First year B.Pharm
	23-Monday	Scholarship Committee (Non-Government) meeting
	23-Monday	DIC meeting
	24-Tuesday	Industry and Institute interaction cell meeting
	25-Wednesday	NSS Cell-National voters Day celebration
	25-Wednesday	Student Mentoring Committee meeting
	26-Thursday	NSS Cell-Republic Day celebration

	28-Saturday	Hostel Committee meeting
	28-Saturday	TPC Cell-Workshop on Personality Development by Jeevan Sanjivani, Satara
	30-Monday	NSS Cell-Visit & awareness program at Lohare orphan school on occasion of world leprosy Day
	31-Tuesday	Alumni Cell-Expert lecture by Alumni
7	February-2023	
	1-Wednesday	Field visit of Third year B.Pharm
	2-Thursday	NSS Cell-Self-defense training program
	4-Saturday	NSS Cell- Cancer Awareness & Medicine Counseling Rally on occasion World Cancer Day.
	8-Wednesday	Code of Conduct & Discipline Committee meeting
	10-Friday	TPC Cell- Workshop on Good Clinical Practices
	11-Saturday	Academic Committee meeting
	11-Saturday	Alumni Cell-Expert lecture by Alumni
	12-Sunday	Alumni Meet
	13-Monday	Student council meeting
	13-Monday	Affiliation cell meeting
	13-Monday	Research Committee (Promotion & Evaluation) meeting
	13- Monday	Innovation & Incubation Cell meeting
	14-Tuesday To 19-Sunday	NSS Cell- Youth week' celebration with following activity I. Poster Competition II. Just a Minute, III. Debate Competition, IV. Rangoli competition V. Guest Lecture.
	15-Wednesday	TPC Cell- Expert session on Entrepreneurship Development
	15-Wednesday	IAEC meeting
	16-Thursday To 24-Friday	Annual sport Day
	16-Thursday	Parent Teacher Association meeting
	16-Thursday	IQAC Cell-Workshop on HPTLC
	25-Saturday	TPC Cell- Workshop on Herbal drug Standardization by Dr. Punit Rachh
	25-Saturday	Women Empowerment Cell meeting
	25-Saturday	Internal Complaints Committee & Anti-harassment Squad Meeting
	22 –Wednesday to 24-Friday	Cultural day's
	25-Saturday	Annual social gathering 2k23
	27-Monday To 3-Friday	First Sessional Practical Examination B & M.Pharm
	27-Monday	IQAC meeting

8	March-2023	
	3-Friday	Grievance Redressal committee meeting
	6—Monday	Library Committee meeting
	9- Thursday To 14-Tuesday	First sessional Theory Examination B & M.Pharm
	10-Friday	NSS Cell- Guest Lecture and Health Hygiene Program on occasion of World Women's Day'
	11-Saturday	Academic Committee meeting
	17-Friday	NSS meeting
	17-Friday	Admission committee meeting
	25-Saturday	Hostel Committee meeting
	25-Saturday	Alumni Cell-Expert lecture by Alumni
	28-Tuesday	Student Mentoring Committee meeting
	28-Tuesday	TPC Cell- Industrial Visit of F.Y.M.Pharm
9	April-2023	
	5-Wednesday	TPC Cell- Expert lecture by Mr. Ravi Gaware
	6-Thursday	Sport Dept.-International sport Day celebration
	7-Friday	TPC Cell- Training session by Smart Chem Plus
	7-Friday	NSS Cell- Health Check-Up Camp on Occasion of World Health Day
	8-Saturday	Academic Committee meeting
	10-Monday	TPC Cell- Expert lecture by Dr.Sayyad Sadik
	11-Tuesday	Research Committee (Promotion & Evaluation) meeting
	17- Monday	Student council meeting
	20-Thursday	Industry and Institute interaction cell meeting
	22-Saturday	Women Empowerment Cell meeting
	22-Saturday	Alumni Cell-Expert lecture by Alumni
	22-Saturday	Internal Complaints Committee & Anti-harassment Squad meeting
	27-Thursday	Publicity Committee meeting
10	May-2023	
	3-Wednesday	Academic Committee meeting
	2- Monday To 6-Saturday	Second Sessional Practical Examination
	8- Monday To 12-Friday	Second sessional Theory Examination B & M. Pharm
	13- Saturday	Cultural Dept.- Farewell function
	14-Sunday	SPPU Even Semester Examination Theory and Practical

	16-Tuesday	**Anti-ragging Committee/Anti-ragging squad meeting**
	17-Wednesday	**Parents meet**
	16-Tuesday	**Sports & Extracurricular activity Committee meeting**
	27-Saturday	**Hostel Committee meeting**
	31-Wednesday	**IQAC meeting**
	31-Wednesday	**NSS Cell- Lecture on Tobacco side effect on occasion of Anti-Tobacco Day 2023.**
11	**June-2023**	
	1-Thursday To 6-Tuesday	**M. Pharm Thesis submission**
	2-Friday	**Admission committee meeting**
	6-Tuesday	**Student Mentoring Committee meeting**

VIII. COURSE STRUCTURE & SCHEME FOR EXAMS ASSESMENT

Table-III: Course of study for semester III

Course code	Name of the course	No. of hours per week/Total No. of hours	Tutorial	Credit points
BP301T	Pharmaceutical Organic Chemistry II – Theory	3/45	1	4
BP302T	Physical Pharmaceutics I – Theory	3/45	1	4
BP303T	Pharmaceutical Microbiology – Theory	3/45	1	4
BP304T	Pharmaceutical Engineering – Theory	3/45	1	4
BP305P	Pharmaceutical Organic Chemistry II – Practical	4/60	-	2
BP306P	Physical Pharmaceutics I – Practical	4/60	-	2
BP307P	Pharmaceutical Microbiology – Practical	4/60	-	2
BP 308P	Pharmaceutical Engineering –Practical	4/60	-	2
	Total	**28/420**	**4**	**24**

Semester III

Course code	Name of the course	Internal Assessment				End Semester Exams		Total Marks
		Continuous Mode	Sessional Exams		Total	Marks	Duration	
			Marks	Duration				
BP301T	Pharmaceutical Organic Chemistry II – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP302T	Physical Pharmaceutics I –Theory	10	15	1 Hr	25	75	3 Hrs	100
BP303T	Pharmaceutical Microbiology – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP304T	Pharmaceutical Engineering – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP305P	Pharmaceutical Organic Chemistry II – Practical	5	10	4 Hr	15	35	4 Hrs	50
BP306P	Physical Pharmaceutics I – Practical	5	10	4 Hr	15	35	4 Hrs	50
BP307P	Pharmaceutical Microbiology – Practical	5	10	4 Hr	15	35	4 Hrs	50
BP308P	Pharmaceutical Engineering – Practical	5	10	4 Hr	15	35	4 Hrs	50
	Total	**60**	**100**	**20**	**160**	**440**	**28Hrs**	**600**

IX. EVALUATION GUIDELINES

Scheme for Continuous mode (Theory): [Total: 10 Marks]

Criteria	Maximum Marks	
Attendance	4	2
Academic activities (Average of any 2 activities e.g. class test, quiz, assignment,open book test, field work, group discussion and seminar)	4	3
Student -Teacher interaction	2	
Total	10	05

Guidelines for the allotment of marks for attendance Percentage of

Attendance	Theory
95 – 100	4
90 – 94	3
85 – 89	2
80 – 84	1
Less than 80	0

In-Semester Examination (Sessional): [Total: 15 Marks]

Two Sessional exams shall be conducted for each theory / practical course as per theschedule fixed by the college. The scheme of question paper is given below. The average marks of two Sessional exams shall be computed for internal assessment.

Paper pattern and marks distribution for In Semester Exam: As per universityguideline

I. Objective Type Questions (Answer 5 out of 7) = 05 x 2 = 10
II. Long Answers (Answer 1 out of 2) = 1 x 10 = 10
II. Short Answers (Answer 2 out of 3) = 2 x 5 = 10

Total = 30 marks (1.5 Hrs)

Sessional exam shall be conducted for 30 marks for theory and shall be computedfor 15 marks.

End Semester Examination [Total: 75 Marks]:

Paper pattern and marks distribution for End Semester Exam: As per universityguideline

I. Objective Type Questions (Answer 5 out of 7) = 5 x 3 = 15

II. Long Answers (Answer 2 out of 4) = 2 x 10 = 20

II. Short Answers (Answer 8 out of 10) = 8 x 5 = 40

Total = 75 marks (3 hrs)

XI.

SECOND YEAR B. PHARMACY

SEMESTER-III

PHARMACEUTICCAL ORGANIC CHEMISTRY-II (Theory) BP 301T

1. COURSE DETAILS

Course Name and code: PHARMACEUTICCAL ORGANIC CHEMISTRY-II (Theory) BP 301T

Year and Semester: II Year III Semester

Year of study: 2022-23 (2019 Pattern)

2. SCOPE:

This subject deals with general methods of preparation and reactions of some organic compounds. Reactivity of organic compounds is also studied here. The syllabus emphasizes on mechanisms & orientation of reactions. Chemistry of fats and oils are also included in the syllabus.

3. OBJECTIVES:

Course Objectives:

Upon the completion of the course student shall be able

1. To write the structure, name and the type of isomerism of the organic compound.
2. To write the reaction, name the reaction and orientation of reactions.
3. To account for reactivity/stability of compounds.
4. To prepare organic compounds.

4. SYLLABUS:

Theory	Practical	Tutorial	Credits
3	-----	1	4

Unit	Content	Session in Hrs.
1	**UNIT-I** **Benzene and its derivatives**	10

	Introduction to benzene, orbital picture, resonance in benzene, Huckel's rule Reactions of benzene - nitration, sulphonation, halogenation- reactivity, Friedel-Craft's alkylation- reactivity, limitations, Friedel-Craft's acylation. Substituents, effect of substituents on reactivity and orientation of mono substituted benzene compounds towards electrophilic substitution reaction.	
2	**Phenols* -** Acidity of phenols, effect of substituents on acidity, qualitative tests for phenols, structure and uses of phenol, cresols, resorcinol, naphthols **Aromatic Amines*** - Basicity of amines, effect of substituents on basicity, Nitrosation reaction, coupling and Sandmayer's reaction, Hinsberg Test, synthetic uses of aryl diazonium salts	08
3	**UNIT-III** **Stereo Isomerism** **Optical isomerism** Elements of symmetry, chiral and achiral molecules Optical activity, enantiomerism, diastereoisomerism, *meso* compounds D & L system of nomenclature of optical isomers, sequence rules, *R* & *S* system of nomenclature of optical isomers **Geometrical isomerism** Nomenclature of geometrical isomers (*Cis & Trans, E* & *Z, Syn & Anti* systems) Methods of determination of configuration of geometrical isomers.	10
4	**UNIT-IV** **Polynuclear hydrocarbons** Synthesis, reactions and structure and medicinal uses of naphthalene, phenanthrene, anthracene, diphenylmethane, triphenylmethane and their derivatives.	10
5	**UNIT-V** **Cycloalkanes*** Stabilities – Baeyer's strain theory, limitation of Baeyer's strain theory, Coulson and Moffitt's modification, Sachse Mohr's theory (Theory of strainless rings), reactions of cyclopropane and cyclobutane only.	05
6	**UNIT-VI** Fats and Oils - Hydrolysis, Hydrogenation, Saponification and Rancidity of oils.	02
		45

5. COURSE OUTCOME (CO)

After successful completion of course student will able to

Cognitive level (CL): Bloom's taxonomy Cognitive level (1/2/3/4/5/6)

Knowledge Category (KC): F= Factual Knowledge, C= Conceptual Knowledge, P= Procedural Knowledge, M= Metacognitive Knowledge

CO	Course Outcomes	CL (Cognitive level)	KC (Knowledge Category)	Class Session Hrs.	Units
CO1	Discuss the reactions & orientation of reaction of benzene & its derivatives towards electrophilic substitution reactions	**3**	P	10	1
CO2	Explain general methods of preparation and reactions of phenols and aromatic amines	3	P	8	2
CO3	Discuss stereoisomerism of organic compounds with respective types, structure, nomenclature, assigning the configuration & their significance on biological activity.	**3**	C	10	3
CO4	Differentiate the polynuclear medicinal organic compounds with respect to their chemistry.	2	C	10	4
CO5	Summarize different theories related to stability of cyloalkane & reactivity of cyclopropane & cyclobutane.	2	C	5	5
CO6	Describe the chemistry of fats and oils	2	F	2	6

6. Mapping of Course Outcome (CO) with Program Outcome (PO)

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO 9	PO 10	PO 11
CO1	√	--	√	--	--	--	--	√	--	--	√
CO2	√	--	√	--	--	--	--	√	--	--	√
CO3	√	--	√	√	--	--	--	√	--	--	√
CO4	√	--	√	√	--	--	--	√	--	--	√
CO5	√	--	√	--	--	--	--	√	--	--	√
CO6	√	--	√	--	--	--	--	√	--	--	√

7.JUSTIFICATION:

CO's	Justification
CO1	PO1: Knowledge of chemical reaction principles and concept of benzene and its derivatives which required for synthesis of organic compounds PO3: To study of principles of reactions & orientation of benzene & its derivatives, To analyze the physical and chemical characteristic (M.P, B.P, pH) PO8: To Write effective reports and presentation of same PO11: Knowledge of reactions & orientation of benzene & its derivatives to utilize in recent technological changes
CO2	PO1: Knowledge of chemical reaction, preparation and its principles of phenols and aromatic amines which required for synthesis of organic compounds PO3: To study of chemical reaction, preparation and its principles of phenols and aromatic amines, To analyze the physical and chemical characteristic (M.P, B.P, pH) PO8: To Write effective reports and presentation of same PO11: Knowledge of chemical reaction, preparation and its principles of phenols and aromatic amines to utilize in recent technological changes
CO3	PO1: Knowledge of stereoisomerism and its configuration (R& S, E&Z) of various organic compounds PO3: For analyzing stereochemistry and its configuration of various organic compounds and to check significance of biological activity according to its stereochemistry and its configuration.

	PO4: Molecular docking and other modern tools helps to study the various stereoisomers and configurations and their related biological activity. PO8: To Write effective reports and presentation of same PO11: Knowledge of stereoisomerism and its configuration (R& S, E&Z) of various organic compounds utilize in recent technological changes
CO4	PO1: Knowledge related to the chemistry and medicinal uses of polynuclear hydrocarbon PO3: Relevant to perform experiments, analylze and interpret the data. PO4: It deals with modern tools and techniques for pharma process PO8: To Write effective reports and presentation of same PO11: It deals with understanding and implementing theoretical and practical knowledge in pharmacy practice.
CO5	PO1: Knowledge of theories related to stability & reactivity of cycloalkanes PO3:Analyze the stability & reactivity of cycloalkanes PO8: To Write effective reports and presentation of same PO11: Knowledge of theories related to stability & reactivity of cycloalkanes were utilize in recent technological changes
CO6	PO1: Knowledge of chemistry of fats and oils used for differentiation of fats and oils with physical and chemical properties PO3: To evaluate the acid value, saponification value of fats and oils PO8: To Write effective reports and presentation of same PO11: Knowledge chemistry of fats and oils were utilize in recent technological changes

8. MAPPING STRENGTH OF CO's To PO's

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO 9	PO 10	PO 11
CO1	3	0	1	0	0	0	0	1	0	0	1
CO2	2	0	1	0	0	0	0	1	0	0	2
CO3	3	0	2	1	0	0	0	1	0	0	2
CO4	3	0	1	1	0	0	0	1	0	0	2
CO5	2	0	1	0	0	0	0	1	0	0	2
CO6	1	0	1	0	0	0	0	1	0	0	2

1: Low **2: Moderate** **3: High**

PHYSICAL PHARMACEUTICS I (THEORY) BP302T

1. COURSE DETAILS

Course Name and code: Physical Pharmaceutics I (Theory) BP302T

Year and Semester: IInd Year IIIrd Semester

Year of study: 2022-2023(2019 Pattern)

2. SCOPE:

The course deals with the various physical and physicochemical properties, and principles involved in dosage forms/formulations. Theory and practical components of the subject help the student to get a better insight into various areas of formulation research and development, and stability studies of pharmaceutical dosage forms.

3. OBJECTIVES:

Upon the completion of the course student shall be able to

1. Investigate and apply various theories, laws and equations related to different states of matter

2. Distinguish the principles of complexation/ protein binding & to use them for calculations of drug release and stability constant.

3. Demonstrate use of physicochemical properties of drugs in the formulation development and evaluation of dosage forms.

4. SYLLABUS

T	P	T	Hrs.
45	15	15	60

Unit	Content	Session in Hrs.
UNIT 1	Solubility of drugs: Solubility expressions, mechanisms of solute solvent interactions, ideal solubility parameters, solvation & association, quantitative approach to the factors influencing solubility of drugs, Dissolution & drug release, diffusion principles in biological systems. Solubility of gas in liquids, solubility of liquids in liquids, (Binary solutions, ideal solutions) Raoult's law, real solutions,	**12 Hours**

	azeotropic mixtures, fractional distillation. Partially miscible liquids, Critical solution temperature and applications. Distribution law, its limitations and applications	
UNIT-II	**States of Matter and properties of matter:** State of matter, changes in the state of matter, latent heats, vapour pressure, sublimation critical point, eutectic mixtures, gases, aerosols – inhalers, relative humidity, liquid complexes, liquid crystals, glassy states, solid-crystalline, amorphous & polymorphism. **Physicochemical properties of drug molecules:** Refractive index, optical rotation, dielectric constant, dipole moment, dissociation constant, determinations and applications	**10 Hours**
UNIT-III	Surface and interfacial phenomenon: Liquid interface, surface & interfacial tensions, surface free energy, measurement of surface & interfacial tensions, spreading coefficient, adsorption at liquid interfaces, surface active agents, HLB Scale, solubilisation, detergency, adsorption at solid interface.	**08 Hours**
UNIT-IV	Complexation and protein binding: Introduction, Classification of Complexation, Applications, methods of analysis, protein binding, Complexation and drug action, crystalline structures of complexes and thermodynamic treatment of stability constants	**08 Hours**
UNIT-V	pH, buffers and Isotonic solutions: Sorensen's pH scale, pH determination (electrometric and calorimetric), applications of buffers, buffer equation, buffer capacity, buffers in pharmaceutical and biological systems, buffered isotonic solutions	**07 Hours**

5. COURSE OUTCOMES

After successful completion of course student will able to

CO No.	Course Outcome Statement	Bloom Levels (1-Knowledge, 2-Understand, 3-Apply, 4-Analyze, 5-Evaluate, 6-Creat)
1	Explain solubility of various states of matter with respect to principles, expressions, laws governing the solubility and their applications in drug solubilization.	**3**
2	Discuss various states and properties of matter.	3
3	Discuss surface and interfacial phenomenon , methods for its instrumentation, surface active agents and HLB Scale.	**2**
4	Classify the complexation , applications, stability of drug complexes and biological actions.	2
5	Apply pH and buffer concepts in pharmaceutical and biological systems	2

6. Mapping of Course Outcome (CO) with Program Outcome

Cos/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
1	√	-	√	√	-	-	-	√	-	-	√
2	√	-	√	√	-	-	-	√	-	√	√
3	√	-	√	√	-	-	-	√	√	√	√
4	√	-	√	√	-	-	-	√	√	-	√
5	√	-	√	√	-	-	-	√	√	-	√

7. JUSTIFICATION-

COs	Justification
CO1	PO1: The basic knowledge of the pharmaceutical science and biological principles of physiology of drug diffusion and distribution.
	PO3: It deals with acquiring knowledge of solubility and distribution and applying this basic principle for identifying, analysing and solving problem related to formulation.
	PO4: It uses the modern analytical tools and techniques for determining the solubility, distribution, dissolution and diffusion principal
	PO8: It study and document the solubility and distribution phenomena of pharmaceutical active excipient which can be used for further advanced study by formulator pharmacist.
	PO11: The formulation and development with different drug and excipients is the continuous process and adopt the latest/updated technology for Profession development.
CO2	PO1: It deals with the basic knowledge of physicochemical properties of drug and state of matter in pharmaceutical sciences.
	PO3: The problem in formulation and development can be identified by understanding the physicochemical properties of drug.
	PO4: use of modern technique and tools for interpreting and analyzing the properties of drug and excipients (S/L/G).
	PO8 :it generates report related to fundamental studies of drug molecules and excipients.
	PO10: it deals with various properties of solid, liquid and gas and impact of these in environmental circumstances.
	PO11: it deals with application of pharmacy knowledge for continuous Professional development
CO3	PO1 : It gives the basic knowledge of the interfacial phenomena in pharmaceutical science.
	PO3: It uses the knowledge of interface properties in investigation and analysing the problem in formulation development.
	PO4: It deals with use modern tools and techniques for determining surface and interfacial properties.
	PO8: It comprehends the properties at interfaces for formulation development.
	PO9: It deals with use of surfactant in various level of formulation of dosage form to aid in better pharmaceutical care.
	PO10: It shows the impact of use of surfactant and related excipients on environment.

	PO12: It deals with implementing advance technology for continuous professional development.
CO4	PO1: It deals with the basic pharmacy knowledge about complexation and protein binding.
	PO3: learned knowledge about complexation and protein binding will help in identifying, analyzing and solving problems related to formulation.
	PO4: It uses modern tools and techniques for investigation complexation and binding properties.
	PO8: It comprehends the properties of complexation and protein binding for formulation development.
	PO9: It deals with use of complexation and protein binding in various level of formulation of dosage form to aid in better pharmaceutical care.
	PO11: It deals with implementing advance technology for continuous professional development.
CO5	PO1: It deals with the basic knowledge of pH and buffer system.
	PO3: It deals with identifying, analysing and stabilizing the dosage form.
	PO4: It uses modern analytical tools for investigating pH of formulation.
	PO8: It comprehends the properties of pH and buffer for formulation development.
	PO9: It deals with use of principles of pH and buffer in various level of formulation of dosage form to help in better pharmaceutical care.
	PO11:it deals with implementing advance technology for continuous professional development.

8. MAPPING STRENGTH OF CO's To PO's

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
1	3	-	3	3	-	-	-	2	-	-	3
2	3	-	3	3	-	-	-	2	-	3	3
3	3	-	3	3	-	-	-	2	2	2	3
4	3	-	3	3	-	-	-	2	2	-	3
5	3	-	3	3	-	-	-	2	2	-	3

1: Low 2: Moderate 3: High

PHARMACEUTICAL MICROBIOLOGY (Theory) BP 303 T

1. COARSE DETAILS

Course Name and code: PHARMACEUTICAL MICROBIOLOGY (Theory) BP 303 T

Year and Semester: II Year III Semester

Year of study: 2022-23 (2019 Pattern)

2. SCOPE:

Study of microorganisms and its effect on pharmaceutical products

3. OBJECTIVES:

Upon completion of the subject student shall be able to;

1. Understand methods of identification, cultivation and preservation of various Microorganisms

2. To understand the importance and implementation of sterlization 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.

4 SYLLABUS

Theory	Practical	Tutorial	Credits
3	-----	1	4

Unit	Content	Session in Hrs.
1	UNIT I Introduction, history of microbiology, its branches, scope and its importance. Introduction to Prokaryotes and Eukaryotes Study of ultra-structure and morphological classification of bacteria, nutritional requirements, raw materials used for culture media and physical parameters for growth, growth curve, isolation and preservation methods for pure cultures, cultivation of anaerobes, quantitative measurement of bacterial growth (total & viable count). Study of different types of phase constrast microscopy, dark field microscopy and electron microscopy. Definition and examples of Probiotics and Prebiotics	10

2	**UNIT II** Identification of bacteria using staining techniques (simple, Gram"s &Acid fast staining) and biochemical tests (IMViC). Definition of D value & Z value and its significance. Study of principle, procedure, merits, demerits and applications of physical, chemical gaseous,radiation and mechanical method of sterilization. Evaluation of the efficiency of sterilization methods. Equipments employed in large scale sterilization. Sterility indicators.	10
3	**UNIT III** Study of morphology, classification, reproduction/replication and cultivation of Fungi and Viruses. Classification and mode of action of disinfectants Factors influencing disinfection, antiseptics and their evaluation. For bacteriostatic and bactericidal actions Evaluation of bactericidal & Bacteriostatic. Sterility testing of products (solids, liquids, ophthalmic and other sterile products) according to IP, BP and USP.	10
4	**UNIT IV** Designing of aseptic area, laminar flow equipments; study of different sources of contamination in an aseptic area and methods of prevention, clean area classification. Principles and methods of different microbiological assay. Methods for standardization of antibiotics, vitamins and amino acids. Assessment of a new antibiotic.	08
5	**UNIT V** Types of spoilage, factors affecting the microbial spoilage of pharmaceutical products, sources and types of microbial contaminants, assessment of microbial contamination and spoilage. Preservation of pharmaceutical products using antimicrobial agents, evaluation of microbial stability of formulations. Growth of animal cells in culture, general procedure for cell culture, Primary, established and transformed cell cultures. Application of cell cultures in pharmaceutical industry and research.	07
		45

5. COURSE OUTCOMES (CO)

After successful completion of course student will able to

CO No.	Course Outcome Statement	Bloom Levels (1-Knowledge, 2-Understand, 3-Apply, 4-Analyze, 5-Evaluate, 6-Creat)
1	Describe the classification, methods of identification, microbial growth/reproduction, cultivation, quantification and preservation of microorganisms	1
2	Explain the microbial control techniques such as sterilization, sterility tests, disinfection and preservation of pharmaceutical products.	2
3	Predict appropriate methods for microbiological standardization and cell culture technology.	2
4	Discuss on types, factors affecting, sources and assessment of microbial contamination and spoilage.	2
5	Examine stability of microbial cultures and its applications in pharmaceutical industry and research.	3

6. Mapping of Course Outcome (CO) with Program Outcome (PO)

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO 9	PO 10	PO 11
CO1	√	√	√	--	--	--	--	--	--	--	--

CO2	√	√	√	√	--	--	--	--	--	--	--
CO3	√	√	√	√	--	--	--	--	--	--	--
CO4	√	√	√	√	--	--	--	--	--	--	--
CO5	√	√	√	√	--	--	--	--	--	--	--

7. JUSTIFICATION:

CO's	Justification
CO1	PO1: Basic knowledge of microorganisms PO2: Planning of the cultivation of microorganisms PO3: To solve the problems of quantification and preservation of microorganisms
CO2	PO1: Basic knowledge of microbial control techniques PO2: Planning of the different microbial control techniques PO3: To solve the problems of sterilization and sterility tests PO4: To learn the modern tools for sterilization
CO3	PO1: Basic knowledge of microbial standardization and cell culture technology PO2: Planning of the different microbial standardization techniques PO3: To solve the problems of standardization and cell culture technology PO4: To learn the modern tools for cell culture technology
CO4	PO1: Basic knowledge of microbial contamination and spoilage PO2: Planning of the different microbial contamination techniques PO3: To solve the problems of methods to identify microbial contamination PO4: To learn the modern tools for assessment of microbial contamination and spoilage
CO5	PO1: Basic knowledge of stability of microbial culture PO2: Planning of the different microbial culture stability techniques for applications in pharmaceutical industry and research. PO3: To solve the problems of microbial culture stability PO4: To learn the modern tools for pharmaceutical industry and research in microbial culture techniques

8. MAPPING STRENGTH OF CO's TO PO's

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO 9	PO 10	PO 11
CO1	2	1	1	--	--	--	--	--	--	--	--
CO2	2	1	1	2	--	--	--	--	--	--	--
CO3	2	2	2	2	--	--	--	--	--	--	--
CO4	2	2	2	2	--	--	--	--	--	--	--
CO5	3	1	1	1	--	--	--	--	--	--	--

1: Low 2: Moderate 3: High

PHARMACEUTICAL ENGINEERING (Theory) BP 304 T

1. SYLLABUS

Course Name and code: PHARMACEUTICAL ENGINEERING (Theory) BP 304 T

Year and Semester: II Year III Semester

Year of study: 2022-23 (2019 Pattern)

2. SCOPE:

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

3. OBJECTIVES:

Upon completion of the course student shall be able:

1. To know various unit operations used in Pharmaceutical industries.
2. To understand the material handling techniques.
3. To perform various processes involved in pharmaceutical manufacturing process.
4. To carry out various 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.

4. SYLLABUS

Theory	Practical	Tutorial	Credits
3	-----	1	4

Unit	Content	Session in Hrs.
1	**Flow of fluids:** Types of manometers, Reynolds number and its significance, Bernoulli's theorem and its applications, Energy losses, Orifice meter, Venturimeter, Pitot tube and Rotometer. **Size Reduction:** Objectives, Mechanisms & Laws governing size reduction, factors affecting size reduction, principles, construction, working, uses, merits and demerits of Hammer mill, ball mill, fluid energy mill, Edge runner mill & end runner mill. **Size Separation:** Objectives, applications & mechanism of size separation, official standards of powders, sieves, size separation Principles, construction, working, uses, merits and demerits of Sieve shaker, cyclone separator, Air separator, Bag filter & elutriation tank.	3hours 4hours 4hours
2	**Heat Transfer:** Objectives, applications & Heat transfer mechanisms. Fourier's law, Heat transfer by conduction, convection & radiation. Heat interchangers & heat exchangers **Evaporation:** Objectives, applications and factors influencing evaporation, differences between evaporation and other heat process. principles, construction, working, uses, merits and demerits of Steam jacketed kettle, horizontal tube evaporator, climbing film evaporator, forced circulation evaporator, multiple effect evaporator& Economy of multiple effect evaporator. **Distillation:** Basic Principles and methodology of simple distillation,flash distillation, fractional distillation, distillation under reduced pressure, steamdistillation & molecular distillation	**4 hours** **4 hours** 2 **hours**
3	**Drying:** Objectives, applications & mechanism of drying process, measurements & applications of Equilibrium Moisture content, rate of drying curve. principles, construction, working, uses, merits and demerits of Tray dryer, drum dryer spray dryer, fluidized bed dryer, vacuum dryer, freeze dryer. **Mixing:** Objectives, applications & factors affecting mixing, Difference between solid and liquid mixing, mechanism of solid mixing, liquids mixing and semisolids mixing. Principles, Construction, Working, uses, Merits and Demerits of Double cone blender, twin shell blender, ribbon blender, Sigma blade mixer, planetary mixers, Propellers, Turbines, Paddles & Silverson Emulsifier,	**7 hours** 3hours

4	**Filtration:** Objectives, applications, Theories & Factors influencing filtration, filter aids, filter medias. Principle, Construction, Working, Uses, Merits and demerits of plate & frame filter, filter leaf, rotary drum filter, Meta filter &Cartridge filter, membrane filters and Seidtz filter. **Centrifugation:** Objectives, principle & applications of Centrifugation, principles, construction, working, uses, merits and demerits of Perforated basket centrifuge, Non-perforated basket centrifuge, semi continuous centrifuge & super centrifuge.	3 Hours 5 Hours
5	**Materials of pharmaceutical plant construction, Corrosion and its prevention:** Factors affecting during materials selected for Pharmaceutical plant construction, Theories of corrosion, types of corrosion and there prevention. Ferrous and nonferrous metals, inorganic and organic non metals, basic of material handling systems.	07 hours
Total		45

5. COURSE OUTCOME (CO)

After successful completion of course student will able to

CO No.	Course Outcome Statement	Bloom Levels (1-Knowledge, 2-Understand, 3-Apply, 4-Analyze, 5-Evaluate, 6-Creat)
1	Explain significance of Reynold's number, Bernoulli's theory, working of various manometer and flow meters with respect to flow of fluids.	**2**
2	Explain objective, principle, application, and working of various unit operations like size reduction, size separation, heat transfer, evaporation, distillation, drying, mixing, filtration and centrifugation in pharmaceutical industry.	2
3	Illustrate various equipments used in pharmaceutical industry during unit operations.	**3**
4	Distinguish various factors affecting material selection for pharmaceutical plant constructions.	2

CO No.	Course Outcome Statement	Bloom Levels (1-Knowledge, 2-Understand, 3-Apply, 4-Analyze, 5-Evaluate, 6-Creat)
5	Describe theories of corrosion, type of corrosion and their preventions.	2

6. Mapping of Course Outcome (CO) with Program Outcome (PO)

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO 9	PO 10	PO 11
CO1	√	--	√	--	--	--	--	--	--	--	√
CO2	√	--	√	√	--	--	--	--	--	--	--
CO3	√	--	√	√	--	--	--	--	--	√	--
CO4	√	--	√	--	--	--	--	--	--	--	√
CO5	√	--	√	--	--	--	--	--	--	√	--

7. JUSTIFICATION:

CO's	Justification
CO1	CO1 is aligned with PO1 because pharmaceutical knowledge related to flow meter is essential to utilize it in pharmaceutical industry. CO1 is aligned with PO3 because problem analysis is required during energy losses. CO1 is aligned with PO11 because adjustments related to any fluid during its flow is part of daily life.
CO2	CO2 is aligned with PO1 because pharmaceutical knowledge is essential related to various unit operations. CO2 is aligned with PO3 because problems like factors associated with various equipment must be required to analyse. CO2 is aligned with PO4 because modern tool includes combine processes must be used in single unit operator. E.g., mixing and size reduction
CO3	CO3 is aligned with PO1 because pharmaceutical knoeledge related to various equipment is essential.

	CO3 is aligned with PO3 because problems related to equipment selection is must be required. CO3 is aligned with PO4 any modern equipment or any change in existed equipment related to particular operation is required to be known. CO3 is aligned with PO10 because the impact of any equipment on environment is required to know. E.g., noise of equipment in size reduction process (ball mill).
CO4	CO4 is aligned with PO1 because pharmaceutical knowledge related to material selection during plant construction is required. CO4 is aligned with PO3 because problems related to material must be known. E.g., merits and demerits. CO4 is aligned with PO11 because knowledge of effect of material on environment is required.
CO5	CO5 is aligned with PO1 because pharmaceutical knowledge related to corrosion is required. i.e. effect of corrosion on pharmaceutical product. CO5 is aligned with PO3 because problems related to corrosion must be able to minimize. CO5 is aligned with PO10 because effect of corrosion on environment must require to know.

8. MAPPING STRENGTH OF CO's TO PO's

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO 9	PO 10	PO 11
CO1	1	--	2	--	--	--	--	--	--	--	2
CO2	1	--	2	2	--	--	--	--	--	--	--
CO3	1	--	2	2	--	--	--	--	--	2	--
CO4	1	--	2	--	--	--	--	--	--	--	2
CO5	1	--	2	--	--	--	--	--	--	2	--

1: Low 2: Moderate 3: High

PHARMACEUTICAL ORGANIC CHEMISTRY - II (PRACTICAL) BP 305 P

1. COURSE DETAILS

Course Name and code: Pharmaceutical organic chemistry - II (Practical) BP 305 P

Year and Semester: II Year III Semester

Year of study: 2022-23 (2019 Pattern)

2.SYLLABUS

Theory	Practical	Tutorial	Credits
---	3	1	4

Unit	Content	Session in Hrs.
1	**1. Experiments involving laboratory techniques** □ Recrystallization □ Steam distillation	4
2	Experiments involving Separation of Binary mixtures	4
3	Experiments involving Separation of Binary mixtures	4
4	Determination of saponification value of oil samples (Any two)	4
5	**Synthesis of following compounds**	4
6	□ Benzanilide /phenyl benzoate /acetanilide from aniline/ phenol/ aniline by benzoylation/acylation reaction	4
7	□ 2, 4, 6-Tribromoaniline/para-bromo acetanilide from aniline	4
8	□ p-bromo Acetanilide by halogenation (Bromination) reaction.	4
9	□ 5-Nitrosalicylic /meta-dinitrobenzene from salicylic acid/ nitrobenzene by nitration reaction	4
10	□ Benzoic acid/ Salicylic acid from alkyl benzoate/ alkyl salicylate by hydrolysis reaction.	4

11	1-Phenylazo-2-naphthol from aniline by diazotization and coupling reactions/ pIodobenzoic acid from P-aminobenzoic acid by replacement reaction.	4
12	Benzil from benzoin by oxidation reaction	4
13	Dibenzal acetone from benzaldehyde by Claisen-Schmidt reaction	4

CO	Course Outcomes	CL (Cognitive level)	KC (Knowledge Category)	Class Session Hrs.	Units
CO1	Apply recrystallization and steam distillation methods for purification of synthesized organic compounds	3	P	4	1
CO2	Categorize the binary mixture of organic compounds by using procedure.	4	P	8	2
CO3	Demonstrate saponification value of fats and oils using giving procedure	3	P	4	3
CO4	Prepared purified specified organic compounds using a given synthetic procedure	3	P	44	4

3. COURSE OUTCOMES

Cognitive level (CL): Bloom's taxonomy Cognitive level (1/2/3/4/5/6)

Knowledge Category (KC): F= Factual Knowledge, C= Conceptual Knowledge, P= Procedural Knowledge, M= Metacognitive Knowledge

4. Mapping of COs to POs

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO 9	PO 10	PO 11
CO1	√	--	√	--	--	--	--	√	--	--	√
CO2	√	--	√	--	--	--	--	√	--	--	√
CO3	√	√	√	--	--	--	--	√	--	--	√
CO4	√	√	√	--	--	--	--	√	--	--	√

5.JUSTIFICATION-

CO's	Justification
CO1	PO1: Knowledge of laboratory techniques such as recrystallization and steam distillation which required for synthesis of organic compounds PO3: To study of principles of recrystallization and steam distillation PO8: To Write effective reports and presentation of same PO11: Knowledge of laboratory techniques such as recrystallization and steam distillation which required for synthesis of organic compounds to utilize in recent technological changes
CO2	PO1: Understanding the principle of organic compounds separation techniques. PO3: To Analyze and solve the complex problem related to binary mixtures PO8: To Write effective reports and presentation of same PO11: Regularly assess and evaluate the course based on the principle of organic compounds separation techniques
CO3	PO1: Knowledge to perform saponification value tests accurately and interpret the results PO2: Conduct experiments to determine the chemical properties of fats and oils PO3: Adhere laboratory safety protocols during saponifications experiments PO8: To Write effective reports and presentation of same PO11: Knowledge of demonstration of saponification values of fats and oils are utilize in recent technological changes
CO4	PO1: Knowledge applies organic chemistry principles to synthesize and purify specific organic compounds. PO2 : Demonstrate proficiency in laboratory techniques for organic compound synthesis and purification PO3: Analyze and troubleshoot synthetic procedures to achieve high purity compounds.

	PO8: To Write effective reports and presentation of same PO11: It deals with understanding and implementing practical knowledge in pharmacy practice.

6. MAPPING STRENGTH OF CO's TO PO's

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO 9	PO 10	PO 11
CO1	3	0	1	0	0	0	0	1	0	0	1
CO2	2	0	1	0	0	0	0	1	0	0	2
CO3	3	1	2	0	0	0	0	1	0	0	2
CO4	3	1	1	0	0	0	0	1	0	0	2

PHYSICAL PHARMACEUTICS I (PRACTICAL) BP 306 P

1.COURSE DETAILS

Course Name and code: Physical Pharmaceutics I (Practical) BP 306 P

Year and Semester: II Year III Semester

Year of study: 2022-23 (2019 Pattern)

2.SCOPE:

The course deals with the various physical and physicochemical properties, and principles involved in dosage forms/formulations. Theory and practical components of the subject help the student to get a better insight into various areas of formulation research and development, and stability studies of pharmaceutical dosage forms.

3.OBJECTIVES:

Upon the completion of the course student shall be able to

1. Investigate and apply various theories, laws and equations related to different states of matter

2. Distinguish the principles of complexation/ protein binding & to use them for calculations of drug release and stability constant.

3. Demonstrate use of physicochemical properties of drugs in the formulation development and evaluation of dosage forms.

4. SYLLABUS

Theory	Practical	Tutorial	Credits
---	3	1	4

Unit	Content	Session in Hrs.
1	Determination the solubility of drug at room temperature	4
2	Determination of pKa value by Half Neutralization/ Henderson Hasselbalch equation.	4
3	Determination of Partition co- efficient of benzoic acid in benzene and water	4

4	Determination of Partition co- efficient of Iodine in CCl4 and water	4
5	Assay of paracetamol by UV- Spectrophotometry Determination of % composition of NaCl in a solution using phenol-water system by CST method	4
6	Determination of surface tension of given liquids by drop count and drop weight method	4
7	Determination of HLB number of a surfactant by saponification method	4
8	Determination of Freundlich and Langmuir constants using activated char coal	4
9	Determination of critical micellar concentration of surfactants	4
10	Determination of stability constant and donor acceptor ratio of PABA-Caffeine complex by solubility method	4
11	Determination of stability constant and donor acceptor ratio of Cupric-Glycine complex by pH titration method.	4
12	Determination of Refractive index of given sample.	4
13	Determination of thermodynamic parameters using solubility studies.	4

5. COURSE OUTCOME (CO)

After successful completion of course student will able to

CO No.	Course Outcome Statement	Bloom Levels (1-Knowledge, 2-Understand, 3-Apply, 4-Analyze, 5-Evaluate, 6-Creat)
1	To measure the pKa value, partition coefficient and solubility of drugs.	**3**
2	To measure HLB Number ,CMC of surfactant , Freundlich and Langmuir Constant.	**3**
3	To demonstrate solubility and pH titration method for stability constant and donor acceptor ratio.	**4**
4	To measure surface tension of the given liquids by drop count and drop weight method.	**3**
5	To calculate percentage composition of NaCl in a solution using phenol -water system by CST Method.	**2**

6.Mapping of Course Outcome (CO) with Program Outcome (PO)

Cos/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
1	√	-	√	√	-	-	-	-	-	-	√
2	√	-	√	√	-	-	-	-	-	-	√
3	√	-	√	√	-	-	-	-	-	√	√
4	√	-	√	-	-	-	-	√	-	-	√
5	√	-	-	-	-	-	-	-	-	-	√

7.JUSTIFICATION-

COs	Justification
CO1	PO1: The basic knowledge of solubility Pka and partition coefficient of drugs and solving problem related to formulation.
	PO3: It deals with acquiring knowledge of solubility Pka and partition coefficient of drugs and solving problem related to formulation.
	PO4: It uses the modern analytical tools and techniques for determining the solubility, Pka and partition coefficient of drugs.
	PO11: The formulation and development with different drug and excipients is the continuous process and adopt the latest/updated technology for Profession development.
CO2	PO1: It deals with the measuring of HLB Number ,CMC of surfactant , Freundlich and Langmuir Constant..
	PO3: The problem in formulation and development can be identified by understanding the physicochemical properties of drug.
	PO4: use of modern technique and tools for interpreting and analyzing the properties of drug and excipients (S/L/G).
	PO11: it deals with application of pharmacy knowledge for continuous Professional development
CO3	PO1 : It gives the basic knowledge of the interfacial phenomena in pharmaceutical science. demonstrate solubility and pH titration method for stability constant and donor acceptor ratio.
	PO3: It uses the knowledge of interface properties in investigation and analysing the problem in formulation development.
	PO4: It deals with use modern tools and techniques for determining surface and interfacial properties.
	PO10: It shows the impact of use of surfactant and related excipients on environment.

	PO11: It deals with implementing advance technology for continuous professional development.
CO4	PO1: It deals with the basic pharmacy knowledge about to measure surface tension of the given liquids by drop count and drop weight method.
	PO3: learned knowledge about surface tension of the given liquids by drop count and drop weight method helps to identify the viscocity and density of the fluids and thus solving problems related to formulation.
	PO8: It comprehends the properties of complexation and protein binding for formulation development.
	PO11: It deals with implementing advance technology for continuous professional development.
CO5	PO1: It deals with the basic knowledge to calculate percentage composition of NaCl in a solution using phenol -water system by CST Method.
	PO11:it deals with implementing advance technology for continuous professional development.

8. MAPPING STRENGTH OF CO's TO PO's

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
1	3	-	3	3	-	-	-	-	-	-	3
2	3	-	3	3	-	-	-	-	-	-	3
3	3	-	3	3	-	-	-	-	-	2	3
4	3	-	3	-	-	-	-	2	-	-	3
5	3	-	-	-	-	-	-	-	-	-	3

1: Low 2: Moderate 3: High

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PHARMACEUTICAL MICROBIOLOGY (PRACTICAL) BP 307 P

1.COURSE DETAILS

Course Name and code: Pharmaceutical Microbiology (Practical) BP 307 P

Year and Semester: Second Year III Semester

Year of study: 2023-24 (2019 Pattern)

2.SCOPE

Study of microorganisms and its effect on pharmaceutical products

3.OBJECTIVES

Upon completion of this subject, student should be able to

1. Understand methods of identification, cultivation and preservation of various Microorganisms

2. To understand the importance and implementation of sterilization in pharmaceutical Processing and industry

3. Learn sterility testing of pharmaceutical products.

4. Carried out microbiological standardization of Pharmaceuticals.

5. Understand the cell culture technology and its applications in pharmaceutical industries.

4.SYLLABUS

Theory	Practical	Tutorial	Credits
---	4	--	4

Unit	Content	Session in Hrs.
1	Introduction and study of different equipments & processing, used in experimental microbiology.	4
2	Sterilization of glassware preparation &sterilization of nutrient broth.	4
3	Sterilization of glassware preparation &sterilization of nutrient Agar	4
4	Sub culturing of bacteria & fungus preparation & sterilization of nutrient agar slants &stabs.	4
5	To study the morphology of given bacterial culture by simple staining.	4
6	To study the morphology of given bacterial culture by Gram staining.	4
7	To study the morphology of given bacterial culture by Acid fast staining.	4
8	To isolate the given microbial culture by streak plate method.	4
9	To isolate the pure culture by pour plate method.	4
10	To perform microbiological assay of penicillin by cup-plate method	4
11	To study bacterial motility by Hanging Drop Method.	4
12	To study the sterility testing for sodium chloride injection (500ml)	4
13	To perform sterility testing for cotton or prefilled syringe.	4
14	To determine quality of water by multiple –tube fermentation test.	4
15	To perform biochemical test of any one microorganism.	4

5.COURSE OUTCOMES

CO	Course Outcomes	CL (Cognitive level)	KC (Knowledge Category)	Class Session Hrs.	Units
CO1	List and study of apparatus used in microbiology	**2**	C	4	1
CO2	Discuss on different methods of sterilization and sterility testing of pharmaceuticals	3	C	19	1,
CO3	Prepare and use culture media for the growth of microorganisms	**3**	C	15	2
CO4	Identify and isolate bacteria	2	C	4	3
CO5	Apply aseptic procedures for inoculation	2	C	3	3

Cognitive level (CL): Bloom's taxonomy Cognitive level (1/2/3/4/5/6)

Knowledge Category (KC): F= Factual Knowledge, C= Conceptual Knowledge, P= Procedural Knowledge, M= Metacognitive Knowledge

6.Mapping of COs to POs

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO 9	PO 10	PO 11
CO1	√	√	√	√	--	--	--	--	--	--	--
CO2	√	√	√	√	--	--	--	--	--	--	--
CO3	√	√	√	√	--	--	--	--	--	--	--
CO4	√	√	√	√	--	--	--	--	--	--	--
CO5	√	√	√	√	--	--	--	--	--	--	--

7.JUSTIFICATION-

CO's	Justification
CO1	PO1: Basic knowledge of equipment used in practical microbiology. PO4: Planning ability for use of different equipments. PO3: To solve the problem related to the working of equipments. PO4: To use various modern tools like Autoclave ,microprocessor colony counter etc.
CO2	PO1: Knowledge of different method of sterilization & sterility testing of pharmaceuticals. PO2: planning ability to implement sterilization techniques. PO3: To solve problem related to sterilization of glassware, media. PO4: To use various modern tools like Autoclave, laminar air flow, HEPA filters.
CO3	PO1: Basic Knowledge of Microorganism. PO2: planning for the preparation of culture media. PO3: problem related to the growth of media. PO4: To use modern tools like Autoclave.
CO4	PO1: Knowledge of identification & isolation of bacteria. PO2: planning for the isolation of bacteria. PO3: problem analysis related to the identification of bacteria. PO4: To use modern tools like electron microscope.
CO5	PO1: Knowledge of Aseptic procedure for incubation. PO2: planning to maintain the aseptic conditions PO3: problem analysis related to the use of aseptic procedure. PO4: To use modern tools incubator.

8.CO-PO MATRIX OF COURSE (MAPPING STRENGTH)

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO 9	PO 10	PO 11
CO1	3	2	2	2	--	--	--	--	--	--	--
CO2	3	2	2	2	--	--	--	--	--	--	--
CO3	3	2	2	2	--	--	--	--	--	--	--
CO4	3	2	2	2	--	--	--	--	--	--	--
CO5	3	2	2	2	--	--	--	--	--	--	--

PHARMACEUTICAL Engineering (Practical) BP 308P

1.COURSE DETAILS

Course Name and code: Pharmaceutical Engineering (Practical) BP 308P

Year and Semester: II Year III Semester

Year of study: 2022-23 (2019 Pattern)

2.SCOPE:

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

3.OBJECTIVES: Upon completion of the course student shall be able:

1. To know various unit operations used in Pharmaceutical industries.
2. To understand the material handling techniques.
3. To perform various processes involved in pharmaceutical manufacturing process.
4. To carry out various 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.

4.SYLLABUS

Theory	Practical	Tutorial	Credits
--	3	1	4

Unit	Content	Session in Hrs.
1.	Determination of radiation constant of brass, iron, unpainted and painted glass	4
2.	Steam distillation – To calculate the efficiency of steam distillatio	4

3.	To determine the overall heat transfer coefficient by heat exchanger.	4
4.	Construction of drying curves (for calcium carbonate and starch).	4
5.	Determination of moisture content and loss on drying.	4
6	Determination of humidity of air – i) From wet and dry bulb temperatures – use of Dew point method.	4
7	Description of Construction working and application of Pharmaceutical Machinery such as rotary tablet machine, fluidized bed coater, fluid energy mill, de humidifier.	4
8	Size analysis by sieving – To evaluate size distribution of tablet granulations – Construction of various size frequency curves including arithmetic andlogarithmic probability plot.	4
9	Size reduction: To verify the laws of size reduction using ball mill and determining Kicks, Rittinger's, Bond's coefficients, power requirement and critical speed of Ball Mill.	4
10	Demonstration of colloid mill, planetary mixer, fluidized bed dryer, freeze dryer and such other major equipment.	4
11	Factors affecting Rate of Filtration and Evaporation (Surface area, Concentration and Thickness/ viscosity.	4
12	To study the effect of time on the Rate of Crystallization.	4
13	To calculate the uniformity Index for given sample by using Double Cone Blender.	4

5. COURSE OUTCOMES

CO	Course Outcomes	CL (Cognitive level)	KC (Knowledge Category)	Class Session Hrs.	Units
CO1	Perform experiments related to unit operations.	**2**	P	15	1-4
CO2	Operate equipment used in the manufacturing of pharmaceutical products.	3	P	15	1-4
CO3	Interpret results of the experiments conducted.	**3**	P	15	1-4
CO4	Illustrate the material and energy requirements for optimizing the pharmaceutical unit process.	2	P	15	5

Cognitive level (CL): Bloom's taxonomy Cognitive level (1/2/3/4/5/6)

Knowledge Category (KC): F= Factual Knowledge, C= Conceptual Knowledge, P= Procedural Knowledge, M= Metacognitive Knowledge

6. Mapping of COs to POs

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	√	√	√	√	--	--	--	--	--	--	--
CO2	√	√	√	√	--	--	--	--	--	--	--
CO3	--	--	√	--	--	--	--	--	--	--	--
CO4	√	√	√	--	--	--	--	--	--	--	--

7. JUSTIFICATION-

CO's	Justification
CO1	PO1: pharmacy knowledge is required regarding unit operations. PO2: it should require planning ability during handling of euipments. PO3: problems should be analyzed during equipments handling. PO4: knowledge required for modern tool usage.
CO2	PO1: pharmacy knowledge is required regarding unit operations. PO2: it should require planning ability during handling of euipments. PO3: problems should be analyzed during equipments handling. PO4 : knowledge required for modern tool usage.
CO3	PO3: when performing the experiment problem should be analyzed during result interpretations.
CO4	PO1: pharmacy knowledge is require during Illustrate the material and energy requirements for optimizing the pharmaceutical unit process. PO2: planning ability required for material selection. PO3: problem should be analyzed for material selection.

8. CO-PO MATRIX OF COURSE (MAPPING STRENGTH)

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	2	2	2	2	--	--	--	--	--	--	--
CO2	2	2	2	2	--	--	--	--	--	--	--
CO3	--	--	2	--	--	--	--	--	--	--	--
CO4	2	2	2	--	--	--	--	--	--	--	--

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SECOND YEAR B. PHARMACY

SEMESTER-IV

PHARMACEUTICAL ORGANIC CHEMISTRY III Theory

1. COURSE DETAILS:

Course Name and code: Pharmaceutical Organic Chemistry III (Theory) BP401 T
Year and Semester: II Year IV Semester
Year of study: 2022-23 (2019 Pattern)

2. SCOPE:

This subject deals with classification and nomenclature of simple organic compounds, isomerism, intermediates formed in reactions, important physical properties, reactions and methods of preparation of these compounds. The syllabus also emphasizes on mechanisms and orientation of reactions.

3. OBJECTIVES:

1. Write the structure, name and the type of isomerism of the organic compound
2. Write the reaction, name the reaction and orientation of reactions
3. Account for reactivity/stability of compounds
4. Identify/confirm the identification of organic compounds

4. SYLLABUS

Theory	Practical	Tutorial	Credits
3	-----	1	4

Unit	Content	Hrs.
1	**UNIT-I** Stereo isomerism Reactions of Chiral molecules, Racemic modification and resolution of racemic mixture. Introduction to Asymmetric synthesis with suitable examples.	07

2	**UNIT-II** Geometrical isomerism Conformational isomerism in n-Butane and cyclohexane.Stereoisomerism in biphenyl compounds (Atropisomerism) and conditions for optical activity. Stereospecific and stereo selective reactions.	06
3	**UNIT-III** Heterocyclic compounds Nomenclature and classification of heterocyclic compounds in to classes: Oxygen containing five & six membered rings, Nitrogen containing five & six membered rings, sulphur containing five & six member rings; Oxygen & nitrogen containing five & six membered rings, oxygen & sulphur containing five & six membered rings, and sulphur and nitrogen containing five & six membered rings; benzo-fused heterocyclic compounds as benzimidazole, benzthiazole, benzopyran Chemistry, Synthesis (any one), reactions and medicinal uses of following compounds Pyrrole, Furan, and Thiophene and their derivatives (any one from each class)	08
4	**UNIT-IV** Chemistry, Synthesis (any one), reactions and medicinal uses of following compounds and their derivatives (any one from each class) Pyrazole, Imidazole, Oxazole and Thiazole.Pyridine, Quinoline, Isoquinoline, Acridine and Indole Synthesis (any one) and medicinal uses of following compounds Pyrimidine, Purine, Azepines and their derivatives (any one from each class)	12
5	**UNIT-V** Name Reactions of synthetic importance Pinacol-Pinacolone, Hofmann, Baeyer-Villiger oxidation, Benzilic acid rearrangement reaction, Beckmann‟s rearrangement and Schmidt rearrangement, Claisen-Schmidt condensation, Clemmensen reduction, Wolff rearrangement, Oppenauer-oxidation and Dakin reaction, and Birch reduction.	12

5. COURSE OUTCOMES

CO	Course Outcomes	CL (Cognitive level)	KC (Knowledge Category)	Class Session Hrs.	Units
CO1	Explain fundamentals of sterochemical aspect and chiral molecule of organic compound.	2	C	03	1
CO2	Summarize stereoisomerism and Stereospecific reactions of organic compound and condition for optical activity.	3	F	05	2
CO3	Apply nomenclature fundamentals to various class of heterocyclic compounds.(level3)	3	P	06	3
CO4	Explain variousrearrangement reactions used in synthesis of organic compound. (level2)(unit 5)	2	C	15	5
CO5	Summarize synthesis, their reactions and medicinal uses of specified class of heterocyclic moieties. (level 2) unit-3 and 4 ,16hrs	2	F	16	3 and 4

Cognitive level (CL): Bloom's taxonomy Cognitive level (1/2/3/4/5/6)

Knowledge Category (KC): F= Factual Knowledge, C= Conceptual Knowledge, P= Procedural Knowledge, M= Metacognitive Knowledge

6. Mapping of COs to POs

CO NO.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO-401.1	✓	✓	✓	✓	-	-	-	-	-	-	✓
CO-401.2	✓	✓	✓	✓	-	-	-	-	-	-	✓
CO-401.3	✓	✓	✓	✓	-	-	-	-	-	-	✓
CO-401.4	✓	✓	✓	-	-	-	-	-	-	-	✓
CO-401.5	✓	✓	✓	✓	-	-	-	-	-	-	✓

7. Justification-

CO's	Justification
CO1	PO1: Knowledge of heterocyclic moiety and other chemicals natures is required for classification. PO2: Organization of heterocyclic moiety into various class required. PO3:To interpret uses basic moiety for the numbering. PO4: Drawing the structure and using different software's tools based on the classification. PO11: to understand information related to new chemical class of drug.
CO2	PO1: Knowledge of stereoisomerism for the activity. PO2:Modification of chemical structure for optical activity. PO3:To interpret isomerism of structrure. PO4:Drawing the structure and using different software's tools based on the classification. PO11: to understand information related to new chemical and its biological activity
CO3	PO1: Knowledge of nomenclature system for organic compound. PO2: Numbering of basic structure moietyfor IUPAC system. PO3: To interpretbasic structure moiety for IUPAC system PO4:Drawing the structure and using different software's tools based on the classification. PO11: to understand information related nomenclature system for organic compound
CO4	PO1: Knowledge of various rearrangement of organic compound. PO2: Rearranged the structure to complete chemical reaction. PO3: to interpret name rearrangement during reaction. PO11: to understand information various rearrangement of organic compound for synthesis.
CO5	PO1: Knowledge ofsynthesis, their reactions and medicinal uses of specified class of heterocyclic moieties. PO2: Modification in chemical structure will enhance therapeutic activity and lowers side effect. PO4: Structural modification by using modern tools of analysis enhances therapeutic activity.

	PO11: to understand information related synthesis, their reactions and medicinal uses of specified class of heterocyclic moieties.

8. MAPPING STRENGHTS OF CO'S TO PO'S

CO NO.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO-401.1	3	2	1	1	-	-	-	-	-	-	2
CO-401.2	3	2	1	1	-	-	-	-	-	-	2
CO-401.3	3	2	1	1	-	-	-	-	-	-	2
CO-401.4	3	2	1	1	-	-	-	-	-	-	2
CO-401.5	3	2	1	1	-	-	-	-	-	-	2

MEDICINAL CHEMISTRY – I (Theory)

1. COURSE DETAILS

Course Name and code: Medicinal Chemistry-I **402T**

Year and Semester: II Year IV Semester

Year of study: 2022-23 (2019 Pattern)

2. SCOPE:

This subject is designed to impart fundamental knowledge on the structure, chemistry and therapeutic value of drugs. The subject emphasizes on structure activity relationships of drugs, importance of physicochemical properties and metabolism of drugs. The syllabus also emphasizes on chemical synthesis of important drugs under each class.

3. 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 (SAR) of different class of drugs.
4. Write the chemical synthesis of some drugs.

4. SYLLABUS

Theory	Practical	Tutorial	Credits
3	-----	1	4

UNIT-I	**06 hours**
Introduction to Medicinal Chemistry: **a) History and development of medicinal chemistry** **b) Physicochemical properties in relation to biological action** Ionization, Solubility, Partition Coefficient, Hydrogen bonding, Protein binding, Chelation, Bioisosterism, Optical And Geometrical isomerism. **c) Drug metabolism** Drug metabolism principles - Phase I and Phase II. Factors affecting drug metabolism.	
UNIT-II	**10 hours**
Drugs acting on Autonomic Nervous System **a)** Adrenergic Neurotransmitters**:** Biosynthesis and catabolism of catecholamine. Adrenergic receptors (Alpha & Beta) and their distribution. **b)** Sympathomimetic agents**:** SAR of Sympathomimetic agents Directacting: Norepinephrine, Epinephrine, Dopamine, Phenylephrine, Methyldopa, Clonidine, Dobutamine, Isoproterenol, Terbutaline, Salbutamol, Oxymetazolineand and Xylometazoline □ Indirect acting agents: Hydroxyamphetamine, Pseudoephedrine □ Agents with mixed mechanism: Ephedrine, Amphetamine. **c) Adrenergic Antagonists:** □ Alpha adrenergic blockers**:** Tolazoline, Phentolamine, Phenoxybenzamine, Prazosin. □ Beta adrenergic blockers**:** SAR of beta blockers, Propranolol, Atenolol, Labetolol**,** Carvedilol. **[**Phenylephrine, Salbutamol, Tolazoline, Propranolol]	**10 hours**
UNIT-III	**10 hours**

a) Cholinergic neurotransmitters **:** Biosynthesis and catabolism of acetylcholine. Cholinergic receptors (Muscarinic & Nicotinic) and their distribution**.** **b)** Parasympathomimetic agents **:** SAR of Parasympathomimetic agents; Direct acting agents : Acetylcholine, Carbachol, Bethanechol, Pilocarpine**.** Indirect acting/ Cholinesterase inhibitors (Reversible & Irreversible) : Physostigmine, Neostigmine, Edrophonium chloride, Donepezil, Tacrine hydrochloride, Parathion, Malathion. Cholinesterase reactivator: Pralidoxime chloride. **c)** Cholinergic Blocking agents**:** SAR of cholinolytic agents : Solanaceous alkaloids and analogues : Atropine sulphate, Scopolamine hydrobromide, Ipratropium bromide. Synthetic cholinergic blocking agents : Tropicamide, Cyclopentolate hydrochloride**,** Dicyclomine, Glycopyrrolate, Propantheline bromide [Neostigmine, Dicyclomine hydrochloride**]**	
UNIT-IV	**10Hours**
Drugs acting on Central Nervous System **a) Sedatives and Hypnotics:** Benzodiazepines**:** SAR of Benzodiazepines, Chlordiazepoxide, Diazepam, Oxazepam, Chlorazepate, Lorazepam, Alprazolam, Zolpidem Barbiturtes **:** SAR of barbiturates, Barbital, Amobarbital, Butabarbital,Pentobarbital**,** Secobarbital Miscelleneous : Amides& imides Alcohol & theircarbamate derivatives Aldehyde & their derivatives. **b) Antipsychotics** Phenothiazeines **:** SAR of Phenothiazines– Chlorpromazinehydrochloride, Triflupromazine, Thioridazine hydrochloride, Trifluoperazinehydrochloride Ring Analogues of Phenothiazeines : Thiothixene, Loxapine succinate, Clozapine**.** Flurobuterophenones **:** Haloperidol, Droperidol, Risperidone. Benzamides: Sulpiride. **c) Anticonvulsants** : SAR of Anticonvulsants, mechanism of anticonvulsantaction Barbiturates : Phenobarbitone, Mephobarbital Hydantoins : Phenytoin, Mephenytoin Oxazolidinediones : Trimethadione Succinimides : Phensuximide, Methsuximide Urea and monoacylureas : Phenacemide, Carbamazepine	

Benzodiazepines : Clonazepam Miscellaneous : Levetiracetam, Valproic acid **,** Gabapentin , Felbamate. **d) General anesthetics :** Inhalation anesthetics : Halothane, Enflurane Ultra-short acting barbitutrates : Methohexital sodium, Thiopental sodium. Dissociative anesthetics : Ketamine hydrochloride. [Diazepam, Chlorpromazine hydrochloride, Carbamazepine, Halothane, Ketamine hydrochloride]	
UNIT-V	**09 hours**
Centrally Acting analgesics **a)** Narcotic and non-narcotic analgesics Morphine and related drugs : SAR of Morphine analogues, Codeine, Meperidine hydrochloride, Loperamide hydrochloride, Fentanyl citrate, Methadone hydrochloride, Propoxyphene hydrochloride, Pentazocine. Introduction to Narcotic antagonists **b)** Anti-inflammatory agents : Sodium salicylate, Aspirin, Mefenamic acid, Indomethacin, Sulindac, Diclofenac, Ketorolac, Ibuprofen, Piroxicam, Acetaminophen, Phenylbutazone. [Fentanyl citrate, Mefenamic acid, Diclofenac, Ibuprofen**]**	

5. COURSE OUTCOMES

CO	Course Outcomes	CL (Cognitive level)	KC (Knowledge Category)	Class Session Hrs.	Units
CO1	Describe the concept and contribution of scientist in the development of Medicinal Chemistry.	2	C	6	1
CO2	Discuss concept historical aspect of medicinal chemistry and effect of physicochemical properties on biological action of drug.	2	C	6	1

CO3	Explain principle of phase I and phase II and factors affecting these phases.	4	C	3	1
CO4	Classify drugs acting on Autonomic nervous system and Central nervous system based on their chemical structure.	2	F	10	2,3,4,5
CO5	Explain relationship between chemical structure and biological activity of specified drugs acting on Autonomic nervous system and Central nervous system.	4	F	10	2,3,4,5

Cognitive level (CL): Bloom's taxonomy Cognitive level (1/2/3/4/5/6)

Knowledge Category (KC): F= Factual Knowledge, C= Conceptual Knowledge, P= ProceduralKnowledge, M= Metacognitive Knowledge

6. CO-PO MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO 9	PO 10	PO 11
CO1	√	--	√	--	--	--	--	√	--	--	√
CO2	√	--	√	√	--	--	--	--	--	--	√
CO3	√	--	√	--	--	√	--	--	--	--	√
CO4	√	--	√	--	--	--	--	--	--	--	√

7. JUSTIFICATION-

CO's	Justification
CO1	**PO1:** Knowledge of laboratory techniques such as Recrystallization, Distillation, Micro distillation, which required for synthesis of organic compounds. PO3: To study the principal of Reaction for organic compound. PO8: To Write effective report and presentation same.

	PO11: To understand basic safety rules in Laboratory while performing synthesis in lab.
CO2	PO1: Understand the Purification of organic compounds by Column chromatography techniques. PO3: Utilize the Principal of Chromatography techniques for purification. PO4: Use of modern tools techniques like HPLC, UV, IR for compound purification and identification. PO11: Information related to chemical class for writing reports and for documentation.
CO3	PO1: T0 understand the physicochemical properties of drugs like Partition coefficient and ionization constant. PO3: To study of chemical reaction and principals of Partition coefficient. PO6: Information related to chemical class for professional discussion PO11: To understand information related Biological action of Drugs.
CO4	PO1: Knowledge of laboratory purification techniques such as Thin layer Chromatography. PO3: Analyze the synthetic procedures to achieve high purity of compounds. PO11: To understand the principal of separation techniques for organic compounds.

8. MAPPING STRENGHTS OF CO'S TO PO'S

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO 9	PO 10	PO 11
CO1	3	-	--	--	-	1	-	2	-	-	2
CO2	3	-	2	--	-	-	-	2	-	-	2
CO3	3	-	2	--	-	1	-	2	-	-	2
CO4	3	-	2	1	-	1	-	2	-	-	2

PHYSICAL PHARMACEUTICS- II Theory

1. COURSE DETAILS

Course Name and code: Physical Pharmaceutics I (Theory) BP403T

Year and Semester: 2nd Year IV Semester

Year of study: 2022-2023(2019 Pattern)

2. SCOPE:

The course deals with the various physical and physicochemical properties, and principles involved in dosage forms/formulations. Theory and practical components of the subject help the student to get a better insight into various areas of formulation research and development, and stability studies of pharmaceutical dosage forms.

3. OBJECTIVES:

Upon the completion of the course student shall be able to

1. Relate various physicochemical properties of drug and excipient molecules in designing 8the dosage forms

2. Distinguish the principles of chemical kinetics & to use them for stability testing and determination of expiry date of formulations

3. Demonstrate the behavior and mechanism of drugs and excipients in the formulation development and evaluation of dosage forms.

4. SYLLABUS

T	P	T	Hrs.
45	15	15	60

Unit	Content	Session in Hrs.
1.	Colloidal dispersions: Classification of dispersed systems & their general characteristics, size & shapes of colloidal particles, classification of colloids & comparative account of their general properties. Optical, kinetic & electrical properties. Effect of electrolytes, coacervation, peptization& protective action.	**7**

2.	Rheology: Newtonian systems, law of flow, kinematic viscosity, effect of temperature, non- Newtonian systems, pseudoplastic, dilatant, plastic, thixotropy, thixotropy in formulation, determination of viscosity, capillary, falling sphere, rotational viscometers,Visco elasticity Deformation of solids: Plastic and elastic deformation, Heckel equation, Stress, Strain, Elastic Modulus	**10**
3.	Coarse dispersion: Suspension, interfacial properties of suspended particles, settling in suspensions, formulation of flocculated and deflocculated suspensions. Emulsions and theories of emulsification, microemulsion and multiple emulsions; Stability of emulsions, preservation of emulsions, rheological properties of emulsions and emulsion formulation by HLB method.	**10**
4.	Micromeretics: Particle size and distribution, mean particle size, number and weight distribution, particle number, methods for determining particle size by different methods, counting and separation method, particle shape, specific surface, methods for determining surface area, permeability, adsorption, derived properties of powders, porosity, packing arrangement, densities, bulkiness & flow properties.	**08**
5.	Drug stability: Reaction kinetics: zero, pseudo-zero, first & second order (complex reaction: reversible, parallel and side reactions), units of basic rate constants, determination of reaction order. Physical and chemical factors influencing the chemical degradation of pharmaceutical product: temperature, solvent, ionic strength, dielectric constant, specific & general acid base catalysis, Simple numerical problems. Stabilization of medicinal agents against common reactions like hydrolysis & oxidation. Accelerated stability testing in expiration dating of pharmaceutical dosage forms. Photolytic degradation and its prevention.	**10**

5. COURSE OUTCOMES

CO	Course Outcomes	CL	KC	Class Session Hrs.
CO1	determine the particle size and the size distribution by using microscopic and sieving techniques	3	F	12

CO2	Determine the bulk density, true density , porosity and the angle of repose of powders.	3	C	12
CO3	Demonstrate the use of Ostwald's and Brookfield's viscometer to determine the viscocity of liquids and semisolids.	2	F	12
CO4	Experiment effect of suspending agents and their concentration on the sedimentation volume	2	F	12
CO5	Determine the reaction rate constant using the specified experiments.	2	F	12

Cognitive level (CL): Bloom's taxonomy Cognitive level (1/2/3/4/5/6)

Knowledge Category (KC): F= Factual Knowledge, C= Conceptual Knowledge, P= ProceduralKnowledge, M= Metacognitive Knowledge

6. MAPPING OF COS TO POS

Cos/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
1	√	-	√	-	-	-	-	√	-	-	√
2	√	-	√	√	-	-	-	√	-	-	-
3	√	-	√	-	-	-	-	-	-	-	√
4	√	-	√	-	-	-	-	-	-	-	√
5	√	-	√	√	-	-	-	-	-	-	√

7. JUSTIFICATION-

Cos	Justification
CO1	PO1: The basic concept of colloids in dispersion system, its classification and general properties
	PO3: It deals with acquiring knowledge of colloids in dispersion system, its classification and general properties ,analysing and solving problem related to formulation.
	PO8: It helps to understand the nature of colloids which can be used for further advanced study by formulator pharmacist.
	PO11: The formulation and development with different drug and excipients is the continuous process and adopt the latest/updated technology for Profession development.

CO2	PO1: It deals with the basic knowledge of newtonian and non-newtonian flows ystems, the concept of thixotropy and viscocity their application in formulation and methods to determine the viscocity of fluids
	PO3: The problem in formulation and development can be identified by understanding the physicochemical properties of drug.
	PO4: use of modern technique and tools for interpreting and analyzing the properties of drug and excipients (S/L/G).
	PO8 :it deals with the information related to newtonian and non-newtonian flows ystems, the concept of thixotropy and viscocity their application in formulation and methods to determine the viscocity of fluids
CO3	PO1 : It helps to understand the different types of deformation of solids and stress -strain relationship
	PO3: It uses the knowledge of the different types of deformation of solids and stress -strain relationship in analysing the problem in formulation development.
	PO11: It deals with implementing advance technology for continuous professional development.
CO4	PO1: It deals with the basic knowledge of properties, stability, stabilizing agents in various classes of suspensions and emulsions in coarse dispersion system..
	PO3: It deals with identifying, analysing and stabilizing the dosage form.
	PO11:it deals with implementing advance technology for continuous professional development.
CO5	PO1: It Summarize the concept of micromeritics with respect to the physical properties of powders, their measurements and derived properties
	PO3: It helps to derive the respect to the physical properties of powders, their measurements and derived properties
	PO4: It helps in the usage of modern tools to determine the physical properties of powders, their measurements and derived properties
	PO11:it deals with implementing advance technology for continuous professional development.

8. MAPPING STRENGTH OF CO'S TO PO'S

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
1	3	-	3	-	-	-	-	2	-	-	3
2	3	-	3	3	-	-	-	2	-	-	-
3	3	-	3	-	-	-	-	-	-	-	3
4	3	-	3	-	-	-	-	2	-	-	3
5	3	-	3	3	-	-	-	-	-	-	3

PHARMACOLOGY-I

1. COURSE DETAILS

Course Name and code: Pharmacology I (Theory) BP 404 T

Year and Semester: II Year IV Semester

Year of study: 2022-23 (2019 Pattern)

2. SCOPE:

The main purpose of the subject is to understand what drugs do to the living organisms and how their effects can be applied to therapeutics. The subject covers the information about the drugs, mechanism of action, physiological and biochemical effects (Pharmacodynamics) as well as absorption, distribution, metabolism and excretion (pharmacokinetics) along with the adverse effects, clinical uses, interactions, doses, contraindications and route of administration of different classes of drugs.

3. OBJECTIVES:

1. Upon completion of the subject, student shall be able to –
2. Understand the pharmacological actions of different categories of drugs.
3. Explain the mechanism of action at organ system/sub cellular/macromolecular levels.
4. Apply the basic pharmacological knowledge in the prevention and treatment of various diseases.
5. Observe the effects of drugs on animal by simulated experiments.
6. Appreciate correlation of pharmacology with other bio medical sciences.

4. SYLLABUS

	Th	P	Tutorial	Hrs.
	3	-	1	60

Unit	Content	No. of. Hrs
I	**Introduction to Pharmacology** Definition, Historical landmarks and scope of pharmacology, Nature and source of drugs, Essential drugs concept and Routes of drug administration.	10

	Pharmacokinetics Membrane transport, Absorption, Distribution, Metabolism and Excretion of drugs. Enzyme induction, Enzyme inhibition, Introduction tokinetics of elimination.	
II	**General Pharmacology** **Pharmacodynamics:** Principles and mechanisms of drug action. Receptortheories and classification of receptors, regulation of receptors. Drugreceptors interactions, Signal transduction mechanisms, G-protein– coupledreceptors, Ion channel receptors, Transmembrane enzyme linked receptors,JAK-STAT binding receptors and receptors that regulate transcriptionfactors,Spare receptors. Dose response relationship, Therapeutic index,Agonists, Antagonists (competitive and non-competitive),Combined effects of drugs. Factors modifying drug action. **Adverse drug reactions:** Addiction, Tolerance, Dependence, Tachyphylaxis, Idiosyncrasy, Allergy (explain with suitable examples). **Drug interactions:** Pharmacokinetic and pharmacodynamic drug interactions. Drug Discovery and Clinical evaluation of new drugs: Introduction to drug Discovery, Preclinical evaluation and Clinical trials Introduction to Pharmacovigilance.	10
III	**Pharmacology of drugs acting on Peripheral Nervous System** Introduction to Autonomic Nervous System, Parasympathomimetics, Parasympatholytics, Sympathomimetics and Sympatholytics. Neuromuscular blocking agents and skeletal	08

	muscle relaxants (peripheral). Local anaesthetic agents. Drugs used in myasthenia gravis and glaucoma	
IV	**Pharmacology of drugs acting on central nervous system** Neurohumoral transmission in the C.N.S.- Special emphasis tobe given on importance of various neurotransmitters like with GABA, Glutamate, Glycine, Serotonin, Dopamine. General anaesthetics and pre-anaesthetics Sedatives, Hypnotics and Centrally acting muscle relaxants Anti-epileptics Alcohol and Disulfiram	09
V	**Pharmacology of drugs acting on Central Nervous System** Psychopharmacological agents: Antipsychotics, Antidepressants, Anti- anxiety agents, anti-manics and Hallucinogens Drugs used in Parkinson's disease and Alzheimer's disease CNS stimulants and Nootropics Opioid analgesics and antagonists (including addiction, abuse, tolerance and dependence)	08

5. COURSE OUTCOMES

CO	Course Outcomes	CL	KC	Class Hr	Units
CO1	Discuss various branches of pharmacology, source of drugs, route of drug administration and principles of pharmacokinetics	2	C	10	1
CO2	Discuss principles of receptor and non receptor mediated mechanism of drug action and factors modifying drug action	2	C	6	2

CO3	Explain adverse effects of drug, drug–drug interaction and new drug discovery process	2	C	4	2
CO4	Discuss classification, pharmacological effects, uses and adverse effects of drugs acting on Peripheral Nervous System	2	F	09	3
CO5	List out various neurotransmitters, their receptors and effects on CNS	1	F	2	4
CO6	Discuss classification, pharmacological effects, uses and adverse effects of drugs acting on Central Nervous System	2	F	15	4 and 5

Cognitive level (CL): Bloom's taxonomy Cognitive level (1/2/3/4/5/6)

Knowledge Category (KC): F= Factual Knowledge, C= Conceptual Knowledge, P= Procedural Knowledge, M= Metacognitive Knowledge

6. MAPPING OF COS TO POS

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	√	-	-	-	--	√	--	-	--	√	√
CO2	√	-	-	-	--	√	--	-	--	√	-
CO3	√	-	-	-	--	√	-	-	--	√	√
CO4	√	-	-	-	--	√	--	--	--	√	√
CO5	√	-	-	-	-	√	--	--	--	√	-
CO6	√	-	-	-	-	√	-	-	-	√	√

7. JUSTIFICATION-

CO's	Justification
CO1	PO1: Knowledge of Pharmacology is essential for studying effect of various drugs, and administration of drugs by different routes of administration which can be utilised for discovery of drug and different pharmaceutical dosage PO6:Pharmacy professionals have complete knowledge of different drugs and its pharmacokinetics and pharmacodynamics which is utilised for developing dosage form and deciding dose. PO10: Some drugs may have harmful effect on environment so it an be mapped. PO11: New drugs are developed periodically so it is life long learning
CO2	PO1: Different factors affecting drugs are studied and principle and mechanism of action of receptors can be utilised in pharmacy. PO6: Pharmacy professionals can utilised their knowledge about drugs its action and factors affecting it. PO10: Clinical trials or preclinical trials may affect environment
CO3	PO1: Study of drug-drug interaction is important for development of pharmaceutical dosage form. PO6: Pharmacist can utilise the information about drug interactions for making compatible dosage form. PO10: If drug-drug Interaction causes unwanted or undesirable effect it may some how affect environment. PO11: New drug entities are discovered and new drug interaction study is carried out which is why this CO gets Map with Life long learning CO.
CO4	PO1:Pharmacological effect of drug on PNS is important for prescribing the drug. PO6: Professionals can properly elaborate the action of drugs acting on Peripheral Nervous system and can be explained to society. PO10: Discovering the drug which have pharmaceutical effect on PNS can be harmful PO11: New drugs can be periodically developed having effect on Peripheral Nervous System which makes it life long learning.
CO5	PO1: Study of neurotransmitters are done so that any external drug alike neurotransmitters can be discovered. PO6: Pharmacy professionals can make society aware about drug interactions. PO10: Exogenous drug entities may be harmful.
CO6	PO1:Pharmacological effect of drug on CNS is important for prescribing the drug. PO6: Professionals can properly elaborate the action of drugs acting on Central Nervous system and can be explained to society. PO10: Discovering the drug which have pharmaceutical effect on CNS can be harmful

	PO11: New drugs can be periodically developed having effect on Central Nervous System which makes it life long learning.

8. MAPPING STRENGTH OF CO's to PO's

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	-	-	-	-	1	-	-	-	3	2
CO2	3	-	-	-	-	1	-	-	-	3	-
CO3	3	-	-	-	-	1	-	-	-	3	2
CO4	3	-	-	-	-	1	-	-	-	3	2
CO5	3	-	-	-	-	1	-	-	-	3	-
CO6	3	-	-	-	-	1	-	-	-	3	2

PHARMACOGNOSY AND PHYTOCHEMISTRY I (Theory)

1.COURSE DETAILS

Course Name and code: PHARMACOGNOSY AND PHYTOCHEMISTRY I (Theory)

BP 405 T

Year and Semester: II Year IV Semester

Year of study: 2022-23 (2019 Pattern)

2. SCOPE: The subject involves the fundamentals of Pharmacognosy like scope, classification of crude drugs, their identification and evaluation, phytochemicals present in them and their medicinal properties.

3.OBJECTIVES: Upon completion of the course, the student shall be able
1. To know the techniques in the cultivation and production of crude drugs

2. To know the crude drugs, their uses and chemical nature

3. Know the evaluation techniques for the herbal drugs

4. To carry out the microscopic and morphological evaluation of crude drugs

4.SYLLABUS

Theory	Practical	Tutorial	Credits
3	-----	1	4

Unit	Content	Session in Hrs.
1	**Introduction to Pharmacognosy:** (a) Definition, history, scope and development of Pharmacognosy (b) Sources of Drugs – Plants, Animals, Marine & Tissue culture (c) Organized drugs, unorganized drugs (dried latex, dried juices, dried extracts, gums and mucilages, oleoresins and oleo- gum -resins). **Classification of drugs:** Alphabetical, morphological, taxonomical, chemical, pharmacological, chemo and sero taxonomical classification of drugs **Quality control of Drugs of Natural Origin:**	10

	Adulteration of drugs of natural origin. Evaluation by organoleptic, microscopic, physical, chemical and biological methods and properties. Quantitative microscopy of crude drugs including lycopodium spore method, leaf constants, camera lucida and diagrams of microscopic objects to scale with camera lucida.	
2	**UNIT II** **Cultivation, Collection, Processing and storage of drugs of natural origin:** Cultivation and Collection of drugs of natural origin Factors influencing cultivation of medicinal p lants. Plant hormones and their applications. Polyploidy, mutation and hybridization with reference to medicinal plants **Conservation of medicinal plants**	10
3	**UNIT III** **Plant tissue culture:** Historical development of plant tissue culture, types o f cultures, Nutritional requirements, growth and their maintenance. Applications of plant tissue culture in pharmacognosy. Edible vaccines	07
4	**UNIT IV** **Plant description, morphology and anatomy:** Leaves, Roots, Barks, Wood, Flowers, Fruits, Seeds, subterranean organs **Introduction to secondary metabolites:** Definition, classification, properties and test for identification of Alkaloids, Glycosides, Flavonoids, Tannins, Volatile oil and Resins.	10
5	**UNIT V** Study of biological source, chemical nature and uses of drugs of natural origin containing following drugs **Plant Products:** Fibers - Cotton, Jute, Hemp Hallucinogens, Teratogens, Natural allergens **Primary metabolites:** General introduction, detailed study with respect to chemistry, sources, preparation, evaluation, preservation, storage, therapeutic used and commercial utility as Pharmaceutical Aids and/or Medicines for the following Primary metabolites: **Carbohydrates**: Acacia, Agar, Tragacanth, Honey **Proteins and Enzymes**: Gelatin, casein, proteolytic enzymes (Papain, bromelain, serratiopeptidase, urokinase, streptokinase, pepsin). **Lipids (Waxes, fats, fixed oils):** General methods of extraction of lipids. Castor oil, Chaulmoogra oil, Shark liver oil and Cod liver oil, Wool Fat, Bees Wax	08

	Marine Drugs: Novel medicinal agents from marine sources a) Cardiovascular agents and b) Anticancer agents.	
		45

5. COURSE OUTCOME (CO)

After successful completion of course student will able to

CO No.	Course Outcome Statement	Bloom Levels (1-Knowledge, 2-Understand, 3-Apply, 4-Analyze, 5-Evaluate, 6-Creat)
1	Describe the scope and evolution of Pharmacognosy	**2**
2	Describe the cultivation, collection and processing of drugs of natural origin	**2**
3	Describe fundamental aspects of plant tissue culture	**2**
4	Describe different types of secondary metabolites, their general properties, classification, and their test for identification	**2**
5	Describe the biological source, chemical nature and uses of drugs of natural origin and to discuss the medicinal importance of marine drugs	**3**

6. Mapping of Course Outcome (CO) with Program Outcome (PO)

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO 9	PO 10	PO 11
CO1	√	√	√	--	--	--	--	--	--	--	--
CO2	√	√	√	√	--	--	--	--	--	--	--
CO3	√	√	√	√	--	--	--	--	--	--	--
CO4	√	√	√	√	--	--	--	--	--	--	--
CO5	√	√	√	√	--	--	--	--	--	--	--

7. JUSTIFICATION:

CO's	Justification
CO1	PO1: Basic knowledge of Pharmacognosy PO2: Planning of the cultivation of plants PO3: To solve the problems of quantification and preservation of plants
CO2	PO1: Basic knowledge of cultivation, collection and processing of drugs of natural origin PO2: Planning of the different cultivation, collection and processing methods PO3: To solve the problems of cultivation and processing PO4: To learn the modern tools for processing of drugs of natural origin
CO3	PO1: Basic knowledge of plant tissue culture PO2: Planning of the methods of plant tissue culture PO3: To solve the problems involved in practical applications of methods of PTC PO4: To learn the modern tools of plant tissue culture
CO4	PO1: Basic knowledge of different types of secondary metabolites, their general properties, classification, and their test for identification PO2: Planning of the different identification tests of secondary metabolites PO3: To solve the problems of methods to identify secondary metabolites PO4: To learn the modern tools for assessment of secondary metabolites
CO5	PO1: Basic knowledge of biological source, chemical nature and uses of drugs of natural origin and to discuss the medicinal importance of marine drugs PO2: Planning of the different medicinal marine drugs for applications in pharmaceutical industry and research. PO3: To solve the problems of marine drugs

	PO4: To learn the modern tools for chemical nature and uses of drugs of natural origin and to discuss the medicinal importance of marine drugs

8. MAPPING STRENGTH OF CO's TO PO's

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO 9	PO 10	PO 11
CO1	2	1	1	--	--	--	--	--	--	--	--
CO2	2	1	1	2	--	--	--	--	--	--	--
CO3	2	2	2	2	--	--	--	--	--	--	--
CO4	2	2	2	2	--	--	--	--	--	--	--
CO5	3	1	1	1	--	--	--	--	--	--	--

1: Low 2: Moderate 3: High

MEDICINAL CHEMISTRY- I Practical

1. COURSE DETAILS

Course Name and code: MEDICINAL CHEMISTRY – I .BP402(Practical)

Year and Semester: Third Year IV Semester

Year of study: 2023-24 (2019 Pattern)

2. SCOPE:

This subject deals with classification and nomenclature of simple organic compounds, structural isomerism, intermediates forming in reactions, important physical properties, reactions and methods of preparation of these compounds. The syllabus also emphasizes on mechanisms and orientation of reactions.

3. OBJECTIVES:

Upon completion of the course the student shall be able to

1. Understand the interaction of matter with electromagnetic radiations and its applications in drug analysis

2. Understand the chromatographic separation and analysis of drugs.

3. Perform quantitative & qualitative analysis of drugs using various analytical instruments

4. SYLLABUS

Theory	Practical	Tutorial	Credits
---	4	1	5

UNIT	Contant	Session in Hrs.
1.	Introduction to Laboratory Techniques	4
2.	Safety in laboratory	4
3.	To Perform the Synthesis of 1.3 Pyrazole	4
4.	To Perform the Synthesis of Benzimidazole.	4

5.	To Perform the Synthesis of Benztriazole	4
6.	To Perform the Synthesis of 2,3- Diphenyl Quinoxaline	4
7.	To Perform the Synthesis Of Benzocain	4
8.	To Perform the Synthesis of Phenytoin	4
9.	To Perform the Synthesis of Phenothiazin	4
10.	Purification of synthesized compounds by Column chromatography	4
11.	Determination of Partition coefficient and Ionisation constants	4
12.	Determination of Partition coefficient and Ionisation constants	4

5. COURSE OUTCOMES

CO	Course Outcomes	CL (Cognitive level)	KC (Knowledge Category)	Class Session Hrs.	Units
CO1	Prepared purified organic compounds using a given synthetic procedure.	2	C	9	1
CO2	To purified specified organic compounds using a Column chromatography techniques.	2	C	1	3
CO3	To perform physicochemical properties of drugs.	4	C	4	4
CO4	To understand about TLC and other purification techniques.	2	F	1	4

Cognitive level (CL): Bloom's taxonomy Cognitive level (1/2/3/4/5/6)

Knowledge Category (KC): F= Factual Knowledge, C= Conceptual Knowledge, P= ProceduralKnowledge, M= Metacognitive Knowledge

6. MAPPING OF COS TO POS

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO 9	PO 10	PO 11
CO1	√	--	--	--	--	√	--	√	--	--	√
CO2	√	--	√	--	--	--	--	√	--	--	√
CO3	√	--	√	--	--	√	--	√	--	--	√
CO4	√	--	√	√	--	√	--	√	--	--	√
CO5	√	--	√	--	--	√	--	√	--	--	√
CO6	√	--	--	√	--	--	--	√	--	--	√

7. JUSTIFICATION-

CO's	Justification
CO1	PO1: To understand concept and contribution of scientist in the development of Medicinal Chemistry. PO6: Understand Mechanism/cause of disease 0r disorder for professional discussion. PO8: Information related to development of Medicinal Chemistry for writing reports and for documentation. PO11: To understand basic concept of Medicinal chemistry.
CO2	PO1: Understand basic concept of Medicinal chemistry, physicochemical properties and drug metabolism. PO3:To interpret uses and adverse effect based on classification of drug PO8: Information related to pharmacokinetic & pharmacological profile of drugs for professional discussion. PO11: Information related to chemical class for writing reports and for documentation.

CO3	PO1: To understand the drug metabolism pathways, adverse effect and therapeutic value of drugs. PO3: To study of chemical reaction and principals of phase I and phase II, to analyze drug metabolism pathways. PO6: Information related to chemical class for professional discussion PO8: Information related to drug metabolism for writing reports and for documentation. PO11: To understand information related to factor affecting drug metabolism.
CO4	PO1: Knowledge of Chemical Structure and Class of Autonomic Nervous system Central Nervous system. PO3:To interpret uses and adverse effect based on classification of drug PO6: Information related to chemical class for professional discussion. PO8: Information related to chemical class for writing reports and for documentation. PO11: To understand information related to new chemical class of drug.
CO5	PO1: Knowledge of Relationship Between Chemical Structure and biological Activity of specified drugs acting on Autonomic Nervous system Central Nervous system. PO3: To interpret uses and biological action of drug based on classification. PO6: Information related to Biological activity of drug for professional discussion. PO8: Information related to Biological activity for writing reports and for documentation. PO11: Help in correlation between pharmacological of disease and its mitigation or cure.
CO6	PO1: Knowledge about the mechanism pathways of different class of medicinal compounds. PO4: Drawing the structure Modern tools helps to study 3D structure. PO8: Information related to chemical class for writing reports and for documentation.

	PO11: To understand information related to synthesis pathway of specified drug.

8. MAPPING STRENGTH OF CO'S TO PO'S

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO 9	PO 10	PO 11
CO1	3	-	--	--	-	1	-	2	-	-	2
CO2	3	-	2	--	-	-	-	2	-	-	2
CO3	3	-	2	--	-	1	-	2	-	-	2
CO4	3	-	2	1	-	1	-	2	-	-	2
CO5	3	-	2	--	-	1	-	2	-	-	2
CO6	3	-	--	1	-	-	-	2	-	-	2

PHYSICAL PHARMACEUTICS II Practical

1. COURSE DETAILS

Course Name and code: Physical Pharmaceutics II (Practical) BP 407P

Year and Semester: II Year IV Semester

Year of study: 2022-23 (2019 Pattern)

2. SCOPE:

The course deals with the various physical and physicochemical properties, and principles involved in dosage forms/formulations. Theory and practical components of the subject help the student to get a better insight into various areas of formulation research and development, and stability studies of pharmaceutical dosage forms.

3. OBJECTIVES:

Upon the completion of the course student shall be able to

1. Relate various physicochemical properties of drug and excipient molecules in designing the dosage forms

2. Distinguish the principles of chemical kinetics & to use them for stability testing and determination of expiry date of formulations

3. Demonstrate the behavior and mechanism of drugs and excipients in the formulation development and evaluation of dosage forms.

4. SYLLABUS

Unit	Content	Session in Hrs.
1	Determination of particle size, particle size distribution using sieving method	4
2	Determination of particle size, particle size distribution using Microscopic method .	4
3	Determination of bulk density, true density and porosity	4
4	Determine the angle of repose and influence of lubricant on angle of repose	4
5	Determination of viscosity of liquid using Ostwald‟s viscometer system by CST method	4
6	Determination sedimentation volume with effect of different suspending agent .	4
7	Determination sedimentation volume with effect of different concentration of single suspending agent	4

8	Determination of reaction rate constant first order	4
9	Determination of reaction rate constant second order	4
10	Accelerated stability studies	4
11	Determination of Refractive index of given sample.	4
12	Determination of thermodynamic parameters using solubility studies.	4

5. COURSE OUTCOMES

Cognitive level (CL): Bloom's taxonomy Cognitive level (1/2/3/4/5/6)

Knowledge Category (KC): F= Factual Knowledge, C= Conceptual Knowledge, P= Procedural Knowledge, M= Metacognitive Knowledge

CO	Course Outcomes	CL (Cognitive level)	KC (Knowledge Category)	Class Session Hrs.	Units
CO1	Determine the particle size and the size distribution by using microscopic and sieving techniques	3	F	12	1
CO2	Determine the bulk density, true density , porosity and the angle of repose of powders.	3	C	12	2
CO3	Demonstrate the use of Ostwald's and Brookfield's viscometer to determine the viscocity of liquids and semisolids.	2	F	12	3
CO4	Experiment effect of suspending agents and their concentration on the sedimentation volume	2	F	12	4
CO5	Determine the reaction rate constant using the specified experiments.	2	F	12	5

6. MAPPING OF COS TO POS

Cos/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
1	√	-	√	-	-	-	-	√	-	-	√
2	√	-	√	√	-	-	-	√	-	-	-
3	√	-	√	-	-	-	-	-	-	-	√
4	√	-	√	-	-	-	-	-	-	-	√
5	√	-	√	√	-	-	-	-	-	-	√

7. JUSTIFICATION-

Cos	Justification
CO1	PO1: The basic concept of colloids in dispersion system, its classification and general properties
	PO3: It deals with acquiring knowledge of colloids in dispersion system, its classification and general properties ,analysing and solving problem related to formulation.
	PO8: It helps to understand the nature of colloids which can be used for further advanced study by formulator pharmacist.
	PO11: The formulation and development with different drug and excipients is the continuous process and adopt the latest/updated technology for Profession development.
CO2	PO1: It deals with the basic knowledge of newtonian and non-newtonian flows ystems, the concept of thixotropy and viscocity their application in formulation and methods to determine the viscocity of fluids
	PO3: The problem in formulation and development can be identified by understanding the physicochemical properties of drug.
	PO4: use of modern technique and tools for interpreting and analyzing the properties of drug and excipients (S/L/G).
	PO8 :it deals with the information related to newtonian and non-newtonian flows ystems, the concept of thixotropy and viscocity their application in formulation and methods to determine the viscocity of fluids
CO3	PO1 : It helps to understand the different types of deformation of solids and stress -strain relationship
	PO3: It uses the knowledge of the different types of deformation of solids and stress -strain relationship in analysing the problem in formulation development.
	PO11: It deals with implementing advance technology for continuous professional development.

CO4	PO1: It deals with the basic knowledge of properties, stability, stabilizing agents in various classes of suspensions and emulsions in coarse dispersion system..
	PO3: It deals with identifying, analysing and stabilizing the dosage form.
	PO11:it deals with implementing advance technology for continuous professional development.
CO5	PO1: It Summarize the concept of micromeritics with respect to the physical properties of powders, their measurements and derived properties
	PO3: It helps to derive the respect to the physical properties of powders, their measurements and derived properties
	PO4: It helps in the usage of modern tools to determine the physical properties of powders, their measurements and derived properties
	PO11:it deals with implementing advance technology for continuous professional development.

8. CO-PO MAPPING STRENGTH OF CO's to PO's

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
1	3	-	3	-	-	-	-	2	-	-	3
2	3	-	3	3	-	-	-	2	-	-	-
3	3	-	3	-	-	-	-	-	-	-	3
4	3	-	3	-	-	-	-	2	-	-	3
5	3	-	3	3	-	-	-	-	-	-	3

PHARMACOLOGY I (Practical)

1.COURSE DETAILS

Course Name and code: Pharmacology (Practical) BP 408 P

Year and Semester: II Year IV Semester

Year of study: 2022-23 (2019 Pattern)

2. SCOPE:

This course is designed to scientific application of biotechnology in the field of genetic engineering, medicine and fermentation technology makes the subject interesting.
Biotechnology is leading to new biological revolutions in diagnosis, prevention and cure of diseases, new and cheaper pharmaceutical drugs.

3. OBJECTIVES:

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

1. Understanding the importance of Immobilized enzymes in Pharmaceutical Industries
2. Genetic engineering applications in relation to production of pharmaceuticals
3. Importance of Monoclonal antibodies in Industries
4. Appreciate the use of microorganisms in fermentation technology

2. SYLLABUS

T	P hr/week	T	Hrs. Totl
	12		180

UNIT	COURSE CONTENT	HOURS Btch A+B+C
1.	Introduction to experimental pharmacology.	12
2.	Commonly used instruments in experimental pharmacology.	12
3.	Study of common laboratory animals.	12
4.	Maintenance of laboratory animals as per CPCSEA guidelines.	12

5.	Common laboratory techniques. Blood withdrawal, serum and plasma separation, anesthetics and euthanasia used for animal studies. 15. Study of local anesthetics by different methods	12
6.	Study of different routes of drugs administration in mice/rats.	12
7.	Study of effect of hepatic microsomal enzyme inducers on the phenobarbitone sleeping time in mice.	12
8.	Effect of drugs on ciliary motility of frog oesophagus	12
9.	Effect of drugs on rabbit eye.	12
10.	Effects of skeletal muscle relaxants using rota-rod apparatus.	12
11.	Effect of drugs on locomotor activity using actophotometer.	12
12.	Anticonvulsant effect of drugs byMES and PTZ method.	12
13.	Study of stereotype and anti-catatonic activity of drugs on rats/mice.	12
14.	Study of anxiolytic activity of drugs using rats/mice.	12
15.	Study of local anesthetics by different methods	12

3. COURSE OUTCOMES

CO	Course Outcomes	CL	KC	Class Hr	Units
CO-1	Discuss Various branches of experimental pharmacology and discuss in detail various terminologies of experimental pharmacology	3	P	12	1
CO-2	Study working and principle of different instruments used in In Vivo and in vitro experimental pharmacology	3	P	12	2

CO- 3	Explain in detail various animals used in experimental pharmacology along with their handling and maintenance as per CPCSEA Guidelines.	3	P	24	3 & 4
CO 4	Illustrate common laboratory techniques used for animal study.	3	P	12	5
CO-5	Describe different routes of administration of drug in Lab animals along with its dosage form .	3	P	12	6
CO-6	Demonstrate different activity of drug on animals and record its response on them and understand pharmacological action of different categories of drug	3	P	108	7 to 15

Cognitive level (CL): Bloom's taxonomy Cognitive level (1/2/3/4/5/6)

Knowledge Category (KC): F= Factual Knowledge, C= Conceptual Knowledge, P= Procedural Knowledge, M= Metacognitive Knowledge

4. MAPPING OF COS TO POS

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	√	-	-	-	--	√	--	-	--	--	-
CO2	√	-	-	√	--	√	--	-	--	--	-
CO3	√	-	-	-	--	√	√	-	--	√	-
CO4	√	√	√	√	--	√	--	--	--	--	--
CO5	√	-	-	-	-	√	--	--	--	--	--
CO6	√	√	√	√	-	√	-	-	-	√	-

5. JUSTIFICATION

CO's	Justification
CO1	PO1:Various terminology of experimental pharmacology is studied which is essential in pharmacy PO6:Pharmacist have complete knowledge of experimental pharmacology
CO2	PO1: In vivo and in vitro study of drugs is part of pharmacy knowledge PO4: Modern equipments are used for in vitro study of drug like Dissolution apparatus, disintegration apparatus, Analgesiometer, Hot plate apparatus, K . PO6: Pharmacy professionals can well perform this in vitro and invivo study.
CO3	PO1: Knowledge about handling and maintenance os animals used for in vivo study is obtained PO6: This knowledge of handling and maintenance is given by pharmacy professionals. PO7: CPCSEA guidelines are followed and strictly taken into considerations during handling and maintenance of experimental animals. PO10: Animals which are treated with drugs and those animals on which study of new drug is done such animals are either cured or sacrificed (Euthanasia) for safety purpose as it may spread any harmful infection or create environmental hazard.
CO4	PO1: Common laboratory techniques used for animal or clinical study is studied in pharmacy. PO2: Selection of effective laboratory techniques require pre planning in order to reduce wrong use of animals. PO3: If wrong laboratory technique is incorporated it is analysed so that next time same problem can be avoided PO4: Equipments or modern tools an be used for common laboratory techniques. PO6: Pharmacy professionals have detail knowledge of common laboratory techniques
CO5	PO1: Different routes of administration of drugs in lab animals can be studied in detail in pharmacology. PO6: Pharmacists or pharmacologist have detail knowledge about which routei of administration is appropriate for particular drug in particular lab animal.
CO6	PO1: Pharmacological action of drug is studied by administering it in rats or mice and its response over that animal is studied. P O2: Planning is required for selection of drug,route of administration and which instrument is suitable that is selected. PO3: Problems occurred during taking response like undesirable response of animal for that drug is analysed and causes are found out. PO4: modern tools or equipments like analgesiometer,rota rod apparatus, electroconvulsometer, hot plate apparatus, organ bath,dissolution apparatus is used for determining activity of drug on lab animals. PO6: Professionals an clearly identify to pharmacological action of drug on lab animal and can describe the method required for it.

	PO10: Animals which are treated with drugs and those animals on which study of new drug is done such animals are either cured or sacrificed (Euthanasia) for safety purpose as it may spread any harmful infection or create environmental hazard.

6. MAPPING STRENGTH OF CO'S TO PO'S

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	-	-	-	-	1	-	-	-	-	-
CO2	3	-	-	3	-	1	-	-	-	-	-
CO3	3	-	-	-	-	1	1	-	-	3	-
CO4	3	3	3	3	-	1	-	-	-	-	-
CO5	3	-	-	-	-	1	-	-	-	-	-
CO6	3	3	3	3	-	1	-	-	-	3	-

PHARMACOGNOSY AND PHYTOCHEMISTRY I (PRACTICAL) BP 409 P

1. COURSE DETAILS

Course Name and code: Pharmacognosy and Phytochemistry I (Practical) BP 409 P

Year and Semester: Second Year IV Semester

Year of study: 2022-23 (2019 Pattern)

2. SCOPE: The subject involves the fundamentals of Pharmacognosy like scope, classification of crude drugs, their identification and evaluation, phytochemicals present in them and their medicinal properties.

3.OBJECTIVES: Upon completion of the course, the student shall be able

1. To know the techniques in the cultivation and production of crude drugs
2. To know the crude drugs, their uses and chemical nature
3. Know the evaluation techniques for the herbal drugs
4. To carry out the microscopic and morphological evaluation of crude drugs

4.SYLLABUS

Theory	Practical	Tutorial	Credits
---	4	--	4

Unit	Content	Session in Hrs.
1	To Perform Qualitative analysis of crude drugs by chemical tests: Tragacanth & Acacia	4
2	To Perform Qualitative analysis of crude drugs by chemical tests: Gelatin & Agar	4
3	To Perform Qualitative analysis of crude drugs by chemical tests: Starch, Honey & Castor oil	4

4	To determine the stomatal index of given leaf sample	4
5	To determine the stomatal number of given Leafsample	4
6	To determine the Vein – islet number of given Leafsample	4
7	To determine the Vein termination number of given Leaf sample	4
8	To determine the Palisade ratio of given crude drug	4
9	To determine the Size of starch grains and calcium oxalate crystals of given crude drug	4
10	To determine the length and width of fiber presentin crude drug	4
11	To determine the total ashvalue of given powder drug.	4
12	To determine total moisture content of given powder drug.	4
13	To determine the extractive values of givenpowder drug.	4
14	To determine swelling index of given powderdrug	4
15	To determine foaming index of given powderdrug	4

5. COURSE OUTCOME (CO)

After successful completion of course student will able to

CO No.	Course Outcome Statement	Bloom Levels (1-Knowledge, 2-Understand, 3-Apply, 4-Analyze, 5-Evaluate, 6-Creat)
1	Demonstrate chemical tests to identify unorganized crude drugs	**2**
2	Evaluate the quality and purity of crude drugs	**1**
3	Perform linear measurements for crude drug identification	**3**
4	Develop quality control methods for standardization of herbal drugs	**2**

6.Mapping of Course Outcome (CO) with Program Outcome (PO)

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO 9	PO 10	PO 11
CO1	√	√	√	--	--	--	--	--	--	--	--
CO2	√	√	√	--	--	--	--	--	--	--	--
CO3	√	√	√	√	--	--	--	--	--	--	--
CO4	√	√	√	√	--	--	--	--	--	--	--

7. JUSTIFICATION:

CO's	Justification
CO1	PO1: Basic knowledge of equipment used in Pharmacognosy PO4: Planning ability for use of different chemical tests to identify unorganized crude drugs. PO3: To solve the problem related to the working of equipments.
CO2	PO1: Knowledge of different method crude drugs PO2: planning ability to check the quality and purity of crude drugs. PO3: To solve problem related to quality and purity of crude drugs.
CO3	PO1: Basic Knowledge of linear measurements for crude drug identification PO2: planning for the preparation of crude drugs for linear measurements PO3: problem related to the linear measurements. PO4: To use modern tools like camera lucida.
CO4	PO1: Knowledge of quality control methods for standardization of herbal drugs PO2: planning for the development of quality control methods PO3: problem analysis related to the quality control methods for standardization of herbal drugs. PO4: To use modern tools for standardization process.

8. CO-PO MATRIX OF COURSE (MAPPING STRENGTH)

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO 9	PO 10	PO 11
CO1	3	2	2	--	--	--	--	--	--	--	--
CO2	2	1	1	--	--	--	--	--	--	--	--
CO3	3	2	2	2	--	--	--	--	--	--	--
CO4	1	1	2	1	--	--	--	--	--	--	--

1: Low 2: Moderate 3: High

ACADEMIC MONITORING COMMITTEE 2022-23

Sr. No.	Name	Designation	Designation in AMC committee
1.	Dr. Sanjay Bhawar	Principal Chairman	Chairman
2.	Dr. Sunayana Vikhe	Academic Dean UG Programme coordinator Class Incharge Final Y B Pharm	Member
3.	Dr. Suhas Siddheshwar	PG Programme coordinator	Member
4.	Dr. Gaurao Damre	Pharm D. Programme coordinator. Class Incharge F. Y. Pharm. D.	Member
5.	Mrs. Tejal Nirmal	D. Pharm Programme coordinator	Member
6.	Mrs. Rajashree Ghogare	Class Incharge F. Y. B. Pharm	Member
7.	Mrs. Kavita Dhamak	Class Incharge S. Y. B. Pharm	Member
8.	Mr. Sagar Magar	Class Incharge T. Y. B. Pharm	Member
9.	Dr. Vaibhav Bhone	Class Incharge S. Y. Pharm. D.	Member
10.	Mrs. Nilima Wani	Class Incharge F. Y. D. Pharm	Member
11.	Mrs. Sneha Vikhe	Class Incharge S. Y. D. Pharm	Member

DUTIES OF THE COMMITTEE:

- Periodically reviewing the progress of the classes.
- Discussing the problems concerning curriculum, syllabus and the conduct of classes.
- Discussing with the course teachers on the nature and scope of assessment for the course and the same shall be announced to the students at the beginning of respective semesters.
- Communicating its recommendation to the Head of the institution on academic matters.
- The committee shall take periodic feedback of students regarding teaching learning process, analyze it and decide the course of action.

FREQUENCY OF THE MEETING:

- The AM Committee shall meet at least twice in a semester and as and when required.