

# **STUDENT** **handbook** **2023-2024**

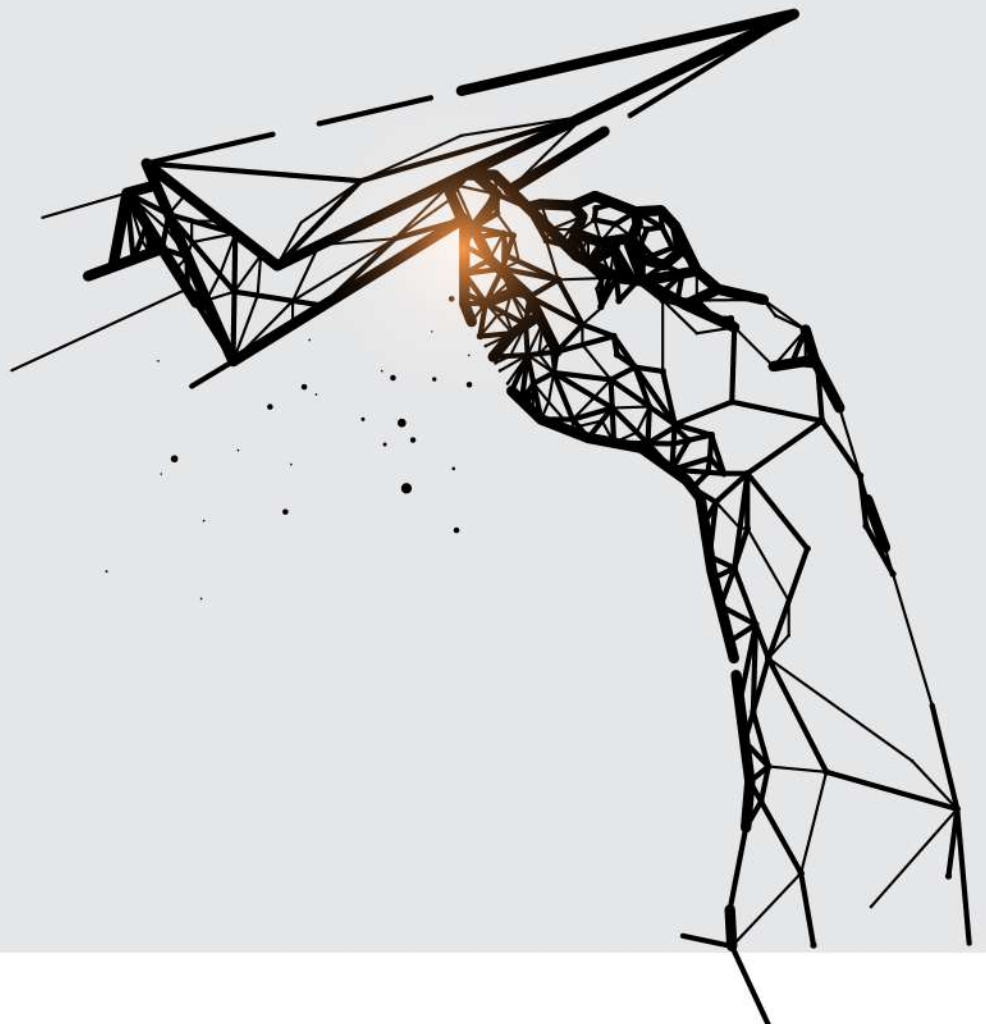
*Pharm.D*

#### VISION

To be a globally renowned university.

#### MISSION

To impart quality higher education and to undertake research and extension with emphasis on application and innovation that cater to the emerging societal needs through all-round development of students of all sections enabling them to be globally competitive and socially responsible citizens with intrinsic values.





**CATEGORY 1  
UNIVERSITY**

BY MHRD, Govt. of India

**KL ACCREDITED BY  
NAAC WITH A++  
GRADE**

**nirf** NATIONAL  
INSTITUTIONAL  
RANKING  
FRAMEWORK  
**2023**

**RANKED 28  
AMONG ALL  
UNIVERSITIES**

**43 YEARS OF  
EDUCATIONAL  
LEADERSHIP**





Koneru Satyanarayana,  
*Chancellor*

Sri Koneru Satyanarayana, BE, FIE, FIETE, MIEEE graduated in Electronics and Communication Engineering in the year 1977. Along with Sri Koneru Lakshmaiah, he is the co-founder of the Institute which was established in the year 1980. He is an educationist of eminence and also an industrialist of great repute. He runs a number of industries in and around Vijayawada.

Dr. K. S. Jagannatha Rao  
*Pro-Chancellor*

Prof. K. S. Jagannatha Rao was one of the leading scientists in neuroscience research in globe. He was the Director on Institute for Scientific Research and Technological Advances (INDICASAT AIP), Republic Panama and contributed lot in building innovation in higher education and research in Panama since 2010. He played a key role in building PRISM (Panamanian Research Institutes of Science and Medicine) in Latin America. Dr. Rao has his research area on Brain Research and established Alzheimer's Centre and published 165 papers in leading Biochemistry and Neuroscience Journals, supervised 19 Ph.D students. He is also adjunct faculty of Biomedical Informatics of UTHS, Houston, and Advisory Board Member of UT- El Paso Minority Health NIH program, USA and Adjunct Faculty, Methodist Research Institute, Houston, USA. He was elected Member of Panamanian Association for the Advancement of Science (APANAC) - Considered as National Science Academy of Panama. He received his undergraduate and Ph.D degrees from Sri Venkateswara University, Tirupati. Later, joined in Central Food Technological Research Institute, Mysore. He received Sir C. V. Raman Award by Karnataka State Council of Science and Technology, 2003.



Prof. G P S Varma  
*Vice-Chancellor*



Prof. G P S Varma, Vice-Chancellor, KLEF, is one of the most widely experienced leaders in Indian higher education, known for his commitment to expanding student opportunity, catalyzing academic innovation, and encouraging university's civic engagement and service to society. He adorned the position of Chairman, ISTE (Indian Society for Technical Education)- AP State, TSEM CET Test Committee Member-2021 nominated By Telangana State Govt, APEAMCET Admission Committee Member in 2016 by Andhra Pradesh State Council of Higher Education, Govt. of Andhra Pradesh. He has been a very farsighted Peer Team Visit Member for National Assessment and Accreditation Council (NAAC), Expert Committee Member for University Grants Commission (UGC) Autonomous Visits. He has been an Advisory Council Member for (CEGR) Centre for Education Growth, and Research India International Centre, New Delhi, and Board Member for Big-Data Analytics Forum.



**Dr. A. V. S. Prasad**  
*Pro-Vice Chancellor*

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Dr. A. V. S. Prasad, M.E and Ph.D from JNTU, Hyderabad is a professor in Civil Engineering. He has a rich experience of 33 years in academics which includes 26 years in administration at various cadres ranging from Head of Department, Dean, Principal, Director and Pro-Vice Chancellor. He has served as Director of Audisankara group of institutions and Narayana Group of Institutions for 18 years and was instrumental in getting these institutions accredited by NAAC, NBA, Autonomous and gained many laurels from the State Government, JNTU etc. He has served as Pro-Vice Chancellor of KL University for 3 years.

He has extensive knowledge of administrative system, maintaining statutory norms of bodies like AICTE, UGC etc and has a good understanding of NBA, NAAC procedures and norms. He served as Member, Chairman of Board of Studies at JNTU(A), KLCE(Autonomous) and KL University.

**Dr. Venkatram Nidumolu**  
*Pro-Vice Chancellor*

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Dr. Venkatram Nidumolu, Pro-Vice Chancellor is High performing, strategic thinking professional with more than 15years of administration experience and 20 years of teaching experience in KLEF and 30 years overall experience in the higher education sector. He graduated in B.Tech (ECE) from Acharya Nagarjuna University, pursued M.S degree from BITS, PILANI in software Systems. He received Ph.D award from Acharya Nagarjuna University. He held the positions like HOD, Joint Register, Principal, and Dean-Academics before becoming Pro-Vice Chancellor. He was core member of all NBA, NAAC, & other accreditations since 2004 and he has good experience in handling of quality issues and assessment related practices.



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## Acronyms

Sl No	Acronyms	Full Form
1	KLEF	Koneru Lakshmaiah Education Foundation
2	CET	Common Entrance Test
3	KLEEE	KLEF Engineering Entrance Examination
4	JEE	Joint Entrance Examination
5	BT	Biotechnology
6	CE	Civil Engineering
7	CS	Computer Science & Engineering
8	EC	Electronics & Communication Engineering
9	EE	Electrical & Electronics Engineering
10	CM	Computer Engineering
11	ME	Mechanical Engineering
12	AD	Artificial Intelligence & Data Science
13	CI	Computer Science & Information Technology
14	CGPA	Cumulative Grade Point Average
15	SGPA	Semester Grade Point Average
16	LTPS	Lecture, Tutorial Practical, Skill
17	SEE	Semester-End Examinations
18	SIE	Semester-In Examinations
19	OJET	On-the-job Engineering Training
20	IRP	Industrial Relations and Placements
21	PS	Practice-School
22	OPAC	Online Public Access Catalog
23	QCM	Quality Circle Meeting
24	MOOC	Massive Open Online Course
25	MOU	Memorandum of Understanding
26	OD	On Duty
27	(A,B]	Between A and B excluding value A and including value B
28	COE	Controller of Examinations
29	VLSI	Very Large-Scale Integration
30	MTech	Master of Technology
31	COA	Council of Architecture
32	JEE	Joint Entrance Examination
33	NATA	National Aptitude in Architecture

34	PC	Professional Core
35	BSAE	Building Science and Applied Engineering
36	PE	Professional Elective
37	PAECC	Professional Ability Enhancement Compulsory Courses
38	SEC	Skill Enhancement Course
39	OE	Open Elective
40	CTIS	Cloud Technology and Information Security
41	DS	Data Science
42	IoT	Internet of Things
43	IPA	Intelligent Process Automation
44	B.B.A.,LL.B.	Bachelor of Business Administration and Bachelor of Laws
45	LL.B.	Bachelor of Laws
46	BCI	Bar Council of India
47	CLAT	Common Law Admission Test
48	HM	Hotel Management
49	BTK	Basic Training Kitchen
50	QTK	Quantitative Training Kitchen
51	ATK	Advanced Training Kitchen
52	MBA	Master of Business Administration
53	BBA	Bachelor of Business Administration
54	MSc (F&C)	Master of Science (Finance & Control)
55	BA	Bachelor of Arts
56	M.Sc.	Master of Science
57	PCI	Pharmacy Council of India
58	PY	Pharmacy
59	B. Com (H)	Bachelor of Commerce with Honors
60	ACCA	Association of Chartered Certified Accountants



## CHAPTER 1

### INTRODUCTION

The President of Koneru Lakshmaiah Education foundation, Er. Koneru Satyanarayana, along with Late Sri. Koneru Lakshmaiah, founded the K L College of Engineering in the Academic year 1980-81. With the mighty vision and restless efforts of Er. Koneru Satyanarayana K L College of Engineering carved a niche for itself through excellence in engineering education, discipline and record numbers of placements and was the leading college in the state of AP. K L College of Engineering achieved NBA Accreditation for all its B.Tech. Programs in 2004 and later re-accredited in 2007. K L College of Engineering was transformed into an autonomous engineering college in the year 2006. In 2008 this college received a record grade of 3.76 on a 4 points scale with “A” Grade from NAAC; and in February 2009, the college, and Accredited by National Assessment and Accreditation Council (NAAC) of UGC as ‘A++’ with highest Grade of 3.57 CGPA on 4-point scale in 2018, through its founding society “Koneru Lakshmaiah Education Foundation” was recognized as Deemed to be University by the MHRD-Govt. of India, Under Section 3 of UGC Act 1956. This Deemed to be University is named as “KLEF”.

#### Location

KLEF is situated in a spacious 100-acre campus on the banks of Buckingham Canal of river Krishna, eight kilometers from Vijayawada city. Built within a rural setting of lush green fields, the institute is a virtual paradise of pristine nature and idyllic beauty. The campus has been aptly named "Green Fields" and the splendid avenue of trees and gardens bear testimony to the importance of ecology and environment. The campus ambience is most befitting for scholastic pursuits. The University is situated in a built-up area of around 15, 00,000 S.Ft.

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#### Facilities

##### **Central Library: E-Resources**

The Central Library is the largest and holds materials to serve the whole University community.

It has materials relevant to the Engineering, Science & Humanities courses offered by the University.

The library system contains more than one lakh and fifty thousand books and periodicals on all subjects related to the teaching and research interests of the University staff and students. The library has over 36,000 electronic journal titles, academic databases and 32.98 lakhs eBooks. Access is available on campus on student computers and remotely.

### The Data Centre

A State-of-the-Art Data center with advanced servers provides a highly interactive learning environment with full-fledged hardware and software training facilities.

### Physical Education- Sports Facilities

KLEF encourages students to explore their latent talents by providing good games and sports facilities. The institute is equipped with the following.

Sport/Game	No. of Courts	Sport/Game	No. of Courts
Athletic track	1	Handball Court	1
Hockey Field	1	Netball Courts	2
Badminton Courts	4	Throw ball courts	2
Tennikoit Courts	2	Beach Volleyball Court	1
Cricket Field with Net practice	3	Football Field	1
Volleyball Courts	2	Basketball Courts	2
Tennis Courts	2	Kabaddi Courts	2
Kho Kho Court	1	Table Tennis	6
Soft Ball	1	Chess	20
Archery	1	Caroms	12

The University had a State-of- the - Art Indoor stadium of 30000 sq.ft with:

- 4 wooden Shuttle Courts/ Basketball Court
- Yoga and Meditation Centre
- Dramatics
- 8 Table Tennis Tables
- Hobby Centre
- Gymnasium for Girls
- Gymnasium for Boys
- Multipurpose room with Chess, Caroms etc.
- Power lifting/Weightlifting

### Accommodation- Hostels

- KLEF has separate hostels for boys and girls with well furnished rooms and modern amenities.
- The overall atmosphere is very conducive for the students to concentrate on their studies.
- A state- of – the- art kitchen and spacious dining area has been provided for both the hostels.
- Generators have been provided as power backup. Emphasis has been laid on hygiene and cleanliness for healthy living. A customized menu caters to the student needs, it keeps changing according to their tastes.
- Teaching staff will have to address the academic and personal problems of the students. Round-the-clock security, communication, dispensary facilities are also available.

### **Facilities in the hostels**

- Protected drinking water
- State of the art kitchen, dining hall
- Newspapers, telephones, toilets and bathrooms are well maintained.
- Every student in the hostel is provided with a cot, study table, chair and a rack.
- Fan and light are also provided in each room.
- Gas & Steam based hygienic food preparation.
- Palatable regional, national and international cuisines
- Cleanliness and Safety STD/ISD Facilities
- Medical Kits and First Aid Boxes Soft drinks, snacks, Fruits etc.
- Laundry Stationary shop

### **Hostel Rules and Regulations**

- Students are hereby informed that while staying in the hostel, it is essential to be responsible for maintaining dignity by upholding discipline.
- They must be obedient to the hostel warden/floor in –charges. Valuable items like jewelry etc. should not be kept with students while staying in the hostel.
- It is student's own responsibility to safeguard her/his Laptops, Money by locking suitcases and bags.
- If any loss is found, management will not take any responsibility. Students must intimate to the hostel authorities before giving police complaints against losses.
- Students are not allowed to indulge in smoking; consumption of Alcohol, Narcotic drugs etc., and defaulters will be strictly viewed upon.
- Students are directed that after locking their rooms they must hand over the keys to security and can collect them on returning to the hostel.
- Students must switch off Fans, Lights, Geysers, A/C's etc., before leaving their rooms.
- Visitors are not allowed inside the hostel at any time; however, they are allowed into the visitor's hall with the prior permission of the warden.
- Only family members listed by the parents are allowed to contact the student. Visiting hours are up to 7.30 pm only and after 7.30 pm visitors are required to leave the premises.
- Hostel students are not allowed to come into the hostel after 3.00 pm for morning shift students and 6.00pm for day shift students.
- Those students who are utilizing the computer lab, library etc., after the times specified must submit the permission slip to the security while entering the hostel.
- During public holiday outings, those who seek permission to leave the hostel will have to obtain written permission from the warden. Permission will be given only to those students who get permission from parents to leave the hostel during holidays/outings.
- Moving out of campus without permission is strictly prohibited. Strict study hours from 7.30 am to 10.30 pm shall be maintained in the hostel.
- The hostellers must be in their allotted rooms during study hours. The general complaints of any kind should be noted in the complaint register, which is available at the hostel office.
- Registered complaints will only be entertained. Any health problem should be brought to the notice of Warden/Floor In – charge for necessary treatment.

### **Transportation**

The institution runs 80 buses covering all the important points in Vijayawada City, Mangalagiri, Guntur & Tenali towns with a total seating capacity of 4000 students in two shifts. Transport is available 24 hrs, In case of any emergency in the institute /hostels. Transportation is available for conducting industrial tours and visits etc. Regular transport facility available up to 10PM.

## **Healthcare**

A full-fledged health center with all the facilities is established to cater the needs of the students, staff, Faculty and the public in the adopted villages. It consists of three doctors (Homoeopathy, Ayurvedic & Allopathy).

## **Cafeteria**

KLEF has a spacious canteen with the latest equipment and hygienic environment which provides quality food and prompts service and caters to the needs of all the students and staff. A central cafeteria of 1500 Sq.m. is available on the campus. Mini cafes and fast-food centers are available in various blocks. The canteen is open from 6:30 a.m. to 8:30 p.m. There is a wide variety of North- Indian and South-Indian cuisine and the students enjoy the pleasure of eating during the breaks. Cool aqua water for drinking is available.

## **Placements**

KLEF has meticulously planned to make all its outgoing students employed. The University had installed the infrastructure, employed well experienced faculty, designed and delivered programs that help to enhance the communication and soft skills which are required for making the students employable. An excellent system is in place that considers all the issues that make a student employable. The University has been successful for the last 7 years in employing all the students who have registered and eligible for placement through its offices located across the country. About 50 trained personnel work extensively to make the students ready for recruitment by the industry.

## **Counselling & Career Guidance**

A special Counseling Cell consisting of professional student counselors, psychologists, and Professors counsels/helps the students in preparing themselves to cope with studies, perform well in the tests & various competitions. This Cell provides its services to the students in getting the solutions for their personal problems and provides career guidance with the help of the Industrial Relations and Placements (IRP) department. A group of 20 students are allotted to each faculty member who counsels them regularly and acts as their mentor.

## **Social Service Wing**

KLEF has a social service wing which is used to channelize the social service activities of the faculty, staff and students. It has adopted 5 nearby villages and conducts activities like medical camps, literacy camps and educates the villagers regarding hygiene and health care on a regular basis.

## **NSS/NCC wings**

NCC/NSS is a credit course designed with an intent to transform NCC/NSS activities into curricular activities from an extracurricular thereby providing credits to students involved in NCC/NSS along with other attended advantages to the students in the university.

## **Hobby Clubs**

Wholly and solely managed by the students, contributed much to the cultural life of the campus and to the cultural evolution of the students. Few student bodies and clubs operate in the campus like music society, dance club, drama society, literary and debating club, English press club, drawing club, painting club, mime club, computer club etc. Students manage entire activities and budget of the organization for the entire semester in advance. Around 4000 students are active members of the Hobby Clubs.

## **Life Skills and Inner Engineering**

KLEF feels that it is its responsibility to mold the students as good human beings, contributing to the country and to society by producing responsible citizens. Along with the regular programs every student admitted into KLEF undergoes a one-week special life skills /orientation program. Through this program, KLEF is producing the students with clarity of thoughts and charity at heart. Strict



regularity, implicit obedience, courtesy in speech and conduct, cleanliness in dress. Life skills and inner engineering teach a student his/her obligation towards GOD, himself /herself his/her country and fellow human beings. Every student is encouraged to practice his/her own religious faith and be tolerant and respectful towards other religions.

#### **Technical Festival**

KLEF organizes various programs for the all-round development of the students. The technical festival and project exhibition is organized in the odd semester (October) every year to elicit the innovative ideas and technical skills of the students.

#### **Cultural Festival**

The cultural festival in the even semester (February) of every year is the best platform for the students to exhibit their talents and creativity. Through these festivals KLEF is imparting organizational skills, leadership skills, competitive spirit, and team behavior skills to our students. Along with the knowledge, KLEF festivals provide recreation to the student community.

#### **Center for Innovation, Incubation and Entrepreneurship (CIIE)**

KLEF being a pioneering institute supporting Academics and Research in Engineering, Science and Technology is endowed with the entire infrastructure and highly experienced faculty, has a Centre for Innovation, Incubation and Entrepreneurship (CIIE) that comprises of: Innovation Centre which aims to inculcate a spirit of innovation. Incubation Centre which aims to incubate innovations through prototype product development. Entrepreneurship Development Centre (EDC) which aims at fostering entrepreneurial skills among the students.

## About KL College of Pharmacy

KL College of Pharmacy offers pharmaceutical sciences, in association with other streams like biotechnology which in turn offers innumerable opportunities as chemist, druggist, and novel drug designers in the modern era. The strides taking place in nanotechnology, stem cell therapy, gene editing and several other innovative therapeutic techniques. Incumbents can establish their startups on diagnostic devices, surgical instruments, and medicines.

## Vision and Mission of the Department

### Vision

Lead the future of global healthcare and well-being of the communities we serve.

### Mission

To produce quality Pharmacy professionals having strong theoretical foundation, innovative ideas, good design experience by bridging industry-academic gap in Pharma Sector through the use of technology and innovative teaching and exposure to research and progress with social ethics.

### Mission Statements

**M1. Education:** Provide the most comprehensive and highest quality education for pharmaceutical sciences in a learning environment that embraces diversity, equity, integrity, ethics, moral courage and accountability.

**M2. Community service:** Conduct health education programs to the community to prevent disease and improve public health and well-ness by fostering an environment that promotes the safe, efficacious, and cost-effective use of medications.

**M3. Research:** Develop a passion for discovery and innovations with multidisciplinary collaborative research and engage in creative partnerships locally and globally to advance health education, research, and practice.

**M4. Entrepreneurship:** Encourage and support resourcefulness, originality, imagination, ingenuity, and vision in our students, faculty, and staff. Foster the development of entrepreneurs who have the ability to dream, inspire and innovate and courage to envisage the commercial success and socio-economic productivity of innovations.

## Hallmarks of KL College of Pharmacy

- Highly qualified, experienced, and dedicated faculty with teaching, research, and industrial expertise.
- Innovative pedagogical approaches to increase student participation, learning and critical thinking.
- Skills and Value-added courses with global certification.
- Campus Recruitment Training and Placements.
- Development of global environment among the students with more than 50% International students.
- Well-equipped and sophisticated laboratories with state of art infrastructure.
- 100+ paper publications in peer reviewed good impact factor national and international journals indexed with Scopus, Web of Science - SCI etc.
- 10+ book chapters with reputed international publishers like Elsevier, Wiley, Springer, Taylor & Francis.
- Over 30+ MoUs have been signed with top foreign Universities.

## CHAPTER 2

### PROGRAM EDUCATIONAL OBJECTIVES (PEOs) AND PROGRAM OUTCOMES (POs)

#### Program Educational Objectives (PEOs)

PEO	DESCRIPTION
1	<b>Knowledge &amp; Understanding:</b> Pharmacy graduates will have strong background in pharmaceutical sciences with excellent knowledge in drugs and pharmaceuticals and very good skills to cater the health-care needs of the society and able to use these tools for personal and professional endeavour's
2	<b>Pharmaceutical Education:</b> To impart sound knowledge in the different curriculum like Pharmacognosy, Pharmaceutical Chemistry including Analytical Chemistry, Pharmaceutical Biotechnology, Pharmacology, Formulation and Development, Community Pharmacy, Clinical Pharmacy and Pharmacotherapeutics to utilized for designing and to create novel herbal or synthetic pharmaceutical products in the view of drug discovery at an affordable price for the benefit of human being.
3	<b>Research:</b> To acquire knowledge towards the current needs in the research activities carried out in various fields of pharmacy which implies the novel research approach towards the drug discovery and development to fulfil the requirement to save the patient from various unrevealed disease ailment. To promote health improvement, wellness and disease prevention in cooperation with public and patient community, and other members of an inter-professional team of health care providers through periodical updating of Drug Information.
4	<b>Attitude:</b> To provide productive, harmonious atmosphere that enables the students to acquire the excellent approach, professional behaviours, moral and ethical values to cultivate the profession dexterously.

#### Program Outcomes (POs)

PO	DESCRIPTION
1	<b>Pharmaceutical Knowledge:</b> Apply the knowledge of science, pharmacy fundamentals, clinical pharmacy and Pharmacotherapeutics to the solution of problem directed study.
2	<b>Problem analysis:</b> Identify, formulate, review research literature, and analyze complex clinical and therapeutic problems reaching substantiated conclusions using first principles of basic sciences, and pharmaceutical sciences.
3	<b>Design/development of solutions:</b> Design solutions for complex pharmaceutical problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4	<b>Conduct investigations of complex problems:</b> Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

5	<b>Modern tool usage:</b> Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex pharmaceutical activities with an understanding of the limitations
6	<b>Individual and team work:</b> Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
7	<b>Environment and sustainability:</b> Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8	<b>Ethics:</b> Apply ethical principles and commit to professional ethics and responsibilities and norms of the Pharmacy practice.
9	<b>The Clinical Pharmacist and society:</b> Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional Pharmacy practice.
10	<b>Communication:</b> Communicate effectively on complex pharmaceutical activities with the health care community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11	<b>Project management and finance:</b> Demonstrate knowledge and understanding of the clinical management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12	<b>Life-long learning:</b> Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change

#### Program Specific Outcomes (PSOs)

PSO	DESCRIPTION
1	To impart knowledge and skills on criteria for formulation design, product development, in vitro & biopharmaceutical evaluation, and optimization for better therapeutic efficacy.
2	To undertake research projects and drive towards entrepreneurship to cater the needs of society with respect to health care sector.

#### Mapping of PEOs with Mission statement

S.NO	Description of PEOs	Key Components of Mission			
		M 1	M 2	M 3	M 4
PEO 1	Knowledge & Understanding	✓		✓	✓
PEO 2	Pharmaceutical Education	✓		✓	
PEO 3	Research	✓		✓	
PEO 4	Attitude		✓	✓	



## CHAPTER 3

### PROGRAMS LIST AND ELIGIBILITY CRITERIA

#### UG Courses

S.NO	NAME OF THE PROGRAM	DURATION (Years)
1	BACHELOR OF PHARMACY	4

#### PG Courses

S.NO	NAME OF THE PROGRAM	DURATION (Years)
1	DOCTOR OF PHARMACY	6
2	MASTER OF PHARMACY	2

#### Eligibility Criteria for Admission in Pharm. D

##### a) Pharm.D. Part-I Course – A pass in any of the following examinations –

1. 10+2 examination with Physics and Chemistry as compulsory subjects along with one of the following subjects: Mathematics or Biology.
2. A pass in D. Pharm course from an institution approved by the Pharmacy Council of India under section 12 of the Pharmacy Act.
3. Any other qualification approved by the Pharmacy Council of India as equivalent to any of the above examinations.

Provided that a student should complete the age of 17 years on or before 31st December of the year of admission to the course.

Provided that there shall be reservation of seats for the students belonging to the Scheduled Castes, Scheduled Tribes and other Backward Classes in accordance with the instructions issued by the Central Government/State Government/Union Territory Administration as the case may be from time to time.

##### b) Pharm. D Post Baccalaureate

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

## CHAPTER 4

### ACADEMIC REGULATIONS

#### Terminology

- **Academic Council:** The Academic Council is the highest academic body of the University and is responsible for the maintenance of standards of instruction, education and examination within the University. The Academic Council is an authority as per UGC regulations and it has the right to take decisions on all academic matters including academic research.
- **Academic Year:** It is the period necessary to complete an actual course of study within a year. It comprises of two consecutive semesters i.e., Even and Odd semester.
- **Academic Pathways:** Students of all programs of study are given the opportunity to choose their career pathways viz. Employability, Innovation and Research. Each of these pathways prepares the students in a unique way, enabling them to achieve the heights of their career.
- **Academic Bank of Credits (ABC):** It helps the students to digitally store their academic credits from any higher education institute registered under ABC in order to award Certificate / Diploma / Degree / Honors based on the credits earned by the student. All the credits acquired by the students are stored digitally by registering into Academic Bank of Credits (ABC) portal. It also supports retaining the credits for a shelf period and continue their program study with multiple breakovers.
- **Backlog Course:** A course is considered to be a backlog if the student has obtained a failure grade (F).
- **Betterment:** Betterment is a way that contributes towards improving the students' grade in any course(s). It can be done by either (a) re-appearing or (b) re-registering for the course.
- **Board of Studies:** Board of Studies (BOS) is an authority as defined in UGC regulations, constituted by Vice Chancellor for each of the department separately. They are responsible for curriculum design and update in respect of all the programs offered by a department.
- **Branch of Study:** It is a branch of knowledge, an area of study or a specific program (like Civil Engineering, Mechanical Engineering, Electrical and Electronics Engineering etc.,)
- **Certificate course:** It is a course that makes a student gain hands-on expertise and skills required for holistic development. It is a mandatory, non-credited course for the award of degree.
- **Change of Branch:** Change of branch means transfer from one's branch of study to another.
- **Compulsory course:** Course required to be undertaken for the award of the degree as per the program.
- **Course:** A course is a subject offered by the University for learning in a particular semester.
- **Course Handout:** Course Handout is a document which gives a complete plan of the course. It contains the details of the course viz. Course title, Course code, Pre-requisite, Credit structure, team of instructors, Course objectives, Course rationale, Course Outcomes and the relevant syllabus, textbook(s) and reference books, Course delivery plan and session plan, evaluation method, chamber consultation hour, course notices and other course related aspects. In essence, course handout is an agreement between students (learners) and the instructor.
- **Course Outcomes:** The essential skills that need to be acquired by every student through a course.
- **Credit:** A credit is a unit that gives weight to the value, level or time requirements of an academic course. The number of 'Contact Hours' in a week of a particular course determines

its credit value. One credit is equivalent to one lecture hour per week or two hours per week of tutorials/ self-learning/ practical/ field work during a semester.

- **Credit Point:** It is the product of grade point and number of credits for a course.
- **Credit Transfer:** The procedure of granting credit(s) to a student for course(s) undertaken at another institution.
- **Choice Based Credit System:** The institute adopts Choice Based Credit System (CBCS) on all the programs offered by it which enables the students to choose their courses, teachers and timings during their registration. This enables the students to decide on the courses to be done by them in a specific semester according to their interests in other activities.
- **Cumulative Grade Point Average (CGPA):** It is a measure of cumulative performance of a student over all the completed semesters. The CGPA is the ratio of total credit points secured by a student in various courses in all semesters and the sum of the total credits of all courses in all the semesters. It is expressed upto two decimal places.
- **Curriculum:** Curriculum is a standards-based sequence of planned experiences where students practice and achieve proficiency in content and applied learning skills. Curriculum is the central guide for all educators as to what is essential for teaching and learning, so that every student has access to rigorous academic experiences.
- **Course Withdrawal:** Withdrawing from a Course means that a student can drop from a course within the first week of the odd or even Semester (there is no withdrawal for summer semester). However, s/he can choose a substitute course in place of it by exercising the option within 5 working days from the date of withdrawal.
- **Degree:** A student who fulfils all the Program requirements is eligible to receive a degree.
- **Degree with Specialization:** A student who fulfills all the Program requirements of her/his discipline and successfully completes a specified set of Professional elective courses in a specialized area is eligible to receive a degree with specialization.
- **Department:** An academic entity that conducts relevant curricular and co-curricular activities, involving both teaching and non-teaching staff and other resources.
- **Detention in a course:** Student who does not obtain minimum prescribed attendance in a course shall be detained in that course. Refer to Attendance & Detention Policy
- **Dropping from the Semester:** A student who doesn't want to register for the semester should do so in writing in a prescribed format before commencement of the semester.
- **Evaluation:** Evaluation is the process of judging the academic work done by the student in her/his courses. It is done through a combination of continuous in-semester assessment and semester end examinations.
- **ERP:** ERP (Enterprise Resource Planning) system is a comprehensive software solution designed to streamline and automate various administrative, academic, and financial processes within the University. It manages student information, including admissions, registration, enrollment, attendance, grades, and academic records.
- **Grade:** It is an index of the performance of the students in a said course. Grades are denoted by alphabets.
- **Grade Point:** It is a numerical weight allotted to each letter grade on a 10 - point scale.
- **Industrial Visit:** Visit to a company/firm as per the academic requirement.
- **In-Semester Evaluation:** Summative assessments used to evaluate student learning, acquired skills, and academic attainment during a course.
- **LMS:** LMS stands for Learning Management System. It is a platform used in the institution to manage and deliver courses. Students can access learning resources, participate in online

discussions, submit assignments, take assessments, and communicate with their instructors and peers.

- **Make-up Test:** An additional test scheduled on a date other than the originally scheduled date.
- **Practice School:** It is a part of the total program and takes one full semester in a professional location, where the students and the faculty get involved in finding solutions to real-world problems. A student can choose Project/Practice School during his/her 7<sup>th</sup> or 8<sup>th</sup> semester of his/her Academic Year to meet the final requirements for the award of B.Tech degree.
- **Pre-requisite:** A course, the knowledge of which is required for registration into higher level course.
- **Professional Core:** The courses that are essential constituents of each engineering discipline are categorized as Professional Core courses for that discipline.
- **Program:** A set of courses offered by the Department. A student can opt and complete the stipulated minimum credits to qualify for the award of a degree in that Program.
- **Program Outcomes:** Program outcomes are statements that describe what students are expected to know or be able to do at the end of a program of study. They are often seen as the knowledge and skills students will have obtained by the time, they have received their intended degree.
- **Program Educational Objectives:** The broad career, professional, personal goals that every student will achieve through a strategic and sequential action plan.
- **Project:** Course that a student has to undergo during his/her final year which involves the student to undertake a research or design, which is carefully planned to achieve a particular aim. It is a credit-based course.
- **Supplementary:** A student can reappear only in the semester end examination for the Theory component of a course, subject to the regulations contained herein.
- **Registration:** Process of enrolling into a set of courses in a semester/ term of the Program.
- **Re-Registration:** Student who are detained in courses due to attendance or marks criteria as per their regulation are given a chance to re-register for the same and complete it during the summer term.
- **Semester:** It is a period of study consisting of 16±1 weeks of academic work equivalent to normally 90 working days including examination and preparation holidays. The odd Semester starts normally in July and even semester in December.
- **Semester End Examinations:** It is an examination conducted at the end of a course of study.
- **Single Section Course:** Course taught for a single section.
- **Social Service:** An activity designed to promote social awareness and generate well-being; to improve the life and living conditions of the society.
- **Student Outcomes:** The essential skill sets that need to be acquired by every student during her/his program of study. These skill sets are in the areas of employability, entrepreneurial, social and behavioral.
- **Summer term:** The term during which courses are offered from May to July. Summer term is not a student's right and will be offered at the discretion of the University.



## **Academic Instructions**

### **General Behaviour**

- Student should communicate in English with faculty and other students while he/ she is in campus.
- Students are expected to wish/greet all officials of the KLEF with due respect.
- Students should be courteous and polite while communicating with all Faculty & staff.
- Students should maintain silence and/or speak in a polite way in and around the classrooms, library, laboratories, and offices of the Deans, Program Chairs, Senior Officials, faculty rooms and corridors of academic buildings.
- It must be noted that shouting, talking in loud voice or in chorus, using indecent, abusive and discourteous language anywhere within the institution premises are considered serious acts of indiscipline and are punishable.
- Students should not loiter during the free time in the university campus.
- Students should not issue any public or press statement, send letters to editors, government, public servants or notaries without prior permission and approval of the Registrar of KLEF in writing.
- Students should keep the status, dignity, prestige and reputation of KLEF high and not engage in anything that might directly or indirectly undermine the standing of the institution.
- Students must always adhere to a prescribed/decent dress code befitting the dignity of a technical/professional student within the campus.
- Ragging of any student is a serious act of indiscipline and has been totally banned by the Hon'ble Supreme Court of India.
- A student found involved in any form of ragging, verbal or physical, inside or outside the institutional campus, hostels, or buses shall be treated as per the anti-ragging rules of the KLEF.
- Students must not be involved in quarrelling or fighting or any indecent verbal or physical activity among themselves, or with staff and faculty or visitors.
- Direct or indirect involvement in any such activity will be considered as serious breach of discipline and strict disciplinary action will be taken against the students that engage in such activities.
- Students are not allowed to sit on the steps, boundary walls on the higher floors of any building, or engage in gossiping, making noise or any other such activity.

**KLEF Working Hours:** KLEF operates between 7:20 AM to 5.00 PM (in shifts) on all weekdays.

**Class Environment:** The institute is a community of learners. Students have a responsibility of creating and maintaining an environment that supports effective learning to receive effective instructions in classrooms and laboratories. KLEF expects students to conduct themselves in an orderly and cooperative manner by adhering to University Rules & Regulations.

## **Laboratory Environment**

**A conducive learning environment in the laboratory is essential and the students are advised to follow the guidelines mentioned below:**

- Always listen carefully to the faculty especially for the safety precautions to take in the laboratories.
- Accidents resulting in injuries may occur if precautions are not taken.
- Eating in laboratories is strictly prohibited.
- Proper dress code is to be followed as prescribed by faculty in each lab.
- Students should familiarize themselves with the location of all the safety equipment which may be available.
- Follow evacuation procedures quickly and quietly, if needed.
- Students should always conduct themselves in a responsible and cautious manner. Risky behaviours such as pushing, running, jumping etc., are unwarranted.
- Only materials required to complete and record the experiment instructions, (e.g., pencils or graph paper, etc.) should be brought into the laboratory.
- Equipment must be carefully handled to prevent breakage or damage, otherwise appropriate penalties/disciplinary-action may be levied/imposed.
- Lab station must be cleaned prior to leaving a lab.
- Any accident, no matter how small or big, must be reported to the concerned faculty immediately.

## **Registration Process**

- For every course, the student must undertake the registration process prior to commencement of the coursework, based on the following conditions.
- Registration into a course will be permitted only for such courses, which are offered by KLEF in that semester.
- A student must clear the pre-requisite(s) if any, to register into a course.
- KLEF reserves the right to register.
- Registration for add/drop/change of a course will be permitted only within one week from the scheduled date of commencement of classes.
- Students can register up to a maximum of 32 credits of their choice in a semester to meet their program requirements.
- Students, who wish to register for additional credits through Overloading or less credits through Underloading, must seek prior permission from Dean- Academics.
- Students who have opted for minor degree, Honours degree, can register for a greater number of credits in a semester through Overloading (subjected to guidelines appropriate to compliance on eligibility).
- KLEF reserves the right to withdraw within one week of the commencement of the semester any elective course offered, if adequate number of students have not registered or for any other

administrative reasons. In such cases, the students are permitted to register for any other elective course of their choice provided they have fulfilled the eligibility conditions.

- KLEF reserves the right to cancel the registration of a student from a course or a semester or debar from the degree on disciplinary / plagiarism grounds.
- A student is solely responsible to ensure that all conditions for proper registration are satisfied. If, there is any clash in the timetable, it should be immediately brought to the notice of the Department Year coordinator for necessary corrective action.
- The registration may be cancelled for a course or the entire semester either by KLEF if any irregularity is found at a later stage.

**Student Course Registration Process:**

To complete the student registration, student login to new ERP portal with their valid login credentials. After login student should click on Academic Registrations Student Course Registration. Now Student can view the courses and sections in dropdown menus. Student can select the sections against the courses on their own choice. Student can view the timetable on top of the selection of each course and section.

## CHAPTER 5

### PROGRAM CURRICULUM

For an academic program the curriculum is the basic framework that will stipulate the credits, category, course code, course title, course delivery (Lectures / Tutorials / Practice / Skill / Project/ Self Study / Capstone Design etc.), in the Choice Based Credit System. However, all such are essentially designed, implemented and assessed in Outcome Based Education Framework.

Sl No	Course Category	Number of Courses
1	HAS	NA
2	BSC	3
3	ESC	NA
4	PCC	45
5	FCC	NA
6	SDC	NA
7	PEC	NA
8	PRI	1
9	OEC	NA
10	VAC	3
11	AUC	NA
12	SIL	NA
GRAD REQUIREMENTS		52

#### Program Structure:

- As this is a yearly course the entire academic year is conducted in a year.
- KLEF may offer summer term between May and June.
- Students have the flexibility to choose courses of their own choice prescribed by the institution.

#### Course Structure:

- Every course has a Lecture-Tutorial-Practice-Skill (L-T-P-S) component attached to it.

#### Course Classification:

Any course offered under Pharm. D program is classified as:

- **Basic Science Courses (BSC):** Basic science courses are the foundation of all science education. They provide students with the knowledge and skills they need to understand the natural world. Basic science courses typically cover Mathematics, Physics, Chemistry, Biology etc., Basic science courses are essential for students who want to pursue careers in science, engineering, medicine, and other STEM fields.
- **Professional Core Courses (PCC):** Professional core courses are a set of courses that are essential for all engineering students. These courses provide students with the knowledge and skills they need to be successful in their chosen engineering discipline.

- **Skill Development Courses (SDC):** Skill development courses can provide students with the knowledge and skills they need to use specific software or hardware. This can be especially important for students who are interested in pursuing a career in a particular field.
- **Project Research & Internships (PRI):** Project, Research and Internships can help students gain a better understanding of their chosen field by giving them the opportunity to apply their knowledge and skills to real-world problems. These can help students explore their interests by giving them the opportunity to work on projects that they are passionate about.

#### **Course Precedence:**

The following are the guidelines for registering into courses with pre-requisites.

- Every course may have one or more of its preceding course(s) as pre- requisite(s).
- To register for a course, the student must successfully be promoted in these course(s) earmarked as pre-requisite(s) for that course.

## CHAPTER 6

### REQUIREMENTS FOR THE AWARD OF DEGREE

The student is awarded a Pharm. D degree provided she/he

- A student shall not be declared to have passed examination unless he or she secures at least 50% marks in each of the subjects separately in the theory examinations, including sessional marks and at least 50% marks in each of the practical examinations including sessional marks.

Regulation	Measure	Min. Requirement
Min Credits	Percentage	50%
Min CGPA	CGPA	NA
SGPA Consistency	NA	NA
Value Added Courses	#Courses	3
Audit Courses	#Courses	NA
Audit Courses for Career Enhancement	#Courses	NA
Specialization Stream	NA	NA
Social Internship	#weeks	NA
Technical Internship	#weeks	NA
SDC Stream	NA	NA
Course Modes (Mode A   Mode P)	NA	NA

#### Award of Degrees

**A student having cleared all the courses and met all the requirements for the award of degree with:**

- Minimum of 50% in each subject is considered as Pass category for a student.
- The students securing 60% marks or above in aggregate in all subjects in a single attempt at the Pharm.D. or as the case may be, Pharm. D. (Post Baccalaureate) course examination shall be declared to have passed in first class.
- Students securing 75% marks or above in any subject or subjects shall be declared to have passed with distinction in the subject or those subjects provided he or she passes in all the subjects in a single attempt.

## CHAPTER 7

### ATTENDANCE RULES AND DETENTION POLICY

#### **Attendance policy for promotion in a course:**

The student must maintain a minimum attendance of 85% in every course. In case of medical exigencies, the student/parent should inform the principal within a week by submitting necessary proofs and in such cases the attendance can be condoned up to an extent of 10% by Principal on the recommendation of the Head of the Department.

- Attendance in a course shall be counted from the date of commencement of the classwork.
- Attendance for the students who are transferred from other institutes and for new admissions, attendance must be considered from the date of her/his admission.
- In case of attendance falling marginally below 75% due to severe medical reasons or any other valid reasons, the Principal/Program chair may bring such cases, along with valid and adequate evidence, to the notice of the Dean Academics. The condonation board formed by Vice-Chancellor under the chairmanship of Dean-Academics will consider any further relaxation in attendance from the minimum attendance percentage requirement condition after going through case by case.

#### **Attendance based Marks:**

There are no specific marks attached to attendance as such, however, if the Course Coordinator of a course desires to award certain marks, for attendance in a course, She/he can do so based on following guidelines, which thereby must be clearly reflected in the respective course handouts which should duly be approved by the Dean Academics. For any course, not more than 5% marks can be allotted for attendance.

**Attendance Waiver:** Students maintaining a CGPA  $\geq 9.00$  and SGPA  $\geq 9.00$  in the latest completed semester get a waiver for attendance in the following semester. Students who thus utilize an attendance waiver will be awarded the marks allocated for attendance (if any) based on their performance in an advanced assignment specified by the course coordinator (emerging topics related to the course). S/he can appear in all assessments and evaluation components without being marked ineligible due to attendance-based regulations.

**Attendance Condonation for Participation in KLEF / National / International Events:** Only those students nominated / sponsored by the KLEF to represent in various forums like seminars / conferences / workshops / competitions or taking part in co- curricular / extra- curricular events will be given compensatory attendance provided the student applies in writing for such a leave in advance and obtain sanction from the Principal basing on the recommendations of the Head of the Department (HoD) for academic related requests; or from the Dean Student Affairs for extracurricular related requests. For participation in the KLEF's placement process the names of students will be forwarded by the placement cell in-charge to the respective Heads of the Departments. Students participating in KLEF/National/International events like technical fests, workshops, conferences etc., will be condoned for 10% of total classes conducted for each course in the semester. This condonation is not applicable for summer term.



**Course Based Detention Policy:**

In any course, a student must maintain a minimum attendance as per the **attendance policy for promotion in a course**, to be eligible for appearing in the Sem-End examination. Failing to fulfill this condition, will deem such student to be detained in that course and become ineligible to take semester end exam.

**Eligibility for appearing Sem – End Examination:**

A Student registered for a course and maintained minimum attendance of 85% is eligible to write the Semester-End Examination for that course unless found ineligible due to one or more of the following reasons:

- Shortfall of attendance
- Detained
- Acts of indiscipline
- Withdrawal from a course

## CHAPTER 8

### ASSESSMENT AND EVALUATION PROCESS

The assessment is conducted in formative and summative modes with a weightage of 30% for Semester-In evaluation and 70% for Semester-End Evaluation.

The distribution of weightage for various components of formative and summative modes are decided and notified by the course coordinator through the course handout after approval by the Dean Academics, prior to the beginning of the semester. Students are advised to refer the course handout to get more detailed information on assessment.

- Sem-In tests and the Semester-End Examinations will be conducted as per the Academic Calendar.
- Students may have to take more than one examination in a day during Sem-In exams, Semester-End Examinations /Supplementary examinations.
- Examinations may be conducted on consecutive days, beyond working hours and during holidays.

#### **Semester-In Evaluation**

The following are the guidelines for the Semester-In evaluation.

- The process of evaluation is continuous throughout the semester. The distribution of marks for Semester-In evaluation is 30% of aggregate marks of the course.
- To maintain transparency in evaluation, answer scripts are shown to the students for verification, within one week of conduct of exam. If there is any discrepancy in evaluation, the student can request the course-coordinator to re-evaluate.
- The solution key and scheme of evaluation for all examinations are displayed by the Course-Coordinator in the appropriate web portal of the course, on the day of the conduct of examination.
- In case the student is unable to appear for any evaluation component owing to hospitalization, participation in extra/ co-curricular activities representing KLEF/ state/ country; the Dean Academics can permit to conduct of re- examination for such students.
- In case a student has missed any of the two in-semester evaluations, S/he is eligible for and will be provided with an opportunity of appearing for re- examination.

#### **Semester End Examination**

- The distribution of marks for Semester-End evaluation is 70% of aggregate marks of the course
- The pattern and duration of Sem End examination are decided and notified by the Course Coordinator through the Course handout, after approval from the Dean Academics.
- To maintain transparency in evaluation, answer scripts are shown to the students for verification. If there is any discrepancy in evaluation, the student can request the Controller of Examinations to re-evaluate.
- If a student earns 'F' grade in any of the courses of a semester, an instant supplementary exam (for only Semester End Exam component) will be provided within a fortnight of the declaration of the results.

### **Assessment of Project/Research-Based Subjects**

All project or research-based subjects must have a defined time limit for completion. The specific time limits and schedule for monitoring and evaluating student performance will be announced each term. The final project report, after obtaining a plagiarism certificate, will be considered, and evaluated by the panel of examiners. Student project reports must follow the guidelines prescribed by the Dean of Academics.

### **Absence in Assessment & Examination**

If a student fails to take any formative assessment component (due to ill-health or any valid reason), no second chance will be given, and zero marks will be awarded for the same. In cases of excused absence, the instructor may provide an opportunity to the student to reappear in quizzes or assignments or any other internal assessment criteria based on the approval from the principal & the concerned Head of the Department in written. If a student fails to write Sem-In Exam-I or obtained less than 50% marks in Sem-In Exam-I, he must attend remedial classes and maintain a minimum 85% of attendance in remedial classes for Sem-In exam-I. Further, the number of remedial classes to be conducted shall be 50% of regular classes held till the Sem-In exam-I. However make up exam is provided if the student is absent in more than 1 Sem-In-Exams of total three Sem-In-Exams.

A student's absence for Sem-In exams under the following circumstances are only considered for makeup test.

- Pre-approved participation in University/State/National/International co- curricular and extra-curricular activities
- Ill health and medical emergencies for the student leading to hospitalization with certification by the doctor stating inability of student to attend Sem-In exams clearly within the necessary dates.
- Death of immediate family member

### **Remedial Classes & Remedial Exam**

**The following categories of students are recommended to attend Remedial classes:**

- Students who did not attend or obtain a minimum of 50% marks in the Sem-In examination-1
- Students for whom the learning objectives of CO1/CO2 are not attained in the Sem-In examination-1
- Any other student may also be permitted to attend remedial classes as per the discretion of the Principal.

**The following are the guidelines to conduct remedial classes:**

- Remedial classes are scheduled to be conducted usually one- or two- weeks after the conclusion of Sem-In exam-1.
- The number of remedial classes to be conducted shall be 50% of regular classes held until the Sem-In exam-I.
- Remedial classes MUST NOT be scheduled during regular class work hours.

**The following are the guidelines for remedial exams:**

- Students attending remedial classes must maintain attendance of minimum 80% in classes conducted under remedial classes, without fail for being eligible for attending remedial exam.
- After conduction of remedial test, the Sem-in exam-1 marks will be updated by considering the weightage of 75% of marks obtained by student in remedial exam, and 25 % of marks obtained by student in regular exam; with a CAP of 75% in overall marks.

## CHAPTER 9

### PROMOTION

All students who have appeared for all the subjects and passed the first-year annual examination are eligible for promotion to the second year and, so on. However, failure in more than two subjects shall debar him or her from promotion to the next year classes.

#### **Rustication**

A student may be rusticated from the KLEF on disciplinary grounds, based on the recommendations of any empowered committee, by the Vice Chancellor.

#### **Award of Medals**

KLEF awards Gold and Silver medals to the top two candidates in each program after successful completion of their study. The medals are awarded based on their CGPA during the Annual Convocation with the following constraints:

- a. The grade obtained through betterment/ supplementary will not be considered for this award.
- b. S/he must have obtained first class with distinction for the award of Gold or Silver-medal.

#### **Academic Bank of Credits:**

ABC helps the students to digitally store their academic credits from any higher education institute registered under ABC in order to award Certificate/Diploma/Degree/Honors based on the credits earned by the student. All the credits acquired by the students are stored digitally by registering into Academic Bank of Credits (ABC) portal. It also supports retaining the credits for a shelf period and continue their program study with multiple breakovers. Students may exit from their current program of study due to any unforeseen reasons or to focus on their chosen career path. In such cases, the student may break for a period of time (preferably not in the middle of an academic year) and may continue with the program of study at a later stage. Moreover, students must be able to complete their program by not exceeding the maximum duration of the program. If not, they may be issued with a Certificate, diploma, degree or honors based on the credits acquired over the period of time for all the programs approved by UGC.

## CHAPTER 10

### STUDENT COUNSELLING AND FEEDBACK

#### Student Counselling

##### **Academic Counselling Board**

Academic Counselling Board is constituted by the Dean Academics. This board shall comprise of the Chairman, Convener, Principal/Director, HOD and Professor/Associate Professor.

**A student will be put under Academic Counselling Board in the following circumstances:**

1. Has CGPA of less than 6.00.
2. Has 'F' grade or 'Detained' in multiple courses.

The first level of Counselling such students will be done by the Mentor of the student and the HoD followed by the ACB and the list of students who have to undergo the ACB counselling be forwarded by the HoD to the Office of Dean Academics.

The students undergoing the Academic Counselling Board process may be allowed to register only for a few courses based on the recommendation of Academic Counselling Board.

##### **Counselling Policy**

Student counselling takes great place in K L University. Counselling is designed to facilitate student achievement, improve student behaviour, subject analysis levels, attendance, and help students develop socially, professionals with bachelor's, master's degrees or beyond. Faculty counsellors provide counselling and serve an educational role in K L University. We have Mentors, Academic, Career, Physiological, Co-Curricular & Extra-Curricular activities counsellors in order to support students who are experiencing personal or academic challenges, help students choose careers and plan for university and intervene when students face behavioural, physical, or mental health challenges.

##### **Academic Counselling**

1. Counsellor shall acquire backlog data and record the same into the counselling sheets.
2. Counsellor will acquire data about the attendance and performance in the internal evaluation and record them into the counselling data sheet.
3. Counsellors shall counsel the students regularly to track the performance of the students.
4. The counselling data sheet shall be submitted to the principal for verification and approval.
5. At the end of the semester a summary report will be sent to Dean Academics Office.

##### **Career Counselling**

1. Counsellor has to take SWEAR analysis data in first year.
2. Counsellor shall acquire the data related to performance of the students in all the soft skills and other courses that contributes towards employability/ entrepreneurship/ career advancement the career counselling data sheets.

3. Counsellor will acquire data about the attendance and performance of the students during all the placement drives conducted by KLU and records the same into the counselling sheet.
4. Counsellors shall counsel the students regularly when the performance of the student is found to be un-satisfactory.
5. The counselling sheet shall be verified by principal and corrective actions if any will be recommended to the respective departments.
6. At the end of the semester a summary report will be sent to Dean Academics Office.

### **Psychological Counselling**

1. Counsellor shall acquire data pertaining to psychological status of the students and record the same into the counselling sheets.
2. Counsellor will acquire data about the attendance and performance in the internal evaluation and record them into the counselling sheet and see whether the performance is in any way related.
3. Counsellor shall counsel the students regularly when the performance of the student is found to be un-satisfactory.
4. Counsellors should identify the need of any therapy required.
5. Once it is identified, the counsellor will arrange the treatment according to the psychological status of the student.
6. Counsellor should maintain the progression level of the student periodically.
7. The counselling sheet shall be verified by principal and corrective actions if any will be recommended to the respective departments.
8. At the end of the semester a summary report will be sent to Dean Academics Office.

### **The duties of counsellors**

**Mentoring:** Plan and design a system for student behavior, mental health and academic challenges, define structural and functional characteristics of the system in detail, plan provisions for academic mentoring apart from classroom interaction.

**Academic Counselling:** Develop a systematic and process-oriented mechanism to improve academic counselling in relation to student attendance, punctuality, performance of students in internal and semester examinations, course / program to be enrolled based on the strength and weakness of the student.

**Career Counselling:** Conduct personality test (SWEAR) to find suitable career path, create awareness on the job opportunities, career paths that exist in a specific discipline.

**Psychological Counselling:** Organize and strengthen the student counselling services, engage qualified and experienced mentors and advisories for each class of students for providing psychological guidance as required.



### **Guidance on Co-Curricular & Extra-Curricular activities**

Form student clubs to give train and encourages the students to improve their skills, physical fitness and mental strength.

### **Counselling Procedures**

- The HOD will allot 20 Students once admitted into a program to a faculty with allocation priority commencing from professors and onwards.
- The faculty concerned will be called a counsellor/mentor.
- One hour per week will be allocated by the departments to enable the counsellors to counsel the students on various aspects.
- The counsellor will maintain a separate sheet to record student performance and also different kinds of counselling undertaken.
- Counsellor shall communicate with parents through mail, SMS and also through telephonic conversations. Student's attendance, marks, placement etc. data must inform to parents once in a month.
- The communication undertaken shall be recorded in a separate register.

### **Feedback System**

At KLEF, monitoring of feedback is a continuous process. Feedback is obtained from students and parents on various aspects. Feedback is taken through personal interaction with students, interaction with parents in addition to mid-semester and end-semester feedback. The institution assesses the learning levels of the students, after admission and organizes special programs for advanced learners and slow learners.

### **Feedback Types**

In first year SWEAR analysis is done for every student in such a way it identifies their interests, pre-existing knowledge, aspects to improve technical and logical skills based on their career choice.

**The following are the different types of feedback taken at regular intervals:**

1. Student General Feedback (Twice in a Sem.)
2. Student Satisfaction Survey (Once in a Sem.)
3. Student Exit Feedback (Once in a Year)
4. Academic Peers Feedback on Curriculum (Once in a Sem.)
5. Parents Feedback on Curriculum (Once in a Sem.)
6. Alumni Feedback on Curriculum (Once in a Sem.)
7. Industry Personnel Feedback on Curriculum (Once in a Sem.)
8. Student Feedback on Curriculum (Once in a Sem.)
9. Faculty Satisfaction Survey (Once in a Sem.)
10. Parent Teacher Association (Once in a Sem.)

## Feedback Procedure

- General Feedback to be taken from the students on the aspects like Course Contents, Teaching Learning Process, Outcomes, Resources and Evaluation twice in every semester (Mid semester and End Semester Feedback) in a structured format floated by dean academics office.
- Student Satisfaction Survey (SSS) to all innovative methods and approaches should be recorded at appropriate intervals and the process should be refined based on that. Students should be sensitized on the process and methods and their understanding of the same should be assured.
- Exit survey feedback to be taken from the final year students on the aspects like entrance test, admission process, Course Contents, Teaching Learning Process, Outcomes, Resources and Evaluation, placements etc.
- Structured feedback for design and review of syllabus – semester wise / year wise is received from Students, Alumni, Peers, Parent, Industry Personnel.
- Satisfaction Survey to be taken from the existing faculty on Course Contents, Teaching Learning Process, Outcomes, Resources and Evaluation once in every semester in a structured format floated by dean academics office.
- Parent Teacher Association (PTA) to develop the potential of parents and to strengthen their relationship with their children through planning and conducting a variety of developmental and recreational activities.
- Online Feedback is collected from all the students once at the end of the semester using well designed questionnaire. Informal feedback will be collected in parallel from selected student representatives within 4-5 weeks of commencement of the semester by the Office of Dean Academics.
- HODs have to submit monthly /semester / Academic Year Feedback reports with necessary comments and proofs to Dean Academics office duly signed by concerned Principal/Director.

## CHAPTER 11

### PROGRAMME STRUCTURE

Koneru Lakshmaiah Education Foundation												
KL College of Pharmacy												
Pharm. D 2023-24 Admitted Batch Course Structure												
SI No	CourseCode	Course Title	Name	Category	Mode (R/A/P)	L	T	P	S	Cr	CH	Pre- requisite
1.	22PY610B6T	Remedial Biology	RBT	BSC	R	3	1	0	0	-	4	Nil
2.	22PY610M6T	Remedial Mathematics	RM	BSC	R	3	1	0	0	-	4	Nil
3.	22PY610B6P	Remedial Biology	RB-P	BSC	R	0	0	3	0	-	3	Nil
<b>Total Credits (Basic Science Courses)</b>										<b>NA</b>		
4.	22PY6101T	Human Anatomy and Physiology	HAP-T	PCC	R	3	1	0	0	-	4	Nil
5.	22PY6101P	Human Anatomy and Physiology	HAP-P	PCC	R	0	0	3	0	-	3	Nil
6.	22PY6102T	Pharmaceutics	PC-T	PCC	R	2	1	0	0	-	3	Nil
7.	22PY6102P	Pharmaceutics	PC-P	PCC	R	0	0	3	0	-	3	Nil
8.	22PY6103T	Medicinal Biochemistry	MBC-T	PCC	R	3	1	0	0	-	4	Nil
9.	22PY6103P	Medicinal Biochemistry	MBC-P	PCC	R	0	0	3	0	-	3	Nil
10.	22PY6104T	Pharmaceutical Organic Chemistry	POC-T	PCC	R	3	1	0	0	-	4	Nil
11.	22PY6104P	Pharmaceutical Organic chemistry	POC-P	PCC	R	0	0	3	0	-	3	Nil

12.	22PY6105T	Pharmaceutical Inorganic Chemistry	PIC-T	PCC	R	2	1	0	0	-	3	Nil
13.	22PY6105P	Pharmaceutical Inorganic Chemistry	PIC-P	PCC	R	0	0	3	0	-	3	Nil
14.	22PY6201T	Pathophysiology	PATH	PCC	R	3	1	0	0	-	4	Nil
15.	22PY6202T	Pharmaceutical Microbiology	PMB-T	PCC	R	3	1	0	0	-	4	Nil
16.	22PY6202P	Pharmaceutical Microbiology	PMB-P	PCC	R	0	0	3	0	-	3	Nil
17.	22PY6203T	Pharmacognosy &Phytopharmaceuticals	P.COg-T	PCC	R	3	1	0	0	-	4	Nil
18.	22PY6203P	Pharmacognosy &Phytopharmaceuticals	P.COg-P	PCC	R	0	0	3	0	-	3	Nil
19.	22PY6204T	Pharmacology-I	P.COL-I	PCC	R	3	1	0	0	-	4	Nil
20.	22PY6205T	Community Pharmacy	COM.PH	PCC	R	2	1	0	0	-	3	Nil
21.	22PY6206T	Pharmacotherapeutics-I	THERAPY I-T	PCC	R	3	1	0	0	-	4	Nil
22.	22PY6206P	Pharmacotherapeutics-I	THERAPY I-P	PCC	R	0	0	3	0	-	3	Nil
23.	22PY6301T	Pharmacology-II	P.COL II-T	PCC	R	3	1	0	0	-	4	P. Col-I
24.	22PY6301P	Pharmacology-II	P.COL II-P	PCC	R	0	0	3	0	-	3	Nil
25.	22PY6302T	Pharmaceutical Analysis	PA-T	PCC	R	3	1	0	0	-	4	Nil
26.	22PY6302P	Pharmaceutical Analysis	PA-P	PCC	R	0	0	3	0	-	3	Nil
27.	22PY6303T	Pharmacotherapeutics-II	THERAPY II-T	PCC	R	3	1	0	0	-	4	Therapy-I
28.	22PY6303P	Pharmacotherapeutics-II	THERAPY II-P	PCC	R	0	0	3	0	-	3	Therapy-I
29.	22PY6304T	Pharmaceutical Jurisprudence	PJ	PCC	R	2	0	0	0	-	2	Nil
30.	22PY6305T	Medicinal Chemistry	MC-T	PCC	R	3	1	0	0	-	4	Nil
31.	22PY6305P	Medicinal Chemistry	MC-P	PCC	R	0	0	3	0	-	3	Nil
32.	22PY6306T	Pharmaceutical Formulations	PF-T	PCC	R	2	1	0	0	-	3	PC

33.	22PY6306P	Pharmaceutical Formulations	PF-P	PCC	R	0	0	3	0	-	3	PC
34.	22PY6401T	Pharmacotherapeutics-III	THERAPY III-T	PCC	R	3	1	0	0	-	4	Therapy-II
35.	22PY6401P	Pharmacotherapeutics-III	THERAPY III-P	PCC	R	0	0	3	0	-	3	Therapy-II
36.	22PY6402T	Hospital Pharmacy	HP-T	PCC	R	2	1	0	0	-	3	Nil
37.	22PY6402P	Hospital Pharmacy	HP-P	PCC	R	0	0	3	0	-	3	Nil
38.	22PY6403T	Clinical Pharmacy	CLP-T	PCC	R	3	1	0	0	-	4	Nil
39.	22PY6403P	Clinical Pharmacy	CLP-P	PCC	R	0	0	3	0	-	3	Nil
40.	22PY6404T	Biostatistics & Research Methodology	BSRM	PCC	R	2	1	0	0	-	3	Nil
41.	22PY6405T	Biopharmaceutics & Pharmacokinetics	BPPK-T	PCC	R	3	1	0	0	-	4	Nil
42.	22PY6405P	Biopharmaceutics & Pharmacokinetics	BPPK-P	PCC	R	0	0	3	0	-	3	Nil
43.	22PY6406T	Clinical Toxicology	CT	PCC	R	2	1	0	0	-	3	Nil
44.	22PY6501T	Clinical Research	CR	PCC	R	3	1	0	0	-	4	Nil
45.	22PY6502T	Pharmacoepidemiology and Pharmacoeconomics	PE&PE	PCC	R	3	1	0	0	-	4	Nil
46.	22PY6503T	Clinical Pharmacokinetics & Pharmacotherapeutic Drug Monitoring	CP-PDM	PCC	R	2	1	0	0	-	3	Nil
47.	22PY650N4	Clerkship	CS	PCC	R	0	1	0	0	-	1	Nil
48.	22PY660N1	Internship	IS	PCC	R	0	0	40	0	-	40	Nil
<b>Total Credits (Professional Core Courses)</b>										<b>NA</b>		
49.	22PY650E5	Project Work	PW	PRI	R	0	0	20	0	-	20	Nil
<b>Total Credits (Project Work Courses)</b>										<b>NA</b>		
<b>Grand Total</b>										<b>NA</b>		

## CHAPTER 12

### ARTICULATION MATRIX

#### Program Articulation Matrix

Sl.	Course Code	Course Name	Category	L	T	P	S	(PO/SO)												PSO	
								1	2	3	4	5	6	7	8	9	10	11	12	1	2
1	22PY6101T	Human Anatomy and Physiology	PC	3	1	0	0	3													
2	22PY6101P	Human Anatomy and Physiology	PC	0	0	3	0	2													
3	22PY6102T	Pharmaceutics	PC	2	1	0	0	2													
4	22PY6102P	Pharmaceutics	PC	0	0	3	0	3													
5	22PY6103T	Medicinal Biochemistry	PC	3	1	0	0	2													
6	22PY6103P	Medicinal Biochemistry	PC	0	0	3	0				3										
7	22PY6104T	Pharmaceutical Organic Chemistry	PC	3	1	0	0	2													
8	22PY6104P	Pharmaceutical Organic chemistry	PC	0	0	3	0	3													
9	22PY6105T	Pharmaceutical Inorganic Chemistry	PC	2	1	0	0	2													
10	22PY6105P	Pharmaceutical Inorganic Chemistry	PC	0	0	3	0	3			3										

11	22PY610B6T/22PY610M6T	Remedial Biology/Remedial Mathematics	BS	3	1	0	0	2													
12	22PY610B6P	Remedial Biology	BS	0	0	3	0	3													
13	22PY6201T	Pathophysiology	PC	3	1	0	0	2													
14	22PY6202T	Pharmaceutical Microbiology	PC	3	1	0	0	2													
15	22PY6202P	Pharmaceutical Microbiology	PC	0	0	3	0	3													
16	22PY6203T	Pharmacognosy & Phytopharmaceuticals	PC	3	1	0	0	2													
17	22PY6203P	Pharmacognosy & Phytopharmaceuticals	PC	0	0	3	0	3													
18	22PY6204T	Pharmacology-I	PC	3	1	0	0	2													
19	22PY6205T	Community Pharmacy	PC	2	1	0	0	2													
20	22PY6206T	Pharmacotherapeutics-I	PC	3	1	0	0	2													
21	22PY6206P	Pharmacotherapeutics-I	PC	0	0	3	0	3													
22	22PY6301T	Pharmacology-II	PC	3	1	0	0	2													
23	22PY6301P	Pharmacology-II	PC	0	0	3	0	3													
24	22PY6302T	Pharmaceutical Analysis	PC	3	1	0	0	2													



25	22PY6302P	Pharmaceutical Analysis	PC	0	0	3	0	3													
26	22PY6303T	Pharmacotherapeutics-II	PC	3	1	0	0	2													
27	22PY6303P	Pharmacotherapeutics-II	PC	0	0	3	0	3													
28	22PY6304T	Pharmaceutical Jurisprudence	PC	2	0	0	0	2													
29	22PY6305T	Medicinal Chemistry	PC	3	1	0	0	2													
30	22PY6305P	Medicinal Chemistry	PC	0	0	3	0	3													
31	22PY6306T	Pharmaceutical Formulations	PC	2	1	0	0	2													
32	22PY6306P	Pharmaceutical Formulations	PC	0	0	3	0	3													
33	22PY6401T	Pharmacotherapeutics-III	PC	3	1	0	0	2													
34	22PY6401P	Pharmacotherapeutics-III	PC	0	0	3	0	3			3										
35	22PY6402T	Hospital Pharmacy	PC	2	1	0	0	2													
36	22PY6402P	Hospital Pharmacy	PC	0	0	3	0	3			3										
37	22PY6403T	Clinical Pharmacy	PC	3	1	0	0	2	2												
38	22PY6403P	Clinical Pharmacy	PC	0	0	3	0	3	3												
39	22PY6404T	Biostatistics & Research Methodology	PC	2	1	0	0	2	2												

40	22PY6405T	Biopharmaceutics & Pharmacokinetics	PC	3	1	0	0	2	2												
41	22PY6405P	Biopharmaceutics & Pharmacokinetics	PC	0	0	3	0	3	3												
42	22PY6406T	Clinical Toxicology	PC	2	1	0	0	2	2												
43	22PY6501T	Clinical Research	PC	3	1	0	0	2	2												
44	22PY6502T	Pharmacoepidemiology and Pharmacoeconomics	PC	3	1	0	0	2	2												
45	22PY6503T	Clinical Pharmacokinetics & Pharmacotherapeutic Drug Monitoring	PC	2	1	0	0	2	2												
46	22PY650N4	Clerkship	PC	0	1	0	0	2	2												
47	22PY650E5	Project work (Six Months)	PW	0	0	20	0	3													
48	22PY660N1	Internship	PC	0	0	40	0	3	3												

### Course Articulation Matrix

S No	Course Code	Course Title	CO NO	Description of the Course Outcome	Program Outcomes												PS O	
					1	2	3	4	5	6	7	8	9	10	11	12	1	2
1	22PY6101T	HUMAN ANATOMY AND PHYSIOLOGY	CO1	Understand the anatomy and physiology of Elementary tissues and to study about basic terminologies used in HAP, detail about hemopoietic and Lymphatic system	2													
			CO2	Understand the in detail about Cardiovascular and Respiratory system	3													
			CO3	Understand the in detail about Digestive and Nervous system	3													
			CO4	Understand the in detail about Urinary and Endocrine system	3													
			CO5	Understand the in detail about anatomy and functions of sense organs, and process of reproduction	2													
			CO6	Understand the skeletal system of humans and sports physiology	2													
2	22PY6101P	HUMAN ANATOMY AND PHYSIOLOGY	CO1	Application of gross morphology of body organs using microscope and Determining blood cell count Determining ESR, Blood Haemoglobin and Bleeding time	3			3										
			CO2	Determination of Blood pressure and Blood group Identifying various Parts of Skeletal, Cardiovascular, Respiratory, Digestive, Urinary systems with models, charts & Specimens	3			3										
			CO3	Identifying various Parts of Nervous, Special senses, Reproductive systems with models, charts & Specimens Recording the muscle curves in different conditions using sciatic nerve preparation	3			3										

3	22PY6102T	PHARMACEUTICS	CO1	To gain knowledge on different dosage forms, History of Pharmacy and pharmacopoeias	2														
			CO2	To Understand the Pharmaceutical Calculations involved in formulation and preparation of powder dosage forms	2														
			CO3	To understand the preparation of Monophasic liquid dosage forms	2														
			CO4	To develop monophasic and biphasic liquid dosage forms	2														
			CO5	To understand the concepts of suppositories and Galenicals	2														
			CO6	To gain the knowledge on Surgical aids and incompatibilities	2														
4	22PY6102P	PHARMACEUTICS	CO1	Preparation of liquid orals	3														
			CO2	Preparation of lotions, emulsions Powders and Suppositories	3														
			CO3	Preparation of Incompatibilities, ear drops and pastes	3														
5	22PY6103T	MEDICINAL BIOCHEMISTRY	CO1	Understand the catalytic activity of enzymes and importance of isoenzymes in diagnosis of disease and role of carbohydrates and their metabolic disorders	3														
			CO2	Understand the role of carbohydrates and their metabolic disorders and biological oxidation process in body.	3														
			CO3	Understand the concepts of proteins, amino acids, and genetic organization in mammals.	3														
			CO4	Analyse the clinical chemistry of cell and kidney function tests.	3														
			CO5	Analyse the liver and lipid profile tests.	3														
			CO6	Analyse the role of Immunochemical tests for diagnosis of various pathological conditions in body.	3														
6	22PY6103P	MEDICINAL BIOCHEMISTRY	CO1	Qualitative analysis of urine and blood				3											
			CO2	Estimation of Liver and kidney parameters				3											
			CO3	Experiments on lipid profile parameters and enzyme activities and electrolyte estimations				3											

7	22PY6104T	PHARMACEUTICAL ORGANIC CHEMISTRY	CO1	Understand the IUPAC/Common system of nomenclature of simple organic compounds	2														
			CO2	To understand the organic reactions, reactivity, stability, mechanisms involved in aliphatic and alicyclic compounds	2														
			CO3	To understand the free radical addition and the theory of resonance	2														
			CO4	To understand the nucleophilic & electrophilic aromatic substitution reactions, reactivity and orientation	2														
			CO5	To understand the named organic reactions with mechanisms and Interpret oxidation and reduction reactions	3														
			CO6	To understand the preparation, test for purity, assay and medicinal uses of official compounds	3														
8	22PY6104P	PHARMACEUTICAL ORGANIC CHEMISTRY	CO1	Applying the knowledge to Synthesize organic compounds by acetylation, benzylation, bromination, condensation, diazotisation and coupling and hydrolysis methods.	3														
			CO2	Applying the knowledge to Synthesize organic compounds by nitration reactions, oxidation, reduction and miscellaneous reactions methods.	3														
			CO3	Acquiring knowledge to Identify Phenols, amides, carbohydrates, amines, Carboxylic acids, aldehyde, ketones, alcohols, Carboxylic acids, aldehyde, ketones and alcohols Esters, hydrocarbons, anilides and nitro compounds	3														
9	22PY6105T	PHARMACEUTICAL INORGANIC CHEMISTRY	CO1	Make Use of Analytical knowledge in identifying errors and concepts of indicators in volumetric analysis	3														
			CO2	Application of principles and procedures of analysis of drugs	3														
			CO3	Application of principle of limit tests in identifying the impurities	3														

			CO4	Understand the role of medicinal gases and drugs used to treat gastrointestinal diseases.	3														
			CO5	Understand the role of electrolyte replenishers and essential trace elements to maintain physiological balance & MOA of antimicrobials	3														
			CO6	Understand the importance of inorganic pharmaceuticals in preventing and curing the diseases.	3														
10	22PY6105P	PHARMACEUTICAL INORGANIC CHEMISTRY	CO1	Test for identification of impurities and selected inorganic compounds	3			3											
			CO2	Analyze the purity of selected inorganic compounds	3			3											
			CO3	Estimation of mixtures and preparation of selected organic compounds	3			3											
11	22PY610B6T	REMEDIAL BIOLOGY	CO1	Understand the classification and salient features of plant kingdoms	2														
			CO2	Understand the plants morphology and salient features of the plants.	2														
			CO3	Understand the taxonomy of plants, fruits and seeds	2														
			CO4	Understand the plant physiology and study of different microorganisms	2														
			CO5	Understanding the anatomy of frog	2														
			CO6	To gain the knowledge on general organization of mammals	2														
12	22PY610B6P	REMEDIAL BIOLOGY	CO1	Generalize the Organisation of plants, plant tissues and plant kingdom and application of biological principles in study of plant kingdom	3														
			CO2	Application of biological principles in studying morphology and plant physiology.	3														
			CO3	Application of biological principles in study of taxonomy, microorganisms, animals and other poisonous animals.	3														
13	22PY610M6T	REMEDIAL MATHEMATICS	CO1	Algebra: Determinants, Matrices Trigonometry : Sides and angles of a triangle, solution of triangles	3	3													
			CO2	Analytical Geometry: Points, Straight line, circle, parabola	2	2													

			CO3	Differential calculus and Partial differentiation	3	3													
			CO4	Integral Calculus	3	3													
			CO5	Differential equations	3	3													
			CO6	Laplace transform	3	3													
14	22PY6201T	PATHOPHYSIOLOGY	CO1	To understand the basic principles of cell injury, adaptations and inflammation	2														
			CO2	To understand the pathophysiology of diseases related to immunity	2														
			CO3	To understand the detailed pathogenesis of cancer	2														
			CO4	To understand biological effects of radiation, environmental and nutritional diseases	2														
			CO5	To understand pathophysiology of common diseases	2														
			CO6	To understand pathogenesis of Infectious diseases	2														
15	22PY6202T	PHARMACEUTICAL MICROBIOLOGY	CO1	Understand methods of identification, classification and relationship among various microorganisms	2														
			CO2	Understand nutritional requirements, cultivation and preservation of various microorganisms	2														
			CO3	Understand the importance and implementation of sterilization in pharmaceutical processing and industry	2														
			CO4	Understand and learn disinfectants, procedures of disinfection for pharmaceutical products.	2														
			CO5	Understand the immune system, Antigen-Antibody reactions, immunization programs, and diagnostic tests for parasites	2														
			CO6	Understand the microbial assays and different infectious diseases	2														
16	22PY6202P	PHARMACEUTICAL MICROBIOLOGY	CO1	Understand various equipment's used in experimental microbiology; Apply knowledge to perform the preparation of culture media and sterilization of glassware, identification of bacteria by staining methods	3														



			CO2	Understand and apply the knowledge for isolation, cultivation and preservation of various microorganisms, testing for sterility for pharmaceuticals	3														
			CO3	To apply and perform microbial assays, perform bacterial microbial assays for vitamins and antibiotics. To perform the relative cellular volume assays of microbes, diagnostic tests of typhoid and malaria.	3														
17	22PY6203T	PHARMACOGNOSY & PHYTOPHARMACEUTICALS	CO1	To know the history and scope of Pharmacognosy and Classification of crude drugs	1														
			CO2	know about the cultivation, collection, and processing of crude drugs and study of cell constituents and natural pesticides	2														
			CO3	To understand about the organic farming and different methods of pest control	2														
			CO4	To know about the detailed study carbohydrates containing drugs.	2														
			CO5	understand the different methods of extraction, chemistry and analysis of lipids and oils and protein based natural drugs	2														
			CO6	To know different types of plants fibres used in surgical dressings and related products and understand different methods of adulteration of crude drugs	1														
18	22PY6203P	PHARMACOGNOSY & PHYTOPHARMACEUTICALS	CO1	To perform macroscopy, microscopy, and powder characteristics of natural drugs.	2														
			CO2	To perform macroscopy, microscopy, and powder characteristics of natural drugs.	2														
			CO3	To apply and perform the different chemical tests	2														
19	22PY6204T	PHARMACOLOGY-I	CO1	Understanding the pharmacological actions of different categories of drugs	2														
			CO2	Understand the pharmacology of drugs acting on Autonomic nervous system	2														
			CO3	Understand the pharmacology of drugs acting on cardio vascular system	2														

20	22PY6205T	COMMUNITY PHARMACY	CO4	Understand the pharmacology of drugs acting on central nervous system	2														
			CO5	Understand the pharmacology of drugs acting on Respiratory system	2														
			CO6	Understand the pharmacology of hormonal and antihistaminic drugs	2														
			CO1	Understand the roles and responsibilities of community pharmacist	1														
			CO2	Understand the layout and infrastructure requirements for community pharmacy	2														
			CO3	Recognise the need of inventory control and understand the various methods	2														
21	22PY6206T	PHARMACOTHERAPEUTICS-I	CO4	Understand the factors affecting medication adherence	2														
			CO5	Application of pharmacy practice principles to Perform general patient counselling	2														
			CO6	Apply health screening services in community pharmacy	3														
			CO1	To understand etiopathogenesis and Pharmacotherapy of CVS diseases (Hypertension, Congestive cardiac failure, Angina Pectoris)	2														
			CO2	To understand etiopathogenesis and Pharmacotherapy of CVS diseases (Myocardial infarction Hyperlipidemias, Cardiac Arrhythmia)	2														
			CO3	To understand etiopathogenesis and Pharmacotherapy of Respiratory system diseases	2														
			CO4	To understand etiopathogenesis and Pharmacotherapy of Endocrine system diseases	2														
			CO5	To understand the general prescribing guidelines for Pediatric, Geriatric, Pregnancy and Breastfeeding and to understand etiopathogenesis and Pharmacotherapy of ophthalmology diseases	2														
			CO6	To understand the Rational use of drugs	2														

22	22PY6206P	PHARMACOTHERAPEUTICS-I	CO1	To apply the knowledge and present the recorded cases in Cardiology department and Pulmonology	2														
			CO2	To apply the knowledge and present the recorded cases in Endocrinology department and to understand the prescribing guidelines	2														
			CO3	To apply the knowledge and present the recorded cases in Ophthalmology department and the guidelines in the rational of drug use	2														
23	22PY6301T	PHARMACOLOGY-II	CO1	To understand the pharmacology of drugs acting on blood and blood forming agents and Renal system	2														
			CO2	To understand the pharmacology of chemotherapy	2														
			CO3	To understand the immuno pharmacology and principles of animal toxicology	2														
			CO4	To acquire the knowledge on cell, macromolecules, cell signalling, DNA replication and cell cycle.	2														
			CO5	To understand the importance of gene and its structure, genome, gene expression, recombinant DNA technology and other associated aspects	2														
			CO6	To understand the importance of RNA and other associated aspects	2														
24	22PY6301P	PHARMACOLOGY-II	CO1	To understand the laboratory animals and their handling, To know the importance of solutions and laboratory appliances used in experimental pharmacology, Understand the anaesthetics used in laboratory animals,	2														
			CO2	Application of bioassays Ach	2														
			CO3	Applications of bioassays of histamine, to understand the demonstrate intraperitoneal and intramuscular routes of administration of drugs in animals and describe different anaesthetics used in laboratory animals	2														
25	22PY6302T	PHARMACEUTICAL ANALYSIS	CO1	To understand the importance of various documentation practices followed in pharmaceutical industry	2														
			CO2	To understand the knowledge about assay of pharmaceutical substance and product	2														





32	22PY6306T	PHARMCEUTICAL FORMULATIONS	CO1	To understand the significance of formulation, preparation and evaluation of tablets	2														
			CO2	To understand the significance of formulation, preparation and evaluation of capsules	2														
			CO3	To understand the significance of formulation, preparation and evaluation of liquid orals	2														
			CO4	To understand the significance of formulation, preparation and evaluation of parenteral Preparations	2														
			CO5	To understand the manufacturing methods of semisolid, and ophthalmic products	3														
			CO6	To understand the concepts of Novel Local drug delivery system	2														
33	22PY6306P	PHARMCEUTICAL FORMULATIONS	CO1	Prepare formulations of tablets and capsules, coating of the tablets.	2														
			CO2	To prepare various parenteral products, different dosage forms by performing quality control tests as per the batch formula	2														
			CO3	Prepare and evaluate various semi-solid preparations, cosmetics such as lipstick, cold cream and shampoo	3														
34	22PY6401T	PHARMACOTHERAPEUTICS-III	CO1	To understand the Etiopathogenesis and pharmacotherapy of diseases associated with gastrointestinal system	2														
			CO2	To understand the Etiopathogenesis and pharmacotherapy of diseases associated with gastrointestinal system : Liver	2														
			CO3	To understand the Etiopathogenesis and pharmacotherapy of diseases associated with haematological system	2														
			CO4	To understand the Etiopathogenesis and pharmacotherapy of diseases associated with nervous system	2														
			CO5	To understand the Etiopathogenesis and pharmacotherapy of Psychiatry disorders	2														

[illegible]





42	22PY6405P	BIOPHARMACEUTICS & PHARMACOKINETICS	CO1	Compare the in-vitro drug release profile of different marketed products, Perform the solubility enhancement techniques for improvement of drug release of poorly water-soluble drugs.	3	3													
			CO2	Estimate the bioavailability (absolute and relative) and bioequivalence from the given clinical data	3	3													
			CO3	Calculate the drug content in blood sample using Area Under Curve approach, various pharmacokinetic parameters from the given clinical data, Conduct planned experiments and prepare laboratory report in a standard format	3	3													
43	22PY6406T	CLINICAL TOXICOLOGY	CO1	Understand the mechanism of action of common poisons and antidotes	2	2													
			CO2	Understand the concepts of Toxicokinetics	2	2													
			CO3	To understand the etiology of acute poisoning and its management by various therapeutic agents	2	2													
			CO4	To understand the etiology of chronic poisoning and its management by various therapeutic agents	2	2													
			CO5	To understand the poisoning caused by plant and animal sources	2	2													
			CO6	To understand the etiology and management of substance abuse	2	2													
44	22PY6501T	CLINICAL RESEARCH	CO1	To understand the various approaches for a new drug discovery	2	2													
			CO2	To understand the principles and phases in clinical trial of drug	2	2													
			CO3	To understand the various guidelines associated with clinical trials	2	2													
			CO4	To understand the various regulatory requirements in India and other countries to conduct clinical trials	2	2													
			CO5	Recognise differing roles and obligations of the Investigator, Sponsor and Institutional Review Board	2	2													
			CO6	To understand the various documents associated with clinical trials	2	2													

45	22PY6502T	PHARMACOEPIDEMIOLOGY AND PHARMACOECONOMICS	CO1	Understand the scope, need, origin and evaluation of Pharmacoepidemiology	2	2												
			CO2	To understand the importance of Measurement of outcomes in Pharmacoepidemiology	2	2												
			CO3	Recommend suitable method for measuring the outcome of Pharmacoepidemiology for a disease	2	2												
			CO4	Suggest an appropriate Pharmacoepidemiological method for a given drug and address the risks associated with Pharmacoepidemiological study	2	2												
			CO5	Understand the basic principles, role and relevance of Pharmacoeconomics in the development of a new drug	2	2												
			CO6	Identify and justify an appropriate evaluation method for Pharmacoeconomics study of a disease	2	2												
46	22PY6503T	CLINICAL PHARMACOKINETICS & PHARMACOTHERAPEUTIC DRUG MONITORING	CO1	Discuss the pharmacokinetic principles to individualize drug therapy in patient care situations	2	2												
			CO2	To understand the methods to calculate various dosage regimens	2	2												
			CO3	To understand the principles of pharmacokinetics to analyse and predict drug interactions	2	2												
			CO4	To understand the concepts of therapeutic drug monitoring	2	2												
			CO5	To understand the dose adjustment in renal and hepatic disorders	2	2												
			CO6	To understand the concepts of population pharmacokinetics	2	2												
47	22PY650N4	CLERKSHIP	CO1	Understand the role of Pharmacist in clinical pharmacy services	2	2												
			CO2	Demonstrate the skills of a clinical Pharmacist	2	2												
			CO3	Understand the available therapeutic options in the management of diseases	2	2												
			CO4	Prepare a pharmaceutical care plan for a given case	2	2												

			CO5	Detect, Interpret and report medication errors	2	2													
			CO6	Detect, Interpret and report drug interactions	2	2													
48	22PY650E5	PROJECT WORK (SIX MONTHS)	CO1	Address a problem related to Pharmacy practice in hospital, community service or clinical set up with a wider perspective and generality	3														
			CO2	Address and translate the problem into a statement of aim, objectives, scope and plan for the project	3														
			CO3	Preparation of report an information survey and take account of findings in executing project	3														
			CO4	Evaluate, select and apply relevant theories and techniques from the full range of courses studied using conceptual models and frameworks to enhance depth of understanding	3														
			CO5	Select appropriate methodology for investigative work, taking into account the pros and cons of the alternatives available and develop solution proposals based on reasoned judgement	3														
			CO6	Present a coherent, logically argued, fully referenced report and engage in a professional manner in a viva-voce discussion about the project	3														
49	22PY660N1	INTERNSHIP	CO1	Understand the pathophysiology of disease states and the rationale for drug therapy	2	2													
			CO2	Acquire the knowledge on available therapeutic options to provide patient care in co-operation with patients, prescribers, and other members of an interprofessional health care team	2	2													
			CO3	Identify, manage and use resources of the health care system, in cooperation with patients, prescribers, other health care providers	3	3													
			CO4	Analyse the therapeutic approaches to promote health improvement, wellness, and disease prevention	3	3													

			C05	Develop leadership qualities to function effectively as a member of the health care team	3	3													
			C06	Communicate effectively with patients and the community	2	2													

## CHAPTER 13

### SYLLABUS

#### REMEDIAL BIOLOGY (RBT)

COURSE CODE	22PY610B6T	MODE	R	LTPS	3-1-0-0	PRE-REQUISITE	Nil
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#### Course Outcomes

CO#	CO Description	BTL	PO Mapping
CO1	Understand the classification and salient features of plant kingdoms	2	1
CO2	Understand the plants morphology and salient features of the plants.	2	1
CO3	Understand the taxonomy of plants, fruits and seeds	2	1
CO4	Understand the plant physiology and study of different microorganisms	2	1
CO5	Understanding the anatomy of frog	2	1
CO6	To gain the knowledge on general organization of mammals	2	1

#### Syllabus

Module 1	Introduction General organization of plants and its inclusions Plant tissues Plant kingdom and its classification
Module 2	Morphology of plants Root, Stem, Leaf and Its modifications Inflorescence and Pollination of flowers Morphology of fruits and seeds
Module 3	Plant physiology Taxonomy of Leguminosae, umbelliferae, Solanaceae, Lilliacae, Zinziberaceae, Rubiaceae Study of Fungi, Yeast, Penicillin and Bacteria
Module 4	Study of Animal cell Study animal tissues Detailed study of frog Study of Pisces, Raptiles, Aves Geneareal organization of mammals 06 Study of poisonous animals

#### Reference Books:

Sl No	Title	Author(s)	Publisher	Year
1	A Text book of Biology	S. B. Gokhale	Nirali Prakashan	2019
2	A Text book of Biology	Dr. Thulajappa and Dr. Seetaram	Cengage Learning India Private Limited; 2nd edition	June 1, 2015
3	A Text book of Biology	Naidu and Murthy	Bangalore Prakasha Sahithya 1988	1988

## REMEDIAL MATHEMATICS (RM)

COURSE CODE	22PY610M6T	MODE	R	LTPS	3-1-0-0	PRE-REQUISITE	Nil
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### Course Outcomes

CO#	CO Description	BTL	PO Mapping
CO1	Algebra: Determinants, Matrices Trigonometry: Sides and angles of a triangle,	2	2,3
CO2	solution of triangles	2	2,3
CO3	Analytical Geometry: Points, Straight line, circle, parabola	2	2,3
CO4	Differential calculus and Partial differentiation	2	2,3
CO5	Integral Calculus	2	2,3
CO6	Differential equations	2	2,3

### Syllabus

Module 1	Matrices and Determinant: Introduction matrices, Types of matrices, Operation on matrices, Transpose of a matrix, Matrix Multiplication, Determinants, Properties of determinants , Product of determinants, Minors and co-Factors, Adjoint or adjugate of a square matrix , Singular and non-singular matrices, Inverse of a matrix, Solution of system of linear of equations using matrix method
Module 2	Application Analytical Geometry Introduction: Signs of the Coordinates, Distance formula, Straight Line : Slope or gradient of a straight line, Conditions for parallelism and perpendicular of two lines, Slope of a line joining two points, Slope intercept form of a straight
Module 3	Derivative of a function, Derivative of a constant, Derivative of a product of a constant and a function , Derivative of the sum or difference of two functions, Derivative of the product of two functions and Conditions for a function to be a maximum or a minimum at a point
Module 4	Integration: Introduction, Definition, Standard formulae, Rules of integration , Method of substitution
Module 5	Differential equations: Definition, order, degree, variable separable, homogeneous, Linear, heterogeneous
Module 6	Laplace Transform : Introduction, Definition, Properties of Laplace transform, Laplace Transforms of elementary functions,

### Reference Books:

Sl No	Title	Author(s)	Publisher	Year
1	Differential Calculus	Shanthinarayan	Schand	2018
2	Pharmaceutical Mathematics with application to Pharmacy	Panchaksharappa Gowda D.H	H media press	2015
3	Integral Calculus	Shanthinarayan	Schand	2018
4	Higher Engineering Mathematics	Khann Publisher	Dr.B.S.Grewal	2012
5	Higher Engineering Mathematics	Tata Maghill	Dr.B.V.Ramana	2015

## REMEDIAL BIOLOGY (RBP)

COURSE CODE	22PY610B6P	MODE	R	LTPS	0-0-3-0	PRE-REQUISITE	Nil
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### Course Outcomes

CO#	CO Description	BTL	PO Mapping
CO1	Generalize the Organisation of plants, plant tissues and plant kingdom and application of biological principles in study of plant kingdom	3	PO1
CO2	Application of biological principles in studying morphology and plant physiology.	3	PO1
CO3	Application of biological principles in study of taxonomy, microorganisms, animals and other poisonous animals.	3	PO1

### Syllabus

Module 1	<ol style="list-style-type: none"> <li><b>Introduction to experiments in biology:</b> a) Study of Microscope b) Section cutting techniques; c) Mounting and staining d) Permanent slide preparation</li> <li>Study of cell and its inclusions</li> <li>Study of mitochondria and golgi apparatus</li> <li>Study of Stem modifications</li> <li>Study of root modifications</li> <li>Study of leaf modifications</li> <li>Identification of fruits</li> <li>Identification of seeds</li> <li>Study of transverse section of Ephedra</li> <li>Study of transverse section of acacia</li> </ol>
Module 2	<ol style="list-style-type: none"> <li>Study of transverse section of ephedra</li> <li>Study of transverse section of podophyllum</li> <li>Study of plant transpiration</li> <li>Study of photosynthesis</li> <li>Study of pollen germination</li> <li>Study of plant population density by quadrat method</li> </ol>
Module 3	<ol style="list-style-type: none"> <li>Different types of bones</li> <li>Detailed study of frog</li> <li>Study of frog's digestive system</li> <li>Study of frog's nervous system</li> <li>Study of frog's reproductive system</li> <li>Study of frog's circulatory system</li> <li>Study of computer-based tutorials</li> <li>Action on salivary amylase on starch</li> <li>Study of plasmolysis</li> <li>Study of distribution of stomata</li> <li>Study of osmosis</li> </ol>

Reference Books:

Sl No	Title	Author(s)	Publisher	Year
1	A Text book of Biology	S. B. Gokhale	Nirali Prakashan	2019
2	A Text book of Biology	Dr. Thulajappa and Dr. Seetaram	Cengage Learning India Private Limited; 2nd edition	June 1, 2015
3	A Text book of Biology	Naidu and Murthy	Bangalore Prakasha Sahithya 1988	1988



## HUMAN ANATOMY AND PHYSIOLOGY (HAP-T)

COURSE CODE	22PY6101T	MODE	R	LTPS	3-1-0-0	PRE-REQUISITE	Nil
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### Course Outcomes

CO#	CO Description	BTL	PO Mapping
CO1	Understand the anatomy and physiology of Elementary tissues and to study about basic terminologies used in HAP, detail About hemopoietic and Lymphatic system	2	PO1
CO2	Understand the in detail about Cardiovascular and Respiratory system	2	PO1
CO3	Understand the in detail about Digestive and Nervous system	2	PO1
CO4	Understand the in detail about Urinary and Endocrine system	2	PO1
CO5	Understand the in detail about anatomy and functions of sense organs, and process of reproduction	2	PO1
CO6	Understand the skeletal system of humans and sports physiology	2	PO1

### Syllabus

Module 1	<ul style="list-style-type: none"> <li>• Scope of anatomy and physiology, basic terminologies used in this subject (Description of the body as such planes and terminologies)</li> <li>• Structure of cell – its components and their functions.</li> <li>• Elementary tissues of the human body: epithelial, connective, Muscular and nervous tissues-their sub-types and characteristics</li> </ul> <p><b>Haemopoietic System</b></p> <ol style="list-style-type: none"> <li>a) Composition and functions of blood</li> <li>b) Hemopoiesis and disorders of blood components (definition of disorder)</li> <li>c) Blood groups</li> <li>d) Clotting factors and mechanism: Platelets and disorders of coagulation</li> </ol> <p><b>Lymph</b></p> <ol style="list-style-type: none"> <li>a. Lymph and lymphatic system, composition, formation and circulation.</li> <li>b. Spleen: structure and functions, Disorders</li> <li>c. Disorders of lymphatic system (definition only)</li> </ol>
Module 2	<p><b>Cardiovascular system</b></p> <ol style="list-style-type: none"> <li>a. Anatomy and functions of heart</li> <li>b. Blood vessels and circulation (Pulmonary, coronary and systemic circulation)</li> <li>c. Electrocardiogram (ECG)</li> <li>d. Cardiac cycle and heart sounds</li> <li>e. Blood pressure – its maintenance and regulation</li> </ol> <p><b>Definition of the following disorders</b></p> <ul style="list-style-type: none"> <li>• Hypertension, Hypotension, Arteriosclerosis, Atherosclerosis, Angina, Myocardial infarction, Congestive heart failure, Cardiac arrhythmias</li> </ul> <p><b>Respiratory system</b></p> <ol style="list-style-type: none"> <li>a. Anatomy of respiratory organs and functions</li> <li>b. Mechanism/physiology of respiration and regulation of respiration</li> <li>c. Transport of respiratory gases</li> <li>d. Respiratory volumes and capacities, and Definition of: Hypoxia, Asphyxia, Dybarism, Oxygen therapy and resuscitation.</li> </ol>

Module 3	<p><b>Digestive system</b></p> <ul style="list-style-type: none"> <li>a) Anatomy and physiology of GIT</li> <li>b) Anatomy and functions of accessory glands of GIT</li> <li>c) Digestion and absorption <ul style="list-style-type: none"> <li>• Disorders of GIT (definitions only)</li> </ul> </li> </ul> <p><b>Nervous system</b></p> <ul style="list-style-type: none"> <li>a) Definition and classification of nervous system</li> <li>b) Anatomy, physiology and functional areas of cerebrum</li> <li>c) Anatomy and physiology of cerebellum</li> <li>d) Anatomy and physiology of mid brain</li> <li>e) Thalamus, hypothalamus and Basal Ganglia</li> <li>f) Spinal cord: Structure &amp; reflexes – mono-poly-planter</li> <li>g) Cranial nerves – names and functions <ul style="list-style-type: none"> <li>• ANS – Anatomy &amp; functions of sympathetic &amp; parasympathetic N.S</li> </ul> </li> </ul> <p><b>Urinary system</b></p> <ul style="list-style-type: none"> <li>a) Anatomy and physiology of urinary system</li> <li>b) Formation of urine</li> <li>c) Renin Angiotensin system – Juxtaglomerular apparatus - acid base Balance</li> </ul> <p><b>Clearance tests and micturition Endocrine system</b></p> <ul style="list-style-type: none"> <li>a) Pituitary gland</li> <li>b) Adrenal gland</li> <li>c) Thyroid and Parathyroid glands</li> </ul> <p>Pancreas and gonads</p>
Module 4	<p><b>Reproductive system</b></p> <ul style="list-style-type: none"> <li>a) Male and female reproductive system</li> <li>b) Their hormones – Physiology of menstruation</li> <li>c) Spermatogenesis &amp; Oogenesis</li> <li>d) Sex determination (genetic basis)</li> <li>e) Pregnancy and maintenance and parturition Sense organs a) Eye</li> <li>f) Ear</li> <li>g) Skin Tongue &amp; Nose</li> </ul> <p><b>Osseous system</b> - structure, composition and functions of the Skeleton.</p> <ul style="list-style-type: none"> <li>• Classification of joints, Types of movements of joints, and disorders of joints (Definitions only)</li> </ul> <p><b>Skeletal muscles</b></p> <ul style="list-style-type: none"> <li>a) Histology</li> <li>b) Physiology of Muscle contraction <ul style="list-style-type: none"> <li>• Physiological properties of skeletal muscle and their disorders (definitions)</li> </ul> </li> </ul> <p><b>Sports physiology</b></p> <ul style="list-style-type: none"> <li>a) Muscles in exercise, Effect of athletic training on muscles and muscle performance,</li> <li>b) Respiration in exercise, CVS in exercise, Body heat in exercise, Body fluids and salts in exercise</li> </ul> <p>Drugs and athletics</p>

Reference Books:

Sl No	Title	Author(s)	Publisher	Year
1	Text book of Medical Physiology	Arthur C, Guyton and John E. Hall	Elsevier	2003
2	Physiological basis of Medical Practice	Best and Tailor	Wolters Kluwer India Pvt.	2011
3	Principles of Anatomy and Physiology	Tortora Grabowski	wiley	2003
4	Anatomy and Physiology in Health and Illness	Kathleen J.W. Wilson	Elsevier	1996

## HUMAN ANATOMY AND PHYSIOLOGY (HAP-P)

COURSE CODE	22PY6101P	MODE	R	LTPS	0-0-3-0	PRE-REQUISITE	Nil
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### Course Outcomes

CO#	CO Description	BTL	PO Mapping
CO1	Application of gross morphology of body organs using microscope and Determining blood cell count Determining ESR, Blood Haemoglobin and Bleeding time	3,4	1,4
CO2	Determination of Blood pressure and Blood group Identifying various Parts of Skeletal, Cardiovascular, Respiratory, Digestive, Urinary systems with models, charts & Specimens	3,4	1,4
CO3	Identifying various Parts of Nervous, Special senses, Reproductive systems with models, charts & Specimens Recording the muscle curves in different conditions using sciatic nerve preparation	3,4	1,4

### Syllabus

Module 1	<ol style="list-style-type: none"> <li>Study of tissues of human body</li> <li>Epithelial tissue.</li> <li>Muscular tissue.</li> <li>Study of tissues of human body</li> <li>Connective tissue.</li> <li>Nervous tissue.</li> <li>Determination of W.B.C. count of blood.</li> <li>Determination of R.B.C. count of blood.</li> <li>Determination of differential count of blood</li> <li>Determination of Erythrocyte Sedimentation Rate.</li> <li>Determination of Hemoglobin content of Blood.</li> <li>Determination of Bleeding time &amp; Clotting time Respiratory system</li> </ol>
Module 2	<ol style="list-style-type: none"> <li>Determination of Blood Pressure.</li> <li>Determination of Blood group.</li> <li>Skeleton system part I-axial skeleton with the help of charts, models &amp; specimens.</li> <li>Skeleton system part II- appendicular skeleton with the help of charts, models &amp; specimens.</li> <li>Cardiovascular system with the help of charts, models &amp; specimens.</li> <li>Respiratory system with the help of charts, models &amp; specimens.</li> <li>Digestive system with the help of charts, models &amp; specimens.</li> <li>Urinary system with the help of charts, models &amp; specimens.</li> </ol>
Module 3	<ol style="list-style-type: none"> <li>Nervous system with the help of charts, models &amp; specimens.</li> <li>Special senses with the help of charts, models &amp; specimens.</li> <li>Reproductive system with the help of charts, models &amp; specimens.</li> <li>Study of different family planning appliances.</li> <li>To perform pregnancy diagnosis test.</li> <li>Study of appliances used in experimental physiology.</li> <li>To record simple muscle curve using gastrocnemius sciatic nerve preparation.</li> <li>To record simple summation curve using gastrocnemius sciatic nerve preparation.</li> <li>To record simple effect of temperature using gastrocnemius sciatic nerve preparation.</li> <li>To record simple effect of load &amp; after load using gastrocnemius sciatic nerve preparation.</li> </ol>

	11. To record simple fatigue curve using gastrocnemius sciatic nerve preparation
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Reference Books:

Sl No	Title	Author(s)	Publisher	Year
1	Text book of Medical Physiology	Arthur C, Guyton and John E. Hall	Elsevier	2003
2	Physiological basis of Medical Practice	Best and Tailor	Wolters Kluwer India Pvt.	2011
3	Principles of Anatomy and Physiology	Tortora Grabowski	wiley	2003
4	Anatomy and Physiology in Health and Illness	Kathleen J.W. Wilson	Elsevier	1996

## PHARMACEUTICS (PC-T)

COURSE CODE	22PY6102T	MODE	R	LTPS	2-1-0-0	PRE-REQUISITE	Nil
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### Course Outcomes

CO#	CO Description	BTL	PO Mapping
CO1	To gain knowledge on different dosage forms, History of Pharmacy, and pharmacopoeias	2	1
CO2	To Understand the Pharmaceutical Calculations involved in formulation and preparation of powder dosage forms	2	1
CO3	To understand the preparation of Monophasic liquid dosage forms	2	1
CO4	To develop monophasic and biphasic liquid dosage forms	2	1
CO5	To understand the concepts of suppositories and Gelanicals	2	1
CO6	To gain the knowledge on Surgical aids and incompatibilities	2	1

### Syllabus

Module 1	<p><b>Introduction to dosage forms</b> - classification and definitions.</p> <p><b>Prescription:</b> definition, parts and handling</p> <p><b>Posology:</b> Definition, Factors affecting dose selection. Calculation of children and infant doses.</p> <p><b>History of Pharmacy:</b> Historical back ground and development of profession of pharmacy and pharmaceutical industry in brief. Development of Indian Pharmacopoeia and introduction to other Pharmacopoeias such as BP, USP, European Pharmacopoeia, Extra pharmacopoeia and Indian national formulary.</p>
Module 2	<p><b>Pharmaceutical calculations:</b> Weights and measures – Imperial &amp; Metric system, Calculations involving percentage solutions, alligation, proof spirit and isotonic solutions based on freezing point and molecular weight.</p> <p><b>Powders and Granules:</b> Classification advantages and disadvantages, Preparation of simple, compound powders, Insufflations, Dusting powders, Eutectic and Explosive powders, Tooth powder and effervescent powders and granules.</p>
Module 3	<p><b>Monophasic liquids:</b> Theoretical aspects of formulation including adjuvant like stabilizers, colorants, flavours with examples. Study of Monophasic liquids like gargles, mouth washes, Throat paint, Ear drops, Nasal drops, Liniments and lotions, Enemas and collodions.</p> <p><b>Biphasic dosage forms:</b> Suspensions and emulsions, Definition, advantages and disadvantages, classification, test for the type of emulsion, formulation, stability and evaluation.</p>
Module 4	<p><b>Suppositories and pessaries:</b> Definition, advantages and disadvantages, types of base, method of preparation, Displacement value and evaluation.</p> <p><b>Galenicals:</b> Definition, equipment for different extraction processes like infusion, Decoction, Maceration and Percolation, methods of preparation of spirits, tinctures and extracts.</p> <p><b>Surgical aids:</b> Surgical dressings, absorbable gelatin sponge, sutures, ligatures and medicated bandages.</p> <p><b>Incompatibilities:</b> Introduction, classification and methods to overcome the incompatibilities</p>

Reference Books:

Sl No	Title	Author(s)	Publisher	Year
1	Pharmaceutical Dosage Form and Drug Delivery System	Loyd Allen	Wolters Kluwer Health, Baltimore	2021
2	Dispensing for Pharmaceutical Students	John William Cooper	Pitman Medical Publishing Company	2008
3	The Science & Dosage Form Design	M.E. Aulton	Churchill Livingstone	1998
4	Theory and Practice of Industrial Pharmacy	Lachmann	Lea & Febiger Publisher	2020
5	The Science and Practice of Pharmacy	Alfonso R. Gennaro	John Wiley & Sons Australia, Limited	2003

### Pharmaceutics (PC-P)

COURSE CODE	22PY6102P	MODE	R	LTPS	0-0-3-0	PRE-REQUISITE	Nil
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#### Course Outcomes

CO#	CO Description	BTL	PO Mapping
CO1	Preparation of liquid orals	2	2
CO2	Preparation of lotions, emulsions Powders and Suppositories	2	2
CO3	Preparation of Incompatibilities, ear drops and pastes	2	2

#### Syllabus

Module 1	<ol style="list-style-type: none"> <li>Simple Syrup IP</li> <li>Syrup of ferrous Phosphate IP</li> <li>Orange syrup</li> <li>Piperazine Citrate Elixir BP</li> <li>Paracetamol Elixir BPC</li> <li>Simple linctus BPC</li> <li>Terpin Hydrate Linctus IP</li> <li>Solution of cresol with soap IP</li> <li>Strong solution of ferric chloride BPC</li> <li>Aqueous iodine solution IP</li> </ol>
Module 2	<ol style="list-style-type: none"> <li>Strong solution of iodine IP</li> <li>Strong solution of ammonium acetate IP</li> <li>Liniments of turpentine IP</li> <li>Liniments of camphor IP</li> <li>Calamine lotion</li> <li>Magnesium hydroxide mixture BP</li> <li>Caster oil emulsion</li> <li>Liquid paraffin emulsion</li> <li>ORS powder IP</li> <li>Dusting powder USP</li> </ol>
Module 3	<ol style="list-style-type: none"> <li>Insufflations</li> <li>Boric acid suppositories</li> <li>Mixture of Magnesium Carbonate Sodium Bicarbonate &amp; Citric Acid</li> <li>Alkaloidal Salt with Alkaline Substance</li> <li>Phenol Glycerine throat paint</li> <li>Sodium bicarbonate Ear drops</li> <li>Zinc oxide Paste</li> </ol>

#### Reference Books:

Sl No	Title	Author(s)	Publisher	Year
1	Pharmaceutical Dosage Form and Drug Delivery System	Loyd Allen	Wolters Kluwer Health, Baltimore	2021
2	Dispensing for Pharmaceutical Students	John William Cooper	Pitman Medical Publishing Company	2008
3	The Science & Dosage Form Design	M.E. Aulton	Churchill Livingstone	1998
4	Theory and Practice of Industrial Pharmacy	Lachmann	Lea & Febiger Publisher	2020



## MEDICINAL BIOCHEMISTRY (MBC-T)

COURSE CODE	22PY6103T	MODE	R	LTPS	3-1-0-0	PRE-REQUISITE	NIL
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### Course Outcomes

CO#	CO Description	BTL	PO Mapping
CO1	Understand the catalytic activity of enzymes and importance of isoenzymes in diagnosis of disease and role of carbohydrates and their metabolic disorders	2	1
CO2	Understand the role of carbohydrates and their metabolic disorders and biological oxidation process in body.	2	1
CO3	Understand the concepts of proteins, amino acids, and genetic organization in mammals.	2	1
CO4	Analyse the clinical chemistry of cell and kidney function tests.	3	1
CO5	Analyse the liver and lipid profile tests.	3	1
CO6	Analyse the role of Immunochemical tests for diagnosis of various pathological conditions in body.	3	1

### Syllabus

Module 1	<p><b>Introduction to biochemistry:</b> Cell and its biochemical organization, transport process across the cell membranes. Energy rich compounds; ATP, Cyclic AMP and their biological significance.</p> <p><b>Enzymes:</b> Definition; Nomenclature; IUB classification; Factor affecting enzyme activity; Enzyme action; enzyme inhibition. Isoenzymes and their therapeutic and diagnostic applications; Coenzymes and their biochemical role and deficiency diseases.</p> <p><b>Carbohydrate metabolism:</b> Glycolysis, Citric acid cycle (TCA cycle), HMP shunt, Glycogenolysis, gluconeogenesis, glycogenesis. Metabolic disorders of carbohydrate metabolism (diabetes mellitus and glycogen storage diseases); Glucose, Galactose tolerance test and their significance; hormonal regulation of carbohydrate metabolism.</p>
Module 2	<p><b>Lipid metabolism:</b> Oxidation of saturated (β-oxidation); Ketogenesis and ketolysis; biosynthesis of fatty acids, lipids; metabolism of cholesterol; Hormonal regulation of lipid metabolism. Defective metabolism of lipids (Atherosclerosis, fatty liver, hypercholesterolemia).</p> <p><b>Biological oxidation:</b> Coenzyme system involved in Biological oxidation. Electron transport chain (its mechanism in energy capture; regulation and inhibition); Uncouples of ETC; Oxidative phosphorylation</p> <p><b>Protein and amino acid metabolism:</b> protein turn over; nitrogen balance; Catabolism of Amino acids (Transamination, deamination &amp; decarboxylation). Urea cycle and its metabolic disorders; production of bile pigments; Hyperbilirubinemia, porphoria, jaundice. Metabolic disorder of Amino acids.</p> <p><b>Nucleic acid metabolism:</b> Metabolism of purine and pyrimidine nucleotides; Protein synthesis; Genetic code; inhibition of protein synthesis; mutation and repair mechanism; DNA replication (semi conservative / onion peel models) and DNA repair mechanism.</p>
Module 3	<p><b>Introduction to clinical chemistry:</b> Cell; composition; malfunction; Role of the clinical chemistry laboratory.</p> <p>The kidney function tests: Role of kidney; Laboratory tests for normal function includes-</p> <p>Urine analysis (macroscopic and physical examination, quantitative and semi quantitative tests.)</p>

	<p>Test for NPN constituents. (Creatinine /urea clearance, determination of blood and urine creatinine, urea and uric acid)</p> <p>Urine concentration test Urinary tract calculi. (stones)</p>
Module 4	<p><b>Liver function tests:</b> Physiological role of liver, metabolic, storage, excretory, protective, circulatory functions and function in blood coagulation.</p> <p>Test for hepatic dysfunction-Bile pigments metabolism.</p> <p>Test for hepatic function test- Serum bilirubin, urine bilirubin, and urine urobilinogen.</p> <p>Dye tests of excretory function.</p> <p>Tests based upon abnormalities of serum proteins. Selected enzyme tests.</p> <p><b>Lipid profile tests:</b> Lipoproteins, composition, functions. Determination of serum lipids, total cholesterol, HDL cholesterol, LDL cholesterol and triglycerides.</p> <p><b>Immunochemical techniques</b> for determination of hormone levels and protein levels in serum for endocrine diseases and infectious diseases. Radio immuno assay (RIA) and Enzyme Linked Immuno Sorbent Assay (ELISA)</p> <p><b>Electrolytes:</b> Body water, compartments, water balance, and electrolyte distribution. Determination of sodium, calcium potassium, chlorides, bicarbonates in the body fluids.</p>

Reference Books:

Sl No	Title	Author(s)	Publisher	Year
1	Principles of biochemistry	Lehninger	Macmillan	2017
2	Text book of Biochemistry	U. Satyanarayana	Elesiver	2022
3	Text book of Biochemistry	A.V.S.S. Rama Rao	UBS Publishers	2008

## MEDICINAL BIOCHEMISTRY (MBC-P)

COURSE CODE	22PY6103P	MODE	R	LTPS	0-0-3-0	PRE-REQUISITE	NIL
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### Course Outcomes

CO#	CO Description	BTL	PO Mapping
CO1	Qualitative analysis of urine and blood	3	4
CO2	Estimation of Liver and kidney parameters	3	4
CO3	Experiments on lipid profile parameters and enzyme activities and electrolyte estimations	3	4

### Syllabus

Module 1	<ol style="list-style-type: none"> <li>1. Qualitative analysis of normal constituents of urine.*</li> <li>2. Qualitative analysis of abnormal constituents of urine.*</li> <li>3. Quantitative estimation of urine sugar by Benedict's reagent method.**</li> <li>4. Quantitative estimation of urine chlorides by Volhard's method.**</li> <li>5. Quantitative estimation of urine calcium by precipitation method.**</li> <li>6. Preparation of Folin Wu filtrate from blood.*</li> <li>7. Quantitative estimation of blood creatinine.**</li> <li>8. Quantitative estimation of blood sugar Folin-Wu tube method</li> </ol>
Module 2	<ol style="list-style-type: none"> <li>1. Estimation of SGOT in serum.**</li> <li>2. Estimation of SGPT in serum.**</li> <li>3. Determination of serum bilirubin</li> <li>4. Quantitative estimation of urine creatinine by Jaffe's method</li> </ol>
Module 3	<ol style="list-style-type: none"> <li>1. Experiment on lipid profile tests</li> <li>2. Determination of Glucose by means of Glucoseoxidase.**</li> <li>3. Enzymatic hydrolysis of Glycogen/Starch by Amylases.**</li> <li>4. Study of factors affecting Enzyme activity. (pH &amp; Temp.)**</li> <li>5. Determination of sodium, calcium and potassium in serum.**</li> </ol>

### Reference Books:

Sl No	Title	Author(s)	Publisher	Year
1	Text book of biochemistry	Ramarao	UBS Publishers	2008
2	Practical Biochemistry	David T. Plummer	McGraw-Hill	2000
3	Practical Biochemistry	Pattabhiraman	All india publosher	2008

## PHARMACEUTICAL ORGANIC CHEMISTRY (POC-T)

COURSE CODE	22PY6104T	MODE	R	LTPS	3-1-0-0	PRE-REQUISITE	Nil
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### Course Outcomes

CO#	CO Description	BTL	PO Mapping
CO1	Understand the IUPAC/Common system of nomenclature of simple organic compounds	2	1
CO2	To understand the organic reactions, reactivity, stability, mechanisms involved in aliphatic and alicyclic compounds	2	1
CO3	To understand the free radical addition and the theory of resonance	2	1
CO4	To understand the nucleophilic & electrophilic aromatic substitution reactions, reactivity and orientation	2	1
CO5	To understand the named organic reactions with mechanisms and Interpret oxidation and reduction reactions	2	1
CO6	To understand the preparation, test for purity, assay and medicinal uses of official compounds	2	1

### Syllabus

Module 1	<b>Structures and Physical properties:</b> Polarity of bonds, polarity of molecules, M.P, Inter molecular forces, B.P, Solubility, non-ionic solutes and ionic solutes, protic and aprotic Solvents, ion pairs. Acids and bases, Lowry bronsted and Lewis theories Isomerism. Nomenclature of organic compound belonging to the following classes Alkanes, Alkenes, Dienes, Alkynes, Alcohols, Aldehydes, Ketones, A Sem-ines, Amines, Phenols, Alkyl Halides, Carboxylic Acid, Esters, Acid Chlorides And Cycloalkanes.
Module 2	<b>Nucleophilic aliphatic substitution mechanism:</b> Nucleophiles and leaving groups, kinetics of second and first order reaction, mechanism and kinetics of $SN_2$ reactions. Stereochemistry and steric hindrance, role of solvents, phase transfer catalysis, mechanism and kinetics of $SN_1$ reactions, stereochemistry, carbocation and their stability, rearrangement of carbocation, role of solvents in $SN_1$ reaction, Ion dipole bonds, $SN_2$ versus $SN_1$ solvolyses, nucleophilic assistance by the solvents. Dehydro halogenation of alkyl halides: 1,2 elimination, kinetics, E2 and E1 mechanism, elimination via carbocation, evidence for E2 mechanism, absence of rearrangement isotope effect, absence hydrogen exchange, the element effect, orientation and reactivity, E2 versus E1, elimination versus substitution, dehydration of alcohol, ease of dehydration, acid catalysis, reversibility, orientation. Free radicals chain reactions of alkane: Mechanism, relative reactivity and stability. Alicyclic compounds: Preparations of cyclo alkanes, Bayer strain theory and orbital picture of angle strain.
Module 3	<b>Electrophilic and free radicals addition:</b> Reactions at carbon-carbon, double bond, electrophile, hydrogenation, heat of hydrogenation and stability of alkenes, markownikoff rule, addition of hydrogen halides, addition of hydrogen broSem-ines, peroxide effect, electrophilic addition, mechanism, rearrangement, absence of hydrogen exchange, orientation and reactivity, addition of halogen, mechanism, halohydrin formation, mechanism of free radicals addition, mechanism of peroxide initiated addition of hydrogen broSem-ine, orientation of free addition, additions of carbene to alkene, cyclo addition reactions. Carbon-carbon double bond as substituents: Free radical halogenations of alkenes, comparison of free radical substitution with free radical addition, free radical substitution in alkenes, orientation and reactivity, allylic rearrangements. Theory of resonance: Allyl radical as a resonance hybrid, stability, orbital picture, resonance stabilisation of allyl radicals, hyper conjugation, allyl cation as a resonance hybrid, nucleophilic substitution in allylic substrate, $SN_1$ reactivity, allylic rearrangement, resonance stabilisation of allyl cation, hyper conjugation, nucleophilic substitution in allylic substrate, $SN_2$ nucleophilic substitution in vinylic substrate, vinylic cation, stability of conjugated dienes, resonance in alkenes, hyper conjugation, ease of formation of conjugated dienes, orientation of elimination, electrophilic addition to conjugated dienes, 1,4- addition,

	<p>1,2-versus 1,4-addition, rate versus equilibrium, orientation and reactivity of free radical addition to conjugated dienes.</p> <p><b>Electrophilic aromatic substitution:</b> Effect of substituent groups, determination of orientation, determination of relative reactivity, classification of substituent group, mechanism of nitration, sulphonation, halogenation, friedel craft alkylation, friedel craft acylation, reactivity and orientation, activating and deactivating O,P,M directing groups, electron release via resonance, effect of halogen on electrophilic aromatic substitution in alkyl benzene, side chain halogenation of alkyl benzene, resonance stabilization of benzyl radical. Nucleophilic addition reaction: Mechanism, ionisation of carboxylic acids, acidity constants, acidity of acids, structure of carboxylate ions, effect of substituent on acidity, nucleophilic acyl substitution reaction, conversion of acid-to-acid chloride, esters, amide and anhydride. Role of caboxyl group, comparison of alkyl nucleophilic substitution with acyl nucleophilic substitution. Nucleophilic aromatic substitution: Bimolecular displacement mechanisms, orientation, comparison of aliphatic nucleophilic substitution with that of aromatic.</p>
Module 4	<p>Mechanism of aldol condensation, claisen condensation, cannizzaro reaction, crossed aldol condensation, crossed cannizzaro reaction, benzoin condensation, perkin condensation. Knoevenagel, Reformatsky reaction, Wittig reaction, Michael addition. Hoffman rearrangement: Migration to electron deficient nitrogen, Sandmeyer's reaction, basicity of amines, diazotisation and coupling, acidity of phenols, Williamson synthesis, Fries rearrangement, Kolbe reaction, Reimer tieman's reactions. Oxidation reduction reaction.</p> <p><b>Study of the following official compounds-</b> preparation, test for purity, assay and medicinal uses of Chlorbutol, Dimercaprol, Glyceryl trinitrate, Urea, Ethylene diamine dihydrate, Vanillin, Paraldehyde, Ethylene chloride, Lactic acid, Tartaric acid, citric acid, salicylic acid, aspirin, methyl salicylate, ethyl benzoate, benzyl benzoate, dimethyl phthalate, sodium lauryl sulphate, saccharin sodium, mephensin.</p>

Reference Books:

Sl No	Title	Author(s)	Publisher	Year
1	Organic chemistry	William H. Brown and Lawrence S. Brown	Brooks/Cole	2011
2	A text book of organic chemistry	Arun Bahl, B.S. Bahl	S Chand & Co. Ltd	2020
3	March's Advanced Organic Chemistry: Reactions, Mechanisms, and Structure	Michael B. Smith	Wiley	2019
4	Organic Chemistry	Morrison and Boyd	Pearson	2010
5	Organic Chemistry	Pine, Stanley H.; Hendrickson, James B.; Cram, Donald J.; Hammond, George S	McGraw-Hill Companies	1980

## PHARMACEUTICAL ORGANIC CHEMISTRY (POC-P)

COURSE CODE	22PY6104P	MODE	R	LTPS	0-0-3-0	PRE-REQUISITE	Nil
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### Course Outcomes

CO#	CO Description	BTL	PO Mapping
CO1	Applying the knowledge to Synthesize organic compounds by acetylation, benzoylation, bromination, condensation, diazotisation and coupling and hydrolysis methods.	3	1
CO2	Applying the knowledge to Synthesize organic compounds by nitration reactions, oxidation, reduction and miscellaneous reactions methods.	3	1
CO3	Acquiring knowledge to Identify Phenols, amides, carbohydrates, amines, Carboxylic acids, aldehyde, ketones, alcohols, Carboxylic acids, aldehyde, ketones and alcohols Esters, hydrocarbons, anilides and nitro compounds	3	1

### Syllabus

Module 1	<b>Introduction to the various laboratory techniques through demonstration involving synthesis of the actylation, benzoylation and bromination reactions</b> <ol style="list-style-type: none"> <li>1. Acetanilide / aspirin (Acetylation)</li> <li>2. Benzanilide / Phenyl benzoate (Benzoylation)</li> <li>3. P-bromo acetanilide / 2,4,6 – tribromo aniline (Bromination)</li> <li>4. Dibenzylidene acetone (Condensation)</li> <li>5. 1-Phenylazo-2-naphthol (Diazotisation and coupling)</li> <li>6. Benzoic acid / salicylic acid (Hydrolysis of ester)</li> </ol>
Module 2	<b>Introduction to the various laboratory techniques through demonstration involving synthesis of the condensation, diazotization and coupling and hydrolysis reactions</b> <ol style="list-style-type: none"> <li>1. Preparation of benzoic acid from toluene or benzaldehyde</li> <li>2. M-phenylene diamine (Reduction of M-dinitrobenzene)/ Aniline from nitrobenzene</li> <li>3. M-dinitro benzene (Nitration)</li> <li>4. Benzophenone oxime</li> <li>5. Nitration of salicylic acid</li> <li>6. Preparation of picric acid</li> <li>7. Preparation of O-chlorobenzoic acid from O-chlorotoluene</li> </ol>
Module 3	Identification of organic compounds belonging to the following classes by systematic qualitative organic analysis including preparation of derivatives like Phenols, Amides, Carbohydrates. Amines. Carboxylic acids, Aldehyde, Ketones, Alcohols, Esters, Hydrocarbons, Anilides and Nitro compounds

### Reference Books:

Sl No	Title	Author(s)	Publisher	Year
1	Elementary Practical Organic Chemistry	Vogel A.I.	CBS	2004
2	Laboratory Techniques	Donald, LP. Lampman, GM. Kriz, GS. Engel, RG.	Saunders College Publishers	1990
3	Practical Organic Chemistry	Mann, FG. Saunders, B.C.	Orient Longman Limited	1986
4	Textbook of Practical Organic Chemistry	Vogel, A. I. and Furniss, B.S.	ELBS Longman Group Ltd	1989

## PHARMACEUTICAL INORGANIC CHEMISTRY (PIC-T)

COURSE CODE	22PY6105T	MODE	R	LTPS	2-1-0-0	PRE-REQUISITE	Nil
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### Course Outcomes

CO#	CO Description	BTL	PO Mapping
CO1	Make Use of Analytical knowledge in identifying errors and concepts of indicators in volumetric analysis	2	1
CO2	Application of principles and procedures of analysis of drugs	3	1
CO3	Application of principle of limit tests in identifying the impurities	3	1
CO4	Understand the role of medicinal gases and drugs used to treat gastrointestinal diseases.	2	1
CO5	Understand the role of electrolyte replenishers and essential trace elements to maintain physiological balance & MOA of antimicrobials	2	1
CO6	Understand the importance of inorganic pharmaceuticals in preventing and curing the diseases.	2	1

### Syllabus

Module 1	<p><b>Errors:</b> Sources of errors, types of errors, methods of minimizing errors, accuracy, precision, and significant figures</p> <p><b>Volumetric analysis:</b> Classification of volumetric analytical techniques based on principle, Primary and secondary standards. Preparation and standardization of various molar and normal solutions</p> <p><b>Acid-base titrations:</b> Classification of acid base titrations and theory involved in titrations of strong, weak, and very weak acids and bases, neutralization curves</p> <p>Theory of indicators: Theories of indicators used in acid-base, redox and Complexometric titrations</p> <p><b>Redox titrations:</b> Concepts of oxidation and reduction, Types of redox titrations (Principles and applications) Cerimetry, Iodimetry, Iodometry, Bromometry, Dichrometry, Titration with potassium iodate</p> <p><b>Non-aqueous titrations:</b> Solvents, Acidimetry and Alkalimetry titration and estimation of Sodium benzoate and Ephedrine HCl</p> <p><b>Precipitation titrations:</b> Mohr's method, Volhard's, Modified Volhard's, Fajans method, estimation of sodium chloride.</p>
Module 2	<p><b>Complexometric titrations:</b> Classification, metal ion indicators, masking and demasking reagents, estimation of Magnesium sulphate, and calcium gluconate.</p> <p><b>Gravimetry:</b> Principle and steps involved in gravimetric analysis. Purity of the precipitate: co-precipitation and post precipitation, Estimation of barium sulphate</p> <p><b>Limit tests:</b> Principles involved in the limit test for Chloride, Sulphate, Iron, Arsenic, Lead and Heavy metals, modified limit test for Chloride and Sulphate.</p> <p><b>Medicinal gases:</b> Oxygen, carbon dioxide, Nitrogen, Helium, Nitrous oxide,</p> <p><b>Acidifiers:</b> Ammonium chloride and Dil. HCl</p> <p><b>Antacids:</b> Ideal properties of antacids, combinations of antacids, Sodium Bicarbonate, Aluminium hydroxide gel, Magnesium hydroxide mixture</p> <p><b>Cathartics:</b> Magnesium sulphate, Sodium orthophosphate, Kaolin and Bentonite</p>
Module 3	<p><b>Electrolyte replenishers:</b> Functions of major physiological ions, Electrolytes used in the replacement therapy: Sodium chloride, Potassium chloride, Calcium gluconate and Oral Rehydration Salt (ORS), Physiological acid base balance.</p>

	<p><b>Essential Trace elements:</b> Importance of trace elements in human body physiology and homeostasis including zinc (Zn), copper (Cu), selenium (Se), chromium (Cr), cobalt (Co), iodine (I), manganese (Mn), and molybdenum (Mo).</p> <p><b>Antimicrobials:</b> Mechanism, classification, Potassium permanganate, Boric acid, Hydrogen peroxide, Chlorinated lime, Iodine and its preparations</p> <p><b>Pharmaceutical aids:</b> Inorganic diluents, Disintegrants, colorants, Glidants used in pharmaceutical formulation</p>
Module 4	<p><b>Dental Products:</b> Dentifrices, role of fluoride in the treatment of dental caries, Desensitizing agents, Calcium carbonate, Sodium fluoride, and Zinc eugenol cement</p> <p><b>Miscellaneous compounds:</b> Expectorants: Potassium iodide, Ammonium chloride*; Emetics: Copper sulphate*, Sodium potassium tartarate; Hematinics: Ferrous sulphate*, Ferrous gluconate; Poison and Antidote: Sodium thiosulphate*, Activated charcoal, Sodium nitrite; Astringents: Zinc Sulphate, Potash Alum</p> <p><b>Radio Pharmaceuticals:</b> Radio activity, Measurement of radioactivity, Properties of <math>\alpha</math>, <math>\beta</math>, <math>\gamma</math> radiations, Half-life, radio isotopes and study of radio isotopes - Sodium iodide I131, Storage conditions, precautions &amp; pharmaceutical application of radioactive substances.</p>

#### Reference Books:

Sl No	Title	Author(s)	Publisher	Year
1	A textbook Inorganic medicinal chemistry	Surendra N. Pandeya	S G Publisher	2005
2	Practical Pharmaceutical chemistry Vol-I & Vol-II	A. H. Beckett and J. B. Stanlake's	Athlone, London.	1988
3	Inorganic Pharmaceutical Chemistry III- Edition	P. Gundu Rao	Vallabh Publications	2005
4	Inorganic Pharmaceutical Chemistry	Anand & Chatwal	Himalaya Pub	2010
5	Pharmaceutical Inorganic chemistry	Dr. B. G. Nagavi	Pragati Books Pvt. Ltd	2008



## PHARMACEUTICAL INORGANIC CHEMISTRY (PIC-P)

COURSE CODE	22PY6105P	MODE	R	LTPS	0-0-3-0	PRE-REQUISITE	Nil
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### Course Outcomes

CO#	CO Description	BTL	PO Mapping
CO1	Test for identification of impurities and selected inorganic compounds	4	1,4
CO2	Analyze the purity of selected inorganic compounds	4	1,4
CO3	Estimation of mixtures and preparation of selected organic compounds	5	1,4

### Syllabus

Module 1	Limit test for chlorides, Limit test for sulphates, Limit test for iron, Limit test for heavy metals, Limit test for arsenic, Modified limit tests for chlorides and sulphates. Test for identity: Sodium bicarbonate, Barium sulphate, Ferrous sulphate, and Potassium chloride
Module 2	Assay of Ammonium chloride- Acid-base titration, Ferrous sulphate- Cerimetry, Copper sulphate- Iodometry, Calcium gluconate- Complexometry, Hydrogen peroxide – Permanganometry, Sodium benzoate – Nonaqueous titration, Sodium chloride – Modified Volhard's method, Assay of KI – KIO <sub>3</sub> titration, Gravimetric estimation of barium as barium sulphate, Sodium antimony gluconate or antimony potassium tartrate. Test for purity: Swelling power in Bentonite, Acid neutralising capacity in aluminium hydroxide gel, Ammonium salts in potash alum, Adsorption power heavy Kaolin and Presence of Iodates in KI.
Module 3	Estimation of mixture: Sodium hydroxide and sodium carbonate, Boric acid and Borax, Oxalic acid and sodium oxalate Preparations: Boric acids, Potash alum, Calcium lactate, and Magnesium sulphate

### Reference Books:

Sl No	Title	Author(s)	Publisher	Year
1	A textbook Inorganic medicinal chemistry	Surendra N. Pandeya	S G Publisher	2005
2	Practical Pharmaceutical chemistry Vol-I & Vol-II	A. H. Beckett and J. B. Stanlake's	Athlone, London.	1988
3	Inorganic Pharmaceutical Chemistry III- Edition	P. Gundu Rao	Vallabh Publications	2005
4	Inorganic Pharmaceutical Chemistry	Anand & Chatwal	Himalaya Pub	2010
5	Pharmaceutical Inorganic chemistry	Dr. B. G. Nagavi	Pragati Books Pvt. Ltd	2008

## PATHOPHYSIOLOGY (PATH)

COURSE CODE	22PY6201T	MODE	R	LTPS	3-1-0-0	PRE-REQUISITE	Nil
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### Course Outcomes

CO#	CO Description	BTL	PO Mapping
CO1	To understand the basic principles of cell injury, adaptations and inflammation	2	1
CO2	To understand the pathophysiology of diseases related to immunity	2	1, 5
CO3	To understand the detailed pathogenesis of cancer	2	1, 5
CO4	To understand biological effects of radiation, environmental and nutritional diseases	2	1, 5
CO5	To understand pathophysiology of common diseases	2	1, 5
CO6	To understand pathogenesis of Infectious diseases	2	1, 5

### Syllabus

Module 1	Basic principles of cell injury and Adaptation a) Causes, Pathogenesis and morphology of cell injury b) Abnormalities in lipoproteinaemia, glycogen infiltration and glycogen infiltration and glycogen storage diseases Inflammation a) Pathogenesis of acute inflammation, Chemical mediators in inflammation, Types of chronic inflammation b) Repairs of wounds in the skin, factors influencing healing of wounds
Module 2	Diseases of Immunity a) Introduction to T and B cells b) MHC proteins or transplantation antigens c) Immune tolerance - Hypersensitivity type I, II, III, IV, Biological significance, Allergy due to food, chemicals and drugs - Autoimmunity Criteria for autoimmunity, Classifications of autoimmune diseases in man, mechanism of autoimmunity, Transplantation and immunologic tolerance, allograft rejections, transplantation antigens, mechanism of rejection of allograft. - Acquired immune deficiency syndrome (AIDS) - Amyloidosis
Module 3	Cancer: differences between benign and malignant tumors, Histological diagnosis of malignancy, invasions and metastasis, patterns of spread, disturbances of growth of cells, classification of tumors, general biology of tumors, spread of malignant tumors, etiology and pathogenesis of cancer. Types of shock, mechanisms, stages and management.
Module 4	Biological effects of radiation. Environmental and nutritional diseases i) Air pollution and smoking- SO <sub>2</sub> , NO, NO <sub>2</sub> , and CO ii) Protein calorie malnutrition, vitamins, obesity, pathogenesis of starvation.
Module 5	Pathophysiology of common diseases a. Parkinsonism b. Schizophrenia c. Depression and mania d. Hypertension, e. Stroke (ischaemic and hemorrhage) f. Angina, CCF, Atherosclerosis, Myocardial infarction g. Diabetes Mellitus h. Peptic ulcer and inflammatory bowel diseases i. Cirrhosis and Alcoholic liver diseases j. Acute and chronic renal failure k. Asthma and chronic obstructive airway diseases
Module 6	Infectious diseases : Sexually transmitted diseases (HIV, Syphilis, Gonorrhea), Urinary tract infections, Pneumonia, Typhoid, Tuberculosis, Leprosy, Malaria Dysentery (bacterial and amoebic ), Hepatitis- infective hepatitis

Reference Books:

Sl No	Title	Author(s)	Publisher	Year
1	Pathologic basis of disease	Cotran, Kumar, Robbins	Elsevier	2021
2	Text book of Pathology	Harsh Mohan	Jaypee Brothers Medical Publishers	2015
3	Text book of Pathology	Y.M. Bhide	Popular Prakashan Ltd	2008
4	Clinical Pharmacy and Therapeutics	Roger Walker	Churchill Livingstone publication	2011

## PHARMACEUTICAL MICROBIOLOGY (PMB-T)

COURSE CODE	22PY6202T	MODE	R	LTPS	3-1-0-0	PRE-REQUISITE	Nil
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### Course Outcomes

CO#	CO Description	BTL	PO Mapping
CO1	Understand methods of identification, classification and relationship among various microorganisms	2	1, 4
CO2	Understand nutritional requirements, cultivation and preservation of various microorganisms	2	1, 4
CO3	Understand the importance and implementation of sterilization in pharmaceutical processing and industry	2	1, 4
CO4	Understand and learn disinfectants, procedures of disinfection for pharmaceutical products.	2	1, 4
CO5	Understand the immune system, Antigen-Antibody reactions, immunization programs, and diagnostic tests for parasites	2	1, 4
CO6	Understand the microbial assays and different infectious diseases	2	1, 4

### Syllabus

Module 1	Introduction to the science of microbiology. Major divisions of microbial world and Relationship among them. Different methods of classification of microbes and study of Bacteria, Fungi, virus, Rickettsiae, Spirochetes.
Module 2	Nutritional requirements, growth and cultivation of bacteria and virus. Study of different important media required for the growth of aerobic and anaerobic bacteria & fungi. Differential media, enriched media and selective media, maintenance of lab cultures. Different methods used in isolation and identification of bacteria with emphasis to different staining techniques and biochemical reactions. Counting of bacteria -Total and Viable counting techniques.
Module 3	Detailed study of different methods of sterilization including their merits and demerits. Sterilization methods for all pharmaceutical products. Detailed study of sterility testing of different pharmaceutical preparations. Brief information on Validation. Disinfectants- Study of disinfectants, antiseptics, fungicidal and virucidal agents factors affecting their activation and mechanism of action. Evaluation of bactericidal, bacteristatic, virucidal activities, evaluation of preservatives in pharmaceutical preparations.
Module 4	Immunology- Immunity, Definition, Classification, General principles of natural immunity, Phagocytosis, acquired immunity (active and passive). Antigens, chemical nature of antigens structure and formation of Antibodies, Antigen-Antibody reactions. Bacterial exotoxins and endotoxins. Significance of toxoids in active immunity, Immunization programme, and importance of booster dose.
Module 5	Diagnostic tests: Schick's Test, Elisa test, Western Blot test, Southern Blot, PCR Widal, QBC, Mantoux Peripheral smear. Study of malarial parasite.
Module 6	Microbial culture sensitivity Testing: Interpretation of results Principles and methods of different microbiological assays, microbiological assay of Penicillin, Streptomycin and vitamin B2 and B12. Standardisation of vaccines and sera. Study of infectious diseases: Typhoid, Tuberculosis, Malaria, Cholera, Hepatitis, Meningitis, Syphilis & Gonorrhea and HIV.

Reference Books:

Sl No	Title	Author(s)	Publisher	Year
1	Microbiology 2nd- edition	Prescot L.M., Jarley G.P Klein D.A	Mc Graw Hill Company Inc.	2007
2	Microbiology.   2nd edition	Prescott L.M. Jarley G.P., Klein.D.A	WMC Brown Publishers	1993
3	Immunology   3rd edition	War Roitt, Jonathan Brostoff, David male	Mosby- year book Europe Ltd, London.	1996
4	Pharmacopoeia of India	Govt of India.	Govt of India	1996
5	Microbiology: An Introduction	Gerard J. Tortora	Pearson	2019

### PHARMACEUTICAL MICROBIOLOGY (PMB-P)

COURSE CODE	22PY6202P	MODE	R	LTPS	0-0-3-0	PRE-REQUISITE	Nil
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#### Course Outcomes

CO#	CO Description	BTL	PO Mapping
CO1	Understand various equipment's used in experimental microbiology; Apply knowledge to perform the preparation of culture media and sterilization of glassware, identification of bacteria by staining methods	3	1,4
CO2	Understand and apply the knowledge for isolation, cultivation and preservation of various microorganisms, testing for sterility for pharmaceuticals	3	1,4
CO3	To apply and perform microbial assays, perform bacterial microbial assays for vitamins and antibiotics. To perform the relative cellular volume assays of microbes, diagnostic tests of typhoid and malaria.	4	1,4

#### Syllabus

Module 1	<ol style="list-style-type: none"> <li>Study of apparatus used in experimental microbiology*.</li> <li>Sterilisation of glass wares. Preparation of media and sterilisation. *</li> <li>Staining techniques – Simple staining; Gram's staining; Negative staining**</li> <li>Study of motility characters*</li> </ol>
Module 2	<ol style="list-style-type: none"> <li>Enumeration of micro-organisms (Total and Viable) *</li> <li>Study of the methods of isolation of pure culture. *</li> <li>Biochemical testing for the identification of micro*-organisms.</li> <li>Cultural sensitivity testing for some micro-organisms. *</li> <li>Sterility testing for powders and liquids. *</li> <li>Determination of minimum inhibitory concentration. *</li> </ol>
Module 3	<ol style="list-style-type: none"> <li>Microbiological assay of antibiotics by cup plate method. *</li> <li>Microbiological assay of vitamins by Turbidometric method*</li> <li>Determination of RWC. **</li> <li>Diagnostic tests for some common diseases, Widal, malarial parasite. **.</li> </ol>

#### Reference Books:

Sl No	Title	Author(s)	Publisher	Year
1	Practical Microbiology	Brian J. Tindall and Michael J. Goodfellow	Wiley-Blackwell	2017
2	Microbiology: A Practical Approach	Colin R. Harwood and Michael J. Wilson	Wiley-Blackwell	2018
3	Microbiology: Experiments in Microbiology, Plant Pathology, and Biotechnology	R.P. Singh and P.K. Sharma	Pearson Education India	2013
4	Laboratory Manual for Microbiology	Gerard J. Tortora, Berdell R. Funke, Christine L. Case, and Ted R. Johnson	Pearson	2023
5	Pharmacopoeia of India	Govt of India.	Govt of India	1996

## PHARMACOGNOSY AND PHYTOPHARMACEUTICALS (P. COG-T)

COURSE CODE	22PY6203T	MODE	R	LTPS	3-1-0-0	PRE-REQUISITE	Nil
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### Course Outcomes

CO#	CO Description	BTL	PO Mapping
CO1	To know the history and scope of Pharmacognosy and Classification of crude drugs	2	1, 4
CO2	know about the cultivation, collection, and processing of crude drugs and study of cell constituents and natural pesticides	2	1, 4
CO3	To understand about the organic farming and different methods of pest control	2	1, 4
CO4	To know about the detailed study carbohydrates containing drugs.	2	1, 4
CO5	understand the different methods of extraction, chemistry and analysis of lipids and oils and protein based natural drugs	2	1, 4
CO6	To know different types of plants fibres used in surgical dressings and related products and understand different methods of adulteration of crude drugs	2	1, 4

### Syllabus

Module 1	Introduction, Definition, history and scope of Pharmacognosy, Classification of crude drugs, and Traditional systems of medicine, Different methods of adulteration of crude drugs
Module 2	Cultivation, collection, processing and storage of crude drugs, Detailed method of cultivation of crude drugs, Study of cell wall constituents and cell inclusions. Microscopical and powder Microscopical study of crude drugs.
Module 3	Pest and pest control, Study of natural pesticides, Organic farming
Module 4	Carbohydrates and related products
Module 5	Definition, classification, chemistry and method of analysis of lipid containing drugs and proteins
Module 6	Study of plants fibres used in surgical dressings and related products

### Reference Books:

Sl No	Title	Author(s)	Publisher	Year
1	Trease and Evans Pharmacognosy, 16 <sup>th</sup> edition	W.C.Evans and Trease	.B. Sounders & Co., London	2009
2	Pharmacognosy, 9th Edn	Tyler, V.E., Brady, L.R. and Robbers, J.	Lea and Febiger, Philadelphia	2017
3	Text book of Pharmacognosy	C.K. Kokate, Purohit, Gokhlae	Nirali Prakashan, New Delhi.	2021
4	Essentials of Pharmacognosy	Dr.SH.Ansari,	Birla publications, New Delhi	2007
5	Herbal drug industry	R.D. Choudhary	Eastern Publisher, New Delhi	2007

## PHARMACOGNOSY AND PHYTOPHARMACEUTICALS (P. COG-P)

COURSE CODE	22PY6203P	MODE	R	LTPS	0-0-3-0	PRE-REQUISITE	Nil
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### Course Outcomes

CO#	CO Description	BTL	PO Mapping
CO1	To perform macroscopy, microscopy, and powder characteristics of natural drugs.	3	1, 6
CO2	To perform macroscopy, microscopy, and powder characteristics of natural drugs.	3	1, 6
CO3	To apply and perform the different chemical tests	4	1, 6

### Syllabus

Module 1	<ol style="list-style-type: none"> <li>1. Introduction of Pharmacognosy laboratory and experiments.</li> <li>2. Study of cell wall constituents and cell inclusions.</li> <li>3. Macro, powder and microscopic study of Datura.</li> <li>4. Macro, powder and microscopic study of Senna.</li> <li>5. Macro, powder and microscopic study of Cassia,</li> <li>6. Macro, powder and microscopic study of Cinnamon.</li> <li>7. Macro, powder and microscopic study of Cinchona.</li> <li>8. Macro, powder and microscopic study of Ephedra.</li> <li>9. Macro, powder and microscopic study of Quassia.</li> <li>10. Macro, powder and microscopic study of Clove</li> </ol>
Module 2	<ol style="list-style-type: none"> <li>1. Macro, powder and microscopic study of Fennel.</li> <li>2. Macro, powder and microscopic study of Coriander.</li> <li>3. Macro, powder and microscopic study of Isapgol.</li> <li>4. Macro, powder and microscopic study of Nux vomica.</li> <li>5. Macro, powder and microscopic study of Rauwolfia.</li> <li>6. Macro, powder and microscopic study of Liquorice.</li> <li>7. Macro, powder and microscopic study of Ginger.</li> <li>8. Macro, powder and microscopic study of Podophyllum.</li> <li>9. Determination of Iodine value.</li> </ol>
Module 3	<ol style="list-style-type: none"> <li>1. Determination of Saponification value and unsaponifiable matter.</li> <li>2. Determination of ester value.</li> <li>3. Determination of Acid value.</li> <li>4. Chemical tests for Acacia.</li> <li>5. Chemical tests for Tragacanth.</li> <li>6. Chemical tests for Agar.</li> <li>7. Chemical tests for Starch.</li> <li>8. Chemical tests for Lipids. (Castor oil, sesame oil, shark liver oil, bees wax)</li> <li>9. Chemical tests for Gelatin.</li> </ol>

### Reference Books:

Sl No	Title	Author(s)	Publisher	Year
1	Trease and Evans Pharmacognosy, 16 <sup>th</sup> edition	W.C.Evans and Trease	.B. Sounders & Co., London	2009
2	Pharmacognosy, 9th Edn	Tyler, V.E., Brady, L.R. and Robbers, J.	Lea and Febiger, Philadelphia	2017
3	Text book of Pharmacognosy	C.K. Kokate, Purohit, Gokhlae	Nirali Prakashan, New Delhi.	2021
4	Practical Pharmacognosy	Mr. S. B. Gokhale, <u>Dr. C. K. Kokate</u>	Nirali Prakashan, New Delhi.	2008



## PHARMACOLOGY I (P. COL-I)

COURSE CODE	22PY6204T	MODE	R	LTPS	3-1-0-0	PRE-REQUISITE	NIL
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### Course Outcomes

CO#	CO Description	BTL	PO Mapping
CO1	Understanding the pharmacological actions of different categories of drugs	2	1
CO2	Understand the pharmacology of drugs acting on Autonomic nervous system	2	1
CO3	Understand the pharmacology of drugs acting on cardio vascular system	2	1
CO4	Understand the pharmacology of drugs acting on central nervous system	2	1
CO5	Understand the pharmacology of drugs acting on Respiratory system	2	1
CO6	Understand the pharmacology of hormonal and antihistaminic drugs	2	1

### Syllabus

Module 1	General Pharmacology a) Introduction, definitions and scope of pharmacology b) Routes of administration of drugs c) Pharmacokinetics (absorption, distribution, metabolism and excretion) d) Pharmacodynamics e) Factors modifying drug effects f) Drug toxicity - Acute, sub- acute and chronic toxicity. g) Pre-clinical evaluations h) Drug interactions.
Module 2	Pharmacology of drugs acting on ANS a) Adrenergic and antiadrenergic drugs b) Cholinergic and anticholinergic drugs c) Neuromuscular blockers d) Mydriatics and miotics e) Drugs used in myasthenia gravis f) Drugs used in Parkinsonism.
Module 3	Pharmacology of drugs acting on cardiovascular system a) Antihypertensives b) Anti-anginal drugs c) Anti-arrhythmic drugs d) Drugs used for therapy of Congestive Heart Failure e) Drugs used for hyperlipidaemias.
Module 4	Pharmacology of drugs acting on Central Nervous System a) General anesthetics b) Sedatives and hypnotics c) Anticonvulsants d) Analgesic and anti-inflammatory agents e) Psychotropic drugs f) Alcohol and methyl alcohol g) CNS stimulants and cognition enhancers h) Pharmacology of local anesthetic.
Module 5	Pharmacology of Drugs acting on Respiratory tract a) Bronchodilators b) Mucolytics c) Expectorants d) Antitussives e) NasalDecongestants.
Module 6	Pharmacology of Hormones and Hormone antagonists a) Thyroid and Antithyroid drugs b) Insulin, Insulin analogues and oral hypoglycemic agents c) Sex hormones and oral contraceptives d) Oxytocin and other stimulants and relaxants. Pharmacology of autocooids and their antagonists a) Histamines and Antihistaminics b) 5-Hydroxytryptamine and its antagonists c) Lipid derived autocooids and platelet activating factor.

Reference Books:

Sl No	Title	Author(s)	Publisher	Year
1	A Text book of Pharmacology	Rang, H.P. & Dale, M.M	Churchill Living stone.	2022
2	The pharmacological Basis of therapeutics	Goodman Gilman, A., Rall, T.W., Nies, A.I.S. and Taylor, P. Goodman and Gilman's	Mc Graw Hill, Pergamon press.	2022
3	Essentials of medical pharmacology	K D Tripathi	Jaypee, Delhi.	2019

### COMMUNITY PHARMACY (COM.PH)

COURSE CODE	22PY6205T	MODE	R	LTPS	2-1-0-0	PRE-REQUISITE	Nil
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#### Course Outcomes

CO#	Course Outcome	BTL	PO Mapping
CO1	Understand the roles and responsibilities of community pharmacist	2	8, 9
CO2	Understand the layout and infrastructure requirements for community pharmacy	2	8, 9
CO3	Recognise the need of inventory control and understand the various methods	2	8, 9
CO4	Understand the factors affecting medication adherence	2	8, 9
CO5	Application of pharmacy practice principles to Perform general patient counselling	3	8, 9
CO6	Apply health screening services in community pharmacy	3	8, 9

#### Syllabus

Module 1	. Definition, scope, of community pharmacy Roles and responsibilities of Community pharmacist 2 Community Pharmacy Management a) Selection of site, Space layout, and design b) Staff, Materials- coding, stocking c) Legal requirements d) Maintenance of various registers e) Use of Computers: Business and health care soft wares
Module 2	Prescriptions – parts of prescription, legality & identification of medication related problems like drug interactions. 4 Inventory control in community pharmacy Definition, various methods of Inventory Control ABC, VED, EOQ, Lead time, safety stock s
Module 3	Pharmaceutical care Definition and Principles of Pharmaceutical care. 6 Patient counselling Definition, outcomes, various stages, barriers, Strategies to overcome barriers Patient information leaflets- content, design, & layouts, advisory labels 7 Patient medication adherence Definition, Factors affecting medication adherence, role of pharmacist in improving the adherence..
Module 4	Health screening services Definition, importance, methods for screening Blood pressure/ blood sugar/ lung function and Cholesterol testing 9 OTC Medication- Definition, OTC medication list & Counselling 10 Health Education WHO Definition of health, and health promotion, care for children, pregnant & breastfeeding women, and geriatric patients..
Module 5	Commonly occurring Communicable Diseases, causative agents, Clinical presentations and prevention of communicable diseases – Tuberculosis, Hepatitis, Typhoid, Amoebiasis, Malaria, Leprosy, Syphilis, Gonorrhea and AIDS Balance diet, and treatment & prevention of deficiency disorders Family planning – role of pharmacist
Module 6	Responding to symptoms of minor ailments Relevant pathophysiology, common drug therapy to, Pain, GI disturbances (Nausea, Vomiting, Dyspepsia, diarrhea, constipation), Pyrexia, Ophthalmic symptoms, worm's infestations. 12 Essential Drugs concept and Rational Drug Therapy Role of community pharmacist 13 Code of ethics for community pharmacists

Reference Books:

Sl No	Title	Author(s)	Publisher	Year
1	Health Education and Community Pharmacy	NS Palmar	Elsevier	2021
2	WHO consultative group report			2015
3	Drug store & Business management by Mohammed Ali & Jyoti.	MohammedAli	Popular Prakashan Ltd	2008
4	. Handbook of pharmacy – health care	Edt Robin	Churchill Livingstone publication	2011
5	Comprehensive Pharmacy Review	Edt. Leon Shargel	Lippincott Williams & Wilkins.	

## PHARMACOTHERAPEUTICS-I (THERAPY I-T)

COURSE CODE	22PY6206T	MODE	R	LTPS	3-1-0-0	PRE-REQUISITE	NA
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### Course Outcomes

CO#	CO Description	BTL	PO Mapping
CO1	To understand etiopathogenesis and Pharmacotherapy of CVS diseases (Hypertension, Congestive cardiac failure, Angina Pectoris)	2	1
CO2	To understand etiopathogenesis and Pharmacotherapy of CVS diseases (Myocardial infarction Hyperlipidaemias, Cardiac Arrhythmia)	2	1
CO3	To understand etiopathogenesis and Pharmacotherapy of Respiratory system diseases	2	1
CO4	To understand etiopathogenesis and Pharmacotherapy of Endocrine system diseases	2	1
CO5	To understand the general prescribing guidelines for Pediatric, Geriatric, Pregnancy and Breastfeeding To understand etiopathogenesis and Pharmacotherapy of ophthalmology diseases	2	1
CO6	To understand the Rational use of drugs	2	1

### Syllabus

Module 1	Cardiovascular system: Hypertension, Congestive cardiac failure, Angina Pectoris
Module 2	Cardiovascular system: Myocardial infarction, Hyperlipidaemias, Electrophysiology of heart and Arrhythmias
Module 3	Respiratory system: Introduction to Pulmonary function test, Asthma, Chronic obstructive airways disease, Drug induced pulmonary diseases
Module 4	Endocrine system: Diabetes, Thyroid diseases, Oral contraceptives, Hormone replacement therapy, Osteoporosis.
Module 5	General prescribing guidelines for (A) Paediatric patients (B) Geriatric patients (c) Pregnancy and breast feeding Ophthalmology: Glaucoma, Conjunctivitis- viral & bacterial
Module 6	Introduction to rational drug use: Definition, Role of pharmacist Essential drug concept Rational drug formulations

### Reference Books:

Sl No	Title	Author(s)	Publisher	Year
1	Pathologic basis of disease	Robins SL	W.B.Saunders publication.	10 <sup>th</sup>
2	Pathology and therapeutics for Pharmacists: A Basis for Clinical Pharmacy Practice	Green and Harris	Chapman and Hall publication.	3 <sup>rd</sup>
3	Clinical Pharmacy and Therapeutics	Eric T. Herfindal	Williams and Wilkins Publication	6 <sup>th</sup>
4	Avery's Drug Treatment	Trevor M. Speight & Nicholas H.G. Holford	Wiley-india	4 <sup>th</sup>

## PHARMACOTHERAPEUTICS-I (THERAPY I-P)

COURSE CODE	22PY6206P	MODE	R	LTPS	0-0-3-0	PRE-REQUISITE	NA
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### Course Outcomes

CO#	CO Description	BTL	PO Mapping
CO1	To apply the knowledge and present the recorded cases in Cardiology department and Pulmonology	3	2, 3
CO2	To apply the knowledge and present the recorded cases in Endocrinology department and to understand the prescribing guidelines	3	2, 3
CO3	To apply the knowledge and present the recorded cases in Ophthalmology department and the guidelines in the rational of drug use	3	2, 3

### Syllabus

Module 1	Hospital postings in various departments designed to complement the lectures by providing practical clinical discussion; attending ward rounds; follow up the progress and changes made in drug therapy in allotted patients; case presentation upon discharge. Students are required to maintain a record of cases presented and the same should be submitted at the end of the course for evaluation. A minimum of 20 cases should be presented and recorded covering most common diseases.
Module 2	Hospital postings in various departments designed to complement the lectures by providing practical clinical discussion; attending ward rounds; follow up the progress and changes made in drug therapy in allotted patients; case presentation upon discharge. Students are required to maintain a record of cases presented and the same should be submitted at the end of the course for evaluation. A minimum of 20 cases should be presented and recorded covering most common diseases.
Module 3	Hospital postings in various departments designed to complement the lectures by providing practical clinical discussion; attending ward rounds; follow up the progress and changes made in drug therapy in allotted patients; case presentation upon discharge. Students are required to maintain a record of cases presented and the same should be submitted at the end of the course for evaluation. A minimum of 20 cases should be presented and recorded covering most common diseases.

### Reference Books:

Sl No	Title	Author(s)	Publisher	Year
1	Pathologic basis of disease	Robins SL	W.B.Saunders publication.	10 <sup>th</sup>
2	Pathology and therapeutics for Pharmacists: A Basis for Clinical Pharmacy Practice	Green and Harris	Chapman and Hall publication.	3 <sup>rd</sup>
3	Clinical Pharmacy and Therapeutics	Eric T. Herfindal	Williams and Wilkins Publication	6 <sup>th</sup>
4	Avery's Drug Treatment	Trevor M. Speight & Nicholas H.G. Holford	Wiley-india	4 <sup>th</sup>

## PHARMACOLOGY-II (P. COL II-T)

COURSE CODE	22PY6301T	MODE	R	LTPS	3-1-0-0	PRE-REQUISITE	P. Col-I
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### Course Outcomes

CO#	CO Description	BTL	PO Mapping
CO1	To understand the pharmacology of drugs acting on blood and blood forming agents and Renal system	2	1,2
CO2	To understand the pharmacology of chemotherapy	2	1,2
CO3	To understand the immuno pharmacology and principles of animal toxicology	2	1,2
CO4	To acquire the knowledge on cell, macromolecules, cell signalling, DNA replication and cell cycle.	2	1,2
CO5	To understand the importance of gene and its structure, genome, gene expression, recombinant DNA technology and other associated aspects	2	1,2
CO6	To understand the importance of RNA and other associated aspects	2	1,2

### Syllabus

Module 1	Pharmacology of Drugs acting on Blood and blood forming agents <ol style="list-style-type: none"> <li>1. Anticoagulants</li> <li>2. Thrombolytics and antiplatelet agents</li> <li>3. Haemopoietic and plasma expanders</li> </ol> Pharmacology of drugs acting on Renal System <ol style="list-style-type: none"> <li>1. Diuretics</li> <li>2. Antidiuretics</li> </ol>
Module 2	Chemotherapy <ol style="list-style-type: none"> <li>1. Introduction</li> <li>2. Sulfonamides and co-trimoxazole</li> <li>3. Penicillins and Cephalosporins</li> <li>4. Tetracyclins and Chloramphenicol</li> <li>5. Macrolides, Aminoglycosides, Polyene &amp; Polypeptide antibiotics</li> <li>6. Quinolines and Fluroquinolines</li> <li>7. Antifungal antibiotics</li> <li>8. Antiviral agents</li> <li>9. Chemotherapy of tuberculosis and leprosy</li> <li>10. Chemotherapy of Malaria</li> <li>11. Chemotherapy of protozoal infections (amoebiasis, Giardiasis)</li> <li>12. Pharmacology of Anthelmintic drugs</li> <li>13. Chemotherapy of cancer (Neoplasms)</li> </ol>
Module 3	Immunopharmacology Pharmacology of immunosuppressants and stimulants Principles of Animal toxicology Acute, sub-acute and chronic toxicity
Module 4	The dynamic cell: The structures and functions of the components of the cell <ol style="list-style-type: none"> <li>1. Cell and macromolecules: Cellular classification, subcellular organelles, macromolecules, large macromolecular assemblies</li> <li>2. Chromosome structure: Pro and eukaryotic chromosome structures, chromatin structure, genome complexity, the flow of genetic information.</li> <li>3. DNA replication: General, bacterial and eukaryotic DNA replication.</li> <li>4. The cell cycle: Restriction point, cell cycle regulators and modifiers.</li> </ol>

	5. Cell signalling: Communication between cells and their environment, ion-channels, signal transduction pathways (MAP kinase, P38 kinase, JNK, Ras and PI3-kinase pathways, biosensors.
Module 5	<p>The Gene: Genome structure and function:</p> <ol style="list-style-type: none"> <li>1. Gene structure: Organization and elucidation of genetic code.</li> <li>2. Gene expression: Expression systems (pro and eukaryotic), genetic elements that control gene expression (nucleosomes, histones, acetylation, HDACS, DNA binding protein families.</li> <li>3. Transcription and Transcription factors: Basic principles of transcription in pro and eukaryotes. Transcription factors that regulate transcription in pro and eukaryotes</li> </ol>
Module 6	<p>RNA processing: rRNA, tRNA and mRNA processing.</p> <p>Protein synthesis: Mechanisms of protein synthesis, initiation in eukaryotes, translation control and post-translation events</p> <p>Altered gene functions: Mutations, deletions, amplifications, LOH, traslocations, trinucleotide repeats and other genetic abnormalities. Oncogenes and tumor suppressor genes.</p> <p>The gene sequencing, mapping and cloning of human disease genes. Introduction to gene therapy and targeting.</p> <p>Recombinant DNA technology: principles. Processes (gene transfer technology) and applications</p>

Reference Books:

Sl No	Title	Author(s)	Publisher	Year
1	P. Goodman and Gilman's The pharmacological Basis of therapeutics.	Goodman Gilman, A., Rall, T.W., Nies, A.I.S. and Taylor	Mc Graw Hill, Pergamon press.	13th
2	Modern Pharmacology	Craig, C.R. and Stitzel, R.E	Little Brown and company.	2004
3	Basic and clinical pharmacology	Katzung, B.G	Prentice Hall, International	2017
4	Pharmacology	Rang, H.P. and Dale, M.M.	Churchill Living stone	2004
5	Essentials of medical pharmacology	Tripathi, K. D	Jaypee, Delhi	2003



## PHARMACOLOGY-II (P. COL II-P)

COURSE CODE	22PY6301P	MODE	R	LTPS	0-0-3-0	PRE-REQUISITE	Nil
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### Course Outcomes

CO#	CO Description	BTL	PO Mapping
CO1	To understand the laboratory animals and their handling, To know the importance of solutions and laboratory appliances used in experimental pharmacology, Understand the anaesthetics used in laboratory animals,	3	1
CO2	Application of bioassays Ach	3	1
CO3	Applications of bioassays of histamine, to understand the demonstrate intraperitoneal and intramuscular routes of administration of drugs in animals and describe different anaesthetics used in laboratory animals	3	1

### Syllabus

Module 1	<ol style="list-style-type: none"> <li>1. Study of physiological salt solutions used in experimental pharmacology.</li> <li>2. Study of laboratory appliances used in experimental pharmacology.</li> <li>3. Study of use of anaesthetics in laboratory animals.</li> </ol>
Module 2	<ol style="list-style-type: none"> <li>1. To record the dose response curve of Ach using isolated ileum/rectus abdominis muscle preparation.</li> <li>2. To carry out bioassay of Ach using isolated ileum/rectus abdominis muscle preparation by interpolation method.</li> <li>3. To carry out bioassay of Ach using isolated ileum/rectus abdominis muscle preparation by three-point method.</li> </ol>
Module 3	<ol style="list-style-type: none"> <li>1. To record the dose response curve of Histamine using isolated guinea-pig ileum preparation.</li> <li>2. Study of agonistic and antagonistic effects of drugs using isolated guinea-pig ileum preparation.</li> <li>3. To carry out bioassay of Histamine using isolated guinea-pig ileum preparation by interpolation method.</li> </ol>

### Reference Books:

Sl No	Title	Author(s)	Publisher	Year
1	Fundamentals of Experimental Pharmacology	M. N. Ghosh	Hilton and Company	2008
2	Hand book of Experimental Pharmacology	S. K. Kulakarni	Vallabh Prakashan	2014
3	CPCSEA guidelines for laboratory animal facility.		Ministry of Environment, forest, climate change government of India	2018
4	Drug discovery and Evaluation by	Vogel H.G.	Springer	1996
5	Introduction to biostatistics and research methods	PSS Sundar Rao and J Richard	PHI Learning Pvt. Ltd.	2012

### PHARMACEUTICAL ANALYSIS (PA-T)

COURSE CODE	22PY6302T	MODE	R	LTPS	3-1-0-0	PRE-REQUISITE	Nil
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#### Course Outcomes

CO#	CO Description	BTL	PO Mapping
CO1	To understand the importance of various documentation practices followed in pharmaceutical industry	2	1, 2
CO2	To understand the knowledge about assay of pharmaceutical substance and product	2	1, 2
CO3	To develop basic practical skills using instrumental techniques	2	1, 2
CO4	To inculcate theoretical knowledge on various instrumental techniques adopted for analysis of pharmaceuticals	2	1, 2
CO5	To understand various methodologies for assay of drugs and pharmaceuticals with the skills and knowledge gained	2	1, 2
CO6	To understand and gain knowledge on trouble shooting in adopting various methodologies using instrumental techniques	2	1, 2

#### Syllabus

Module 1	<p>Quality Assurance:</p> <p>a. Introduction, sources of quality variation, control of quality variation. b. Concept of statistical quality control. c. Validation methods- quality of equipment, validation of equipment and validation of analytical instruments and calibration. d. GLP, ISO 9000. e. Total quality management, quality review and documentation. f. ICH- international conference for harmonization-guidelines. g. Regulatory control.</p>
Module 2	<p>Chromatography: Introduction, history, classification, separation techniques, choice of methods. The following techniques be discussed with relevant examples of pharmaceutical products involving principles and techniques of separation of drugs from excipients.</p> <p>a. Column Chromatography: Adsorption column chromatography, Operational technique, frontal analysis and elution analysis. Factors affecting column efficiency, applications and partition chromatography.</p> <p>b. TLC: Introduction, principle, techniques, R<sub>f</sub> value and applications.</p> <p>c. PC: Introduction, principle, types of paper chromatography, preparation techniques, development techniques, applications.</p> <p>d. Ion-exchange chromatography: Introduction, principles, types of ion exchange synthetic resins, physical properties, factors affecting ion exchange, methodology and applications.</p>
Module 3	<p>a. HPLC: Introduction, theory, instrumentation, and applications.</p> <p>b. HPTLC: Introduction, theory, instrumentation, and applications.</p> <p>c. Gas Chromatography: Introduction, theory, instrumentation-carrier gases, types of columns, stationary phases in GLC &amp; GSC. Detectors- Flame ionization detectors, electron capture detector, thermal conductivity detector. Typical gas chromatogram, derivatisation techniques, programmed temperature gas chromatography, applications.</p> <p>d. Electrophoresis: Principles of separation, equipment for paper and gel</p>

	<p>electrophoresis, and application.</p> <p>e. Gel filtration and affinity chromatography: Introduction, technique, applications.</p>
Module 4	<p>Electrometric Methods: Theoretical aspects, instrumentation, interpretation of data/spectra and analytical applications be discussed on the following topics.</p> <p>a. Potentiometry: Electrical potential, electrochemical cell, reference electrodes, indicator electrodes, measurement of potential and pH, construction and working of electrodes, Potentiometric titrations, methods of detecting end point, Karl Fischer titration.</p> <p>b. Conductometry: Introduction, conductivity cell, conductometric titrations and applications.</p> <p>c. Polarography: Instrumentation, DME, residual current, diffusion current and limiting current, polarographic wave, Ilkovic's equation, Effect of oxygen on polarographic wave, Polarographic maxima and suppressors and applications.</p> <p>d. Amperometric Titrations: Introduction, types of electrodes used, reference and indicator electrode, instrumentation, titration procedure, advantages and disadvantages of Amperometry over potentiometry. Pharma applications.</p>
Module 5	<p>Theoretical aspects, instrumentation, elements of interpretation of data/spectra and application of analytical techniques be discussed on:</p> <p>a. Absorption Spectroscopy: Theory of electronic, atomic and molecular spectra. Fundamental laws of photometry, Beer-Lambert's Law, application and its deviation, limitation of Beer law, application of the law to single and multiple component analysis, measurement of equilibrium constant and rate constant by spectroscopy. Spectra of isolated chromophores, auxochromes, batho-chromic shift, hypsochromic shift, hyperchromic and hypochromic effect, effect of solvent on absorption spectra, molecular structure and infrared spectra. Instrumentation – Photometer, U.V.-Visible spectrophotometer – sources of U.V.-Visible radiations, collimating systems, monochromators, samples cells and following detectors-Photocell, Barrier layer cell, Phototube, Diode array, applications of U.V.-Visible spectroscopy in pharmacy and spectrophotometric titrations.</p> <p>b. Infrared Spectroscopy: Vibrational transitions, frequency – structure correlations, Infrared absorption bands, Instrumentation-IR spectro- meter – sources of IR, Collimating systems, monochromators, sample cells, sample handling in IR spectroscopy and detectors– Thermocouple, Golay Cells, Thermistor, Bolometer, Pyroelectric detector, Applications of IR in pharmacy.</p> <p>c. Fluorimetric Analysis: Theory, luminescence, factors affecting fluorescence, quenching. Instrumentation, Applications, fluorescent indicators, study of pharmaceutically important compounds estimated by fluorimetry.</p> <p>d. Flame Photometry: Theory, nebulisation, flame and flame temperature, interferences, flame spectrometric techniques and instrumentation and pharmaceutical applications.</p> <p>e. Atomic Absorption Spectrometry: Introduction, Theory, types of electrodes, instrumentation and applications</p>
Module 6	<p>Theoretical aspects, instrumentation, elements of interpretation of data/spectra and application of analytical techniques be discussed on:</p> <p>a. Atomic Emission Spectroscopy: Spectroscopic sources, atomic emission spectrometers, photographic and photoelectric detection.</p> <p>b. NMR &amp; ESR (introduction only): Introduction, theoretical aspects and applications.</p> <p>c. Mass Spectroscopy: (Introduction only) – Fragmentation, types of ions produced mass spectrum and applications.</p>

	d. Polarimetry: (Introduction only) – Introduction to optical rotatory dispersion, circular dichroism, polarimeter. e. X-RAY Diffraction: (Introduction only) – Theory, reciprocal lattice concept, diffraction patterns and applications. f. Thermal Analysis: Introduction, instrumentation, applications, and DSC and DTA.
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Reference Books:

Sl No	Title	Author(s)	Publisher	Year
1	Quantitative Chemical Analysis	A.I Vogel	Pearson education Delhi.	2009
2	Textbook of Pharm. Analysis by K.A.	Connors, John Wiley & Sons	New York, Brisbane, Singapore	2007
3	Spectroscopy by Silverstein	John & Wiley & Sons. Inc.,	Wiley publications	2014
4	Instrumental Analysis	Willard and Merritt	EWP, East West Press Ltd., Delhi/Madras	2009
5	Textbook of Drug Analysis	P.D. Sethi	CBS Publishers, Delhi	2019

### PHARMACEUTICAL ANALYSIS (PA-P)

COURSE CODE	22PY6302P	MODE	R	LTPS	0-0-3-0	PRE-REQUISITE	Nil
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#### Course Outcomes

CO#	CO Description	BTL	PO Mapping
CO1	To separate and identification of compounds by chromatography and spectroscopy	3	1, 2
CO2	Conduction of experiments using electro titrimetric methods and analysis of drugs by absorption spectroscopy	3	1, 2
CO3	To demonstrate the various analytical techniques and determination of concentrations by flame photometry	3	1, 2

#### Syllabus

Module 1	a. Separation and identification of Amino Acids by Paper Chromatography. b. Separation and identification of Sulpha drugs by TLC technique. c. Effect of pH and solvent on the UV spectrum of given compound. d. Comparison of the UV spectrum of a compound with that of its derivatives. e. Determination of dissociation constant of indicators using UV-Visible spectroscopy.
Module 2	1. Conductometric titration of mixture of acids with a strong base. 2. Potentiometric titration of a acid with a strong base. 3. Estimation of drugs by Fluorimetric technique. 4. Study of quenching effect in fluorimetry. 5. Colourimetric estimation of Supha drugs using BMR reagent. 6. Simultaneous estimation of two drugs present in given formulation. 7. Assay of Salicylic Acid by colourimetry. 8. Determination of chlorides and sulphates in calcium gluconate by nepheloturbidimetric method
Module 3	1. Determination of Na/K by Flame Photometry. 2. Determination of pKa using pH meter. Determination of specific rotation. 3. Comparison of the IR spectrum of a compound with that of its derivatives. 4. Demonstration of HPLC. 5. Demonstration of HPTLC. 6. Demonstration of GC-MS. 7. Demonstration of DSC. 8. Interpretation of NMR spectra of any one compound

#### Reference Books:

Sl No	Title	Author(s)	Publisher	Year
1	Quantitative Chemical Analysis	A.I Vogel	Pearson education Delhi.	2009
2	Textbook of Pharm. Analysis by K.A.	Connors, John Wiley & Sons	New York, Brisbane, Singapore	2007
3	Quantitative Drug Analysis	Garrot. D	Chapman & Hall Ltd., London	2008
4	Instrumental Analysis	Willard and Merritt	EWP, East West Press Ltd., Delhi/Madras	2009

## PHARMACOTHERAPEUTICS-II (THERAPY II-T)

COURSE CODE	22PY6303T	MODE	R	LTPS	3-1-0-0	PRE-REQUISITE	Therapy I-T
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### Course Outcomes

CO#	CO Description	BTL	PO Mapping
CO1	To understand basic guidelines of antibiotics, surgical prophylaxis and respiratory tract infectious diseases.	2	1,5,9
CO2	To understand the etiopathogenesis and pharmacotherapy of infectious diseases	2	1,5,9
CO3	To understand the etiopathogenesis and pharmacotherapy of musculoskeletal diseases	2	1,5,9
CO4	To understand the etiopathogenesis and pharmacotherapy of Renal system	2	1,5,9
CO5	To understand the etiopathogenesis and pharmacotherapy of Oncology	2	1,5,9
CO6	To understand the etiopathogenesis and pharmacotherapy of Dermatology	2	1,5,9

### Syllabus

Module 1	Infectious disease: Guidelines for the rational use of antibiotics and surgical Prophylaxis, Tuberculosis, Meningitis, Respiratory tract infections, Gastroenteritis, Endocarditis.
Module 2	Infectious disease : Septicemia, Urinary tract infections, Protozoal infection- Malaria, HIV & Opportunistic infections, Fungal infections, Viral infections, Gonorrhoea and Syphilis.
Module 3	Musculoskeletal disorders Rheumatoid arthritis, Osteoarthritis, Gout, Spondylitis, Systemic lupus erythematosus.
Module 4	Renal system Acute Renal Failure, Chronic Renal Failure, Renal Dialysis, Drug induced renal disorders
Module 5:	Oncology: Basic principles of Cancer therapy, General introduction to cancer chemotherapeutic agents, Chemotherapy of breast cancer, leukemia. Management of chemotherapy nausea and emesis.
Module 6:	Dermatology: Psoriasis, Scabies, Eczema, Impetigo

### Reference Books:

Sl No	Title	Author(s)	Publisher	Year
1	Pharmacotherapy: Pathophysiologic approach	A Joseph T. Dipiro et al. Appleton & Lange	Mc Graw Hill	2016
2	Clinical Pharmacy and Therapeutics	Eric T. Herfindal	Williams and Wilkins	1992

## PHARMACOTHERAPEUTICS-II (THERAPY II-P)

COURSE CODE	22PY6303P	MODE	R	LTPS	0-0-3-0	PRE-REQUISITE	Therapy I-P
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### Course Outcomes

CO#	CO Description	BTL	PO Mapping
CO1	To analyse Case studies on Infectious diseases, Respiratory diseases, Reproductive diseases.	3	1,5,9
CO2	To analyse Case studies on Musculoskeletal diseases and renal diseases	3	1,5,9
CO3	To analyse Case studies on cancer and dermatological diseases	3	1,5,9

### Syllabus

Module 1	Case study on rational use of antibiotics, Surgical prophylaxis, tuberculosis, Meningitis, Gastroenteritis, Septicaemia, Urinary tract infections, Malaria, HIV, Syphilis,
Module 2	Case study on Rheumatoid arthritis, Osteoarthritis, Gout, Spondylitis, Systemic lupus erythematosus, acute renal failure, Chronic renal failure, renal dialysis, drug induced renal disorders, drug interactions & contraindications interlinked with Renal.
Module 3	Case study on cancer therapy protocol, widely used chemotherapeutics agents, breast cancer, Leukaemia, management of chemotherapy nausea and emesis, psoriasis, Scabies, Eczema, Impetigo, drug induced skin allergies.

### Reference Books:

Sl No	Title	Author(s)	Publisher	Year
1	Pharmacotherapy: A Pathophysiologic approach	Joseph T. Dipiro et al. Appleton & Lange	Mc Graw Hill	2016
2	Clinical Pharmacy and Therapeutics	Eric T. Herfindal	Williams and Wilkins	1992
3	Applied Therapeutics: The clinical Use of Drugs.	Lloyd Young and Koda-Kimble MA	Williams and Wilkins	2018

## PHARMACEUTICAL JURISPRUDENCE (PJ)

COURSE CODE	22PY6304T	MODE	R	LTPS	2-0-0-0	PRE-REQUISITE	Nil
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### Course Outcomes

CO#	CO Description	BTL	PO Mapping
CO1	To Understand the importance of code of pharmaceutical ethics	2	1,8
CO2	To understand in detail about various sections of Drugs and Cosmetics Act	2	1,8
CO3	To understand the various provisions of Pharmacy Act 1948	2	1,8
CO4	To understand the various provisions of Medicinal and Toilet Preparation Act 1955	2	1,8
CO5	To understand the various provisions of NDPS Act 1985	2	1,8
CO6	To understand the various Indian pharmaceutical Acts and Laws	2	1,8

### Syllabus

Module 1	<b>Pharmaceutical Legislations</b> – A brief review. Principle and Significance of professional ethics. Critical study of the code of pharmaceutical ethics drafted by PCI.
Module 2	<b>Drugs and Cosmetics Act, 1940, and its rules 1945:</b> Objectives, Legal definition, Study of Schedule's with reference to Schedule B, C&C1, D, E1, F&F1, F2, F3, FF, G, H, J, K, M, N, P, R, V, W, X, Y. Sales, Import, labelling and packaging of Drugs and Cosmetics Provisions Relating to Indigenous Systems. Constitution and Functions of DTAB, DCC, CDL. Qualification and duties –Govt. analyst and Drugs Inspector.
Module 3	<b>Pharmacy Act –1948:</b> Objectives Legal Definitions, General Study, Constitution and Functions of State & Central Council, Registration & Procedure, ER.
Module 4	<b>Medicinal and Toilet Preparation Act –1955:</b> Objectives, Legal Definitions, Licensing, Bonded and Non-Bonded Laboratory, Warehousing, Manufacture of Ayurvedic, Homeopathic, Patent & Proprietary Preparations.
Module 5	<b>Narcotic Drugs and Psychotropic substances Act-1985</b> and Rules. Objectives, Legal Definitions, General Study, Constitution and Functions of narcotic & Psychotropic Consultative Committee, National Fund for Controlling the Drug Abuse, Prohibition, Control and regulations, Schedules to the Act.
Module 6	<ol style="list-style-type: none"> <li>1. Study of Salient Features of Drugs and magic remedies Act and its rules.</li> <li>2. Study of essential Commodities Act Relevant to drugs price control Order.</li> <li>3. Drug Price control Order &amp; National Drug Policy (Current).</li> <li>4. Prevention Of Cruelty to animals Act-1960.</li> <li>5. Patents &amp; design Act-1970.</li> <li>6. Brief study of prescription and Non-prescription Products.</li> </ol>

### Reference Books:

Sl No	Title	Author(s)	Publisher	Year
1	Forensic Pharmacy	B.Suresh	CBS Publishers & Distributors	2022
2	Text book of Forensic Pharmacy	R.M.Mithal	<b>Vikas Publishing House</b>	2016
3	Hand book of drug law	M.L.Mehra	Jain publishers	2023
4	A text book of Forensic Pharmacy	N.K.Jain	Vallabh Prakashan2	2017
5	Text book of Forensic Pharmacy	C.K.Kokate	Pharmamed Press	2012
6	Drugs and Cosmetics Act/Rules		Govt. of India publications	2023
7	Medicinal and Toilet preparations Act 1955		Govt. of India publications	2023
8	Narcotic drugs and psychotropic substances Act		Govt. of India publications	2023
9	Drugs and Magic Remedies Act		Govt. of India publications	2023



### MEDICINAL CHEMISTRY (MC-T)

COURSE CODE	22PY6305T	MODE	R	LTPS	3-1-0-0	PRE-REQUISITE	Nil
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#### Course Outcomes

CO	Course outcome	BTL	PO Mapping
CO 1	To understand the different modern techniques of drug design and their importance	2	1
CO 2	To know the metabolism, adverse effect, and therapeutic activity of anti-infective, anti-fungal agents	2	1
CO 3	To understand the concept of microbial diseases and different anti-viral agents	2	1
CO 4	To explore the mechanisms involved in the cardiac diseases	2	1
CO 5	To understand the chemistry involved in anti-diabetic and thyroid drugs	2	1
CO 6	To discover the drugs involved in steroids and thyroid agents	2	1

#### Syllabus

	Topics
Module 1	<p>Modern concept of rational drug design: A brief introduction to Quantitative Structure Activity Relationship (QSAR), prodrug, combinatorial chemistry, and computer aided drug design (CADD) and concept of antisense molecules.</p> <p><b>Describe the below mentioned topics (CO II to CO VI) as follows:</b> Structural Activity Relationship studies (SAR), Mechanism of action, Synthesis of some important compounds, chemical nomenclature, brand names of important marketed products and their side effects.</p>
Module 2	<ol style="list-style-type: none"> <li>1. Local anti-infective agents: Classification of Drugs, Mechanism of Actions, SAR, Synthesis of important molecules</li> <li>2. Preservatives: Classification of Drugs, Mechanism of Actions, SAR, Synthesis of important molecules</li> <li>3. Antifungal agents: Classification of Drugs, Mechanism of Actions, SAR, Synthesis of important molecules</li> <li>4. Urinary tract anti-infectives: Classification of Drugs, Mechanism of Actions, SAR, Synthesis of important molecules</li> <li>5. Antitubercular agents: Classification of Drugs, Mechanism of Actions, SAR, Synthesis of important molecules</li> </ol>
Module 3	<ol style="list-style-type: none"> <li>1. Antiviral agents and Anti-AIDS agents: Classification of Drugs, Mechanism of Actions, SAR, Synthesis of important molecules</li> <li>2. Antiprotozoal agents: Classification of Drugs, Mechanism of Actions, SAR, Synthesis of important molecules</li> <li>3. Anthelmintics: Classification of Drugs, Mechanism of Actions, SAR, Synthesis of important molecules</li> <li>4. Anti-scabies and Ant pedicular agents: Classification of Drugs, Mechanism of Actions, SAR, Synthesis of important molecules</li> <li>5. Sulphonamides and sulphones: Classification of Drugs, Mechanism of Actions, SAR, Synthesis of important molecules</li> <li>6. Antimalarials: Classification of Drugs, Mechanism of Actions, SAR, Synthesis of important molecules</li> </ol>

Module 4	<ol style="list-style-type: none"> <li>1. Antibiotics: Classification of Drugs, Mechanism of Actions, SAR, Synthesis of important molecules</li> <li>2. Antineoplastic agents: Classification of Drugs, Mechanism of Actions, SAR, Synthesis of important molecules</li> <li>3. Antihypertensive agents: Classification of Drugs, Mechanism of Actions, SAR, Synthesis of important molecules</li> <li>4. Antianginal agents and vasodilators: Classification of Drugs, Mechanism of Actions, SAR, Synthesis of important molecules</li> <li>5. Antiarrhythmic agents: Classification of Drugs, Mechanism of Actions, SAR, Synthesis of important molecules</li> </ol>
Module 5	<ol style="list-style-type: none"> <li>1. Antihyperlipidemic agents: Classification of Drugs, Mechanism of Actions, SAR, Synthesis of important molecules</li> <li>2. Coagulants and Anticoagulants: Classification of Drugs, Mechanism of Actions, SAR, Synthesis of important molecules</li> <li>3. Endocrine: Classification of Drugs, Mechanism of Actions, SAR, Synthesis of important molecules</li> <li>4. Hypoglycemic agents: Classification of Drugs, Mechanism of Actions, SAR, Synthesis of important molecules</li> </ol>
Module 6	<ol style="list-style-type: none"> <li>1. Thyroid and Antithyroid agents: Classification of Drugs, Mechanism of Actions, SAR, Synthesis of important molecules</li> <li>2. Diuretics: Classification of Drugs, Mechanism of Actions, SAR, Synthesis of important molecules</li> <li>3. Diagnostic agents: Classification of Drugs, Mechanism of Actions, SAR, Synthesis of important molecules</li> <li>4. Steroidal Hormones and Adrenocorticoids: Classification of Drugs, Mechanism of Actions, SAR, Synthesis of important molecules</li> </ol>

**Reference Books:**

Sl No	Title	Author(s)	Publisher	Year
1	Organic, Medicinal and Pharmaceutical Chemistry	Wilson and Gisvold's	Lippincott-Raven Publishers-New York, Philadelphia	2015
2	Principles of Medicinal Chemistry	William.O.Foye	B.I. Waverly Pvt. Ltd., New Delhi	2000
3	A Textbook of Medicinal Chemistry	Vol. I and II by Surendra N. Pandeya	S.G. Publisher,	2010

### MEDICINAL CHEMISTRY (MC-P)

COURSE CODE	22PY6305P	MODE	R	LTPS	0-0-3-0	PRE-REQUISITE	Nil
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#### Course Outcomes

CO #	Course Outcome	BTL	PO Mapping
CO1	Synthesis compounds of medicinal interest and conduct monograph analysis of pharmaceutical compounds	3	1
CO2	Determine the amount of drug present in an unknown solution and estimate the purity of drugs	2	1
CO3	Determine partition coefficient and dissociation constant of a given compound	3	1

#### Syllabus

	Topics
Module 1	Preparation of medicinally important compounds or intermediates required for synthesis of drugs. Monograph analysis of important drugs.
Module 2	Assays of important drugs from the course content.
Module 3	Determination of partition coefficients, dissociation constants and molar refractivity of compounds for QSAR analysis

#### Reference Books:

Sl No	Title	Author(s)	Publisher	Year
1	Organic, Medicinal and Pharmaceutical Chemistry	Wilson and Gisvold's	Lippincott-Raven Publishers-New York, Philadelphia	2015
2	Principles of Medicinal Chemistry	William.O.Foye	B.I. Waverly Pvt. Ltd., New Delhi	2000
3	A Textbook of Medicinal Chemistry	Vol. I and II by Surendra N. Pandeya	S.G. Publisher,	2010

### PHARMACEUTICAL FORMULATIONS (PF-T)

COURSE CODE	22PY6306T	MODE	R	LTPS	2-1-0-0	PRE-REQUISITE	PC-T
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#### Course Outcomes

CO#	CO Description	BTL	PO Mapping
CO1	To understand the significance of formulation, preparation and evaluation of tablets	2	1
CO2	To understand the significance of formulation, preparation and evaluation of capsules	2	1
CO3	To understand the significance of formulation, preparation and evaluation of liquid orals	2	1
CO4	To understand the significance of formulation, preparation and evaluation of parenteral Preparations	2	1
CO5	To understand the manufacturing methods of semisolid, and ophthalmic products	2	1
CO6	To understand the concepts of Novel Local drug delivery system	2	1

#### Syllabus

Module 1	Formulation of different types of tablets, tablet excipients, granulation techniques quality control and evaluation of tablets. Tablet coating, Type of coating, quality control tests for coated tablet.
Module 2	Production and filling of hard gelatin capsules, Raw material for shell, finishing, quality control tests for capsules. Production and filling of soft gelatin capsules, quality control tests for soft gelatin capsules.
Module 3	Formulation and evaluation of suspensions, emulsions and solutions.
Module 4	Introduction and classification Factors affecting absorption and anatomy of skin Packaging storage and labelling, Ointments Types of Ointment Base Preparation of ointment, Jellies Types of jellies Formulation of jellies Suppositories, Method of preparation, Types Packaging
Module 5	Introduction and classification Factors affecting absorption and anatomy of skin Packaging storage and labelling, Ointments Types of Ointment Base Preparation of ointment, Jellies Types of jellies Formulation of jellies Suppositories, Method of preparation, Types Packaging
Module 6	Controlled and Novel drug delivery systems of with available examples, viz. parenteral, transdermal, buccal, rectal, nasal, implants, ocular

Reference Books:

Sl No	Title	Author(s)	Publisher	Year
1	Pharmaceutical dosage forms - Tablets, volume 1 -3	Larry L Augsburger, Stephen W Hoag	Informa Healthcare	2008
2	Pharmaceutical dosage forms - Capsules	Larry L Augsburger, Stephen W Hoag	Informa Healthcare	2018
3	Pharmaceutical dosage forms - Parenterals volume1-2	Lieberman & Lachman, Kenneth E. Avis	Informa Healthcare	1992
4	Remington: The Science and Practice of Pharmacy, 20th edition Pharmaceutical Science (RPS)	Adeboye Adejare	Elsevier Academic Press	2021
5	Pharmaceutics- The science of dosage form design by M.E.Aulton	Aulton	Elsevier Academic Press	2018

## PHARMACEUTICAL FORMULATIONS (PF-P)

COURSE CODE	22PY6306P	MODE	R	LTPS	0-0-3-0	PRE-REQUISITE	PC-P
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### Course Outcomes

CO#	CO Description	BTL	PO Mapping
CO1	Prepare formulations of tablets and capsules, coating of the tablets.	3	1
CO2	To prepare various parenteral products, different dosage forms by performing quality control tests as per the batch formula	3	1
CO3	prepare and evaluate various semi-solid preparations, cosmetics such as lipstick, cold cream and shampoo	3	1

### Syllabus

Module 1	Tablet compression by wet granulation method Tablet compression by direct compression method Formulation of soluble tablets Formulation of Chewable tablets Formulation of tetracycline hard gelatin capsule Quality control test of tablets Quality control test of capsules Demonstration of Tablet coating
Module 2	Formulation of ascorbic acid injection Formulation of calcium gluconate injection Formulation of sodium chloride infusion Formulation of Dextrose and sodium chloride injection/infusion Quality control test of parenterals Formulation of paracetamol syrup Formulation of aluminum hydroxide gel suspension
Module 3	Formulation of salicylic acid and Benzoic acid ointment Formulation of Diclofenac gel Formulation of Lipstick Formulation of cold cream Formulation of vanishing cream Formulation of clear liquid shampoo Formulation of tooth paste Formulation of tooth powder

### Reference Books:

Sl No	Title	Author(s)	Publisher	Year
1	Pharmaceutical dosage forms - Tablets, volume 1 -3	Larry L Augsburger, Stephen W Hoag	Informa Healthcare	2008
2	Pharmaceutical dosage forms - Capsules	Larry L Augsburger, Stephen W Hoag	Informa Healthcare	2018
3	Pharmaceutical dosage forms - Parenterals volume1-2	Liberman & Lachman, Kenneth E. Avis	Informa Healthcare	1992
4	Remington: The Science and Practice of Pharmacy, 20th edition Pharmaceutical Science (RPS)	Adeboye Adejare	Elsevier Academic Press	2021

### Pharmacotherapeutics-III (Therapy III-T)

COURSE CODE	22PY6401T	MODE	R	LTPS	3-1-0-0	PRE-REQUISITE	Therapy II-T
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#### Course Outcomes

CO#	CO Description	BTL	PO Mapping
CO1	To understand the Etiopathogenesis and pharmacotherapy of diseases associated with gastrointestinal system	2	1,5,9
CO2	To understand the Etiopathogenesis and pharmacotherapy of diseases associated with gastrointestinal system : Liver	2	1,5,9
CO3	To understand the Etiopathogenesis and pharmacotherapy of diseases associated with haematological system	2	1,5,9
CO4	To understand the Etiopathogenesis and pharmacotherapy of diseases associated with nervous system	2	1,5,9
CO5	To understand the Etiopathogenesis and pharmacotherapy of Psychiatry disorders	2	1,5,9
CO6	To understand the concepts of diseases associated with pain and evidence-based medicine	2	1,5,9

#### Syllabus

Module 1	Etiopathogenesis and pharmacotherapy of Peptic ulcer disease, Gastro Esophageal Reflux Disease, Inflammatory bowel disease.
Module 2	Etiopathogenesis and pharmacotherapy of Liver disorders - Alcoholic liver disease, Viral hepatitis including jaundice, and Drug-induced liver disorders.
Module 3	Etiopathogenesis and pharmacotherapy of Haematological system: Anaemias, Venous thromboembolism, Drug-induced blood disorders.
Module 4	Etiopathogenesis and pharmacotherapy of Nervous system: Epilepsy, Parkinsonism, Stroke, Alzheimer's disease.
Module 5	Etiopathogenesis and pharmacotherapy of Psychiatry disorders: Schizophrenia, Affective disorders, anxiety disorders, sleep disorders, obsessive-compulsive disorders.
Module 6	Pain management includes Pain pathways, neuralgias, and headaches. Evidence-Based Medicine

#### Reference Books:

Sl No	Title	Author(s)	Publisher	Year
1	Pathologic basis of disease	Robins SL	W.B.Saunders	2020
2	Pathology and therapeutics for Pharmacists: A Basis for Clinical Pharmacy Practice	Greene and Harris	Chapman and Hall	1992
3	Clinical Pharmacy and Therapeutics	Eric T. Herfindal	Williams and Wilkins	1992
4	Applied Therapeutics: The clinical Use of Drugs.	Lloyd Young and Koda-Kimble MA	Williams and Wilkins	2018
5	Avery's Drug Treatment	Trevor & holford	Adis International Limited	1997

### PHARMACOTHERAPEUTICS-III (THERAPY III-P)

COURSE CODE	22PY6401P	MODE	R	LTPS	0-0-3-0	PRE-REQUISITE	Therapy II-P
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#### Course Outcomes

CO#	CO Description	BTL	PO Mapping
CO1	To analyse Case studies on gastrointestinal system.	3	1,5,9
CO2	To analyse Case studies on the haematological system and nervous system.	3	1,5,9
CO3	To analyse Case studies on Psychiatry disorders and evidence-based medicine.	3	1,5,9

#### Syllabus

Module 1	Case studies on Gastrointestinal diseases
Module 2	Case studies on the haematological system and nervous system.
Module 3	Case studies on Psychiatry disorders and evidence-based medicine.

#### Reference Books:

Sl No	Title	Author(s)	Publisher	Year
1	Pharmacotherapy: A Pathophysiologic approach	Joseph T. Dipiro et al. Appleton & Lange	Mc Graw Hill	2016
2	Clinical Pharmacy and Therapeutics	Eric T. Herfindal	Williams and Wilkins	1992
3	Applied Therapeutics: The clinical Use of Drugs.	Lloyd Young and Koda-Kimble MA	Williams and Wilkins	2018



### HOSPITAL PHARMACY (HP-T)

COURSE CODE	22PY6402T	MODE	R	LTPS	2-1-0-0	PRE-REQUISITE	Nil
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#### Course Outcomes

CO#	CO Description	BTL	PO Mapping
CO1	To know the organizational structure and functions of a hospital	2	1
CO2	To gain the knowledge on hospital drug policy	2	1
CO3	To understand the hospital pharmacy services	2	1
CO4	To know the manufacturing practices of various formulations in hospital set up	2	1
CO5	To understand the professional development programs	2	1
CO6	To understand the practice-based research methods	2	1

#### Syllabus

Module 1	Hospital - its organization and functions, Hospital Pharmacy-Organization and management 1. Organizational structure-Staff, Infrastructure & work load statistics 2. Management of materials and finance 3. Roles & responsibilities of hospital pharmacist
Module 2	<b>The Budget</b> – Preparation and implementation <b>Hospital drug policy</b> 1. Pharmacy and Therapeutic committee (PTC) 2. Hospital formulary 3. Hospital committees a. Infection committee b. Research and ethical committee 4. Developing therapeutic guidelines 5. Hospital pharmacy communication – Newsletter
Module 3	<b>Hospital pharmacy services</b> 1. Procurement & warehousing of drugs and Pharmaceuticals 2. Inventory control: Definition, various methods of Inventory Control ABC, VED, EOQ, Lead time, safety stock 3. Drug distribution in the hospital a. Individual prescription method b. Floor stock method c. Unit dose drug distribution method d. Distribution of Narcotic and other controlled substances e. Central sterile supply services – Role of pharmacist
Module 4	<b>Manufacture of Pharmaceutical preparations</b> 1. Sterile formulations – large and small volume parenterals 2. Manufacture of Ointments, Liquids, and creams 3. Manufacturing of Tablets, granules, capsules, and powders 4. Total parenteral nutrition Continuing professional development programs, Education and training, Radio Pharmaceuticals – Handling and packaging Professional Relations and practices of hospital pharmacist

#### Reference Books:

Sl No	Title	Author(s)	Publisher	Year
1	Hospital Pharmacy	Martin Stephens	Pharmaceutical Press	2001

### HOSPITAL PHARMACY (HP-P)

COURSE CODE	22PY6402P	MODE	R	LTPS	0-0-3-0	PRE-REQUISITE	Nil
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#### Course Outcomes

CO#	Course Outcome	PO	BTL
CO1	To analyse and report different drug interactions in a given case study and to perform inventory analysis	1.4	3
CO2	To prepare various parenteral preparations and powders	1.4	2
CO3	To analyse the case and answer the related drug information queries posted by healthcare professionals and patients	1.4	2

#### Syllabus

Module 1	Assessment of drug interactions in the given prescriptions To perform inventory analysis
Module 2	Manufacture of parenteral formulations and powders
Module 3	Drug information queries

#### Reference Books:

Sl No	Title	Author(s)	Publisher	Year
1	Hospital Pharmacy	Martin Stephens	Pharmaceutical Press	2001

### CLINICAL PHARMACY (CLP-T)

COURSE CODE	22PY6403T	MODE	R	LTPS	3-1-0-0	PRE-REQUISITE	Nil
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#### Course Outcomes

CO#	CO Description	BTL	PO Mapping
CO1	To understand the role of a clinical pharmacist in a pharmacy	2	1,2
CO2	To understand the process of obtaining patients history and evaluation of drug therapy based on the history	2	1,2
CO3	To gain the knowledge about various clinical laboratory tests to diagnose diseases.	2	1,2
CO4	To understand the working of drug and poison information center.	2	1,2
CO5	To understand the role of pharmacovigilance in ADR monitoring	2	1,2
CO6	To gain the knowledge on communication skills for better interaction with patients	2	1,2

#### Syllabus

Module 1	Definitions, development and scope of clinical pharmacy, Introduction to daily activities of a clinical pharmacist: Drug therapy monitoring (medication chart review, clinical review, pharmacist interventions), Ward round participation, Adverse drug reaction management, Drug information and poisons information, Medication history, Patient counselling, Drug utilisation evaluation (DUE) and review (DUR), Quality assurance of clinical pharmacy services.
Module 2	Patient data analysis: The patient's case history, its structure and use in evaluation of drug therapy & understanding common medical abbreviations and terminologies used in clinical practices.
Module 3	Clinical laboratory tests used in the evaluation of disease states, and interpretation of test results: Haematological, Liver function, Renal function, thyroid function tests, Tests associated with cardiac disorders, Fluid and electrolyte balance, Microbiological culture sensitivity tests, Pulmonary Function Tests.
Module 4	Drug & Poison information: Introduction to drug information resources available. Systematic approach in answering DI queries. Critical evaluation of drug information and literature. Preparation of written and verbal reports. Establishing a Drug Information Centre. Poisons information- organization & information resources.
Module 5	Pharmacovigilance: Scope, definition and aims of pharmacovigilance. Adverse drug reactions - Classification, mechanism, predisposing factors, causality assessment [different scales used]. Reporting, evaluation, monitoring, preventing & management of ADRs. Role of pharmacist in management of ADR.
Module 6	Communication skills, including patient counselling techniques, medication history interview, presentation of cases. Pharmaceutical care concepts. Critical evaluation of biomedical literature. Medication errors

Reference Books:

Sl No	Title	Author(s)	Publisher	Year
1	Australian drug information - Procedure manual.	The Society of Hospital Pharmacists of Australia.	The Society of Hospital Pharmacists of Australia.	1996
2	Clinical Pharmacokinetics	Rowland and Tozer	Williams and Wilkins	2011
3	Pharmaceutical statistics. Practical and clinical applications	Sanford Bolton, Marcel Dekker, Inc.	CRC Press	2010

### CLINICAL PHARMACY (CLP-P)

COURSE CODE	22PY6403P	MODE	R	LTPS	0-0-3-0	PRE-REQUISITE	Nil
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#### Course Outcomes

CO#	CO Description	BTL	PO Mapping
CO1	To analyse the case and answer the related drug information queries posted by healthcare professionals and patients.	1,2	1,5,9
CO2	To analyse medication counselling of patients and laboratory investigations.	1,2	1,5,9
CO3	To analyse conduct interview to elicit the patient past medication history and ADR analysis.	1,2	1,5,9

#### Syllabus

Module 1	Drug information queries posted by healthcare professionals and patients.
Module 2	medication counselling for patients and laboratory investigations.
Module 3	conduct interview to elicit the patient past medication history and ADR analysis.

#### Reference Books:

Sl No	Title	Author(s)	Publisher	Year
1	Australian drug information - Procedure manual.	The Society of Hospital Pharmacists of Australia.	The Society of Hospital Pharmacists of Australia.	1996
2	Clinical Pharmacokinetics	Rowland and Tozer	Williams and Wilkins	2011
3	Pharmaceutical statistics. Practical and clinical applications	Sanford Bolton, Marcel Dekker, Inc.	CRC Press	2010

## BIO STATISTICS AND RESEARCH METHODOLOGY (BSRM)

COURSE CODE	22PY6404T	MODE	R	LTPS	2-1-0-0	PRE-REQUISITE	NIL
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### Course Outcomes

CO#	CO Description	BTL	PO Mapping
CO1	To understand the concept of clinical study designs and case studies	2	1, 2
CO2	To understand the methods used to determine the sample size for a study.	2	1, 2
CO3	To understand the basic concepts of biostatistics	2	1, 2
CO4	To understand the basics of hypothesis testing	2	1, 2
CO5	To understand the statistical methods used in epidemiology	2	1, 2
CO6	To understand the computer applications in pharmacy	2	1, 2

### Syllabus

Module 1	Types of clinical study designs: Case studies, observational studies, interventional studies, Designing the methodology Sample size determination and Power of a study, Determination of sample size for simple comparative experiments,
Module 2	Introduction, Types of data distribution, Measures describing the central tendency distributions- average, median, mode, Measurement of the spread of data-range, variation of mean, standard deviation, variance
Module 3	Construction and labeling of graphs, histogram, pie charts, scatter plots, semilogarithmic plots
Module 4	Null hypothesis, level of significance, power of test, P value, statistical estimation of confidence intervals. Level of significance (Parametric data)- students t test (paired and unpaired), chi Square test, Analysis of Variance (one-way and two-way) Level of significance (Non-parametric data)- Sign test, Wilcoxon's signed rank test, Wilcoxon rank sum test, Mann Whitney U test, Kruskal-Wallis test (one way ANOVA)
Module 5	Linear regression and correlation- Introduction, Pearson's and Spearman's correlation and correlation co-efficient
Module 6	Computer System in Hospital Pharmacy: Patterns of Computer use in Hospital Pharmacy – Patient record database management, Medication order entry – Drug labels and list – Intravenous solution and admixture, patient medication profiles, Inventory control, Management report & Statistics.

### Reference Books:

Sl No	Title	Author(s)	Publisher	Year
1	Pharmaceutical statistics- practical and clinical applications,	Sanford Bolton	3rd edition, publisher Marcel Dekker Inc	2015
2	Drug Information	Patrick M Malone	McGraw Hill	2017
3	Pharmaceutical statistics- Practical and clinical applications	Sanford Bolton	Marcel Dekker Inc	2013
4	Fundamental of Statistics	S.C.Gupth	Himalaya Publishing House-	2014
5	Design and Analysis of Experiments –,R	Pannervselvam,	PHILearning Private Limited	2015

## BIO PHARMACEUTICS AND PHARMACOKINETICS (BPPK-T)

COURSE CODE	22PY6405T	MODE	R	LTPS	3-1-0-0	PRE-REQUISITE	Nil
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### Course Outcomes

CO#	CO Description	BTL	PO Mapping
CO1	To Understand the concepts of biopharmaceutics	2	1,2
CO2	To Understand the process of metabolism and excretion	2	1,2
CO3	To Understand the concept of pharmacokinetics with the use of one compartment open model.	2	1,2
CO4	To Understand the concept of pharmacokinetics with the use of multi compartment analysis	2	1,2
CO5	To understand the Non-linear and non-compartmental kinetics	2	1,2
CO6	To Understand the concepts of bioavailability and bioequivalence	2	1,2

### Syllabus

Module 1	<b>Biopharmaceutics</b> Introduction to Biopharmaceutics 1. Absorption 2. Distribution
Module 2	1. Metabolism 2. Elimination
Module 3	<b>Pharmacokinetics:</b> Introduction to Pharmacokinetics. 1. Mathematical model 2. Drug levels in blood. 3. Pharmacokinetic model 4. Compartment models 5. Pharmacokinetic study. <b>One compartment open model.</b> 1. Intravenous Injection (Bolus) 2. Intravenous infusion
Module 4	<b>Multicompartment models.</b> 1. Two compartment open model. 2. IV bolus, IV infusion and oral administration <b>Multiple – Dosage Regimens.</b> 1. Repetitive Intravenous injections – One Compartment Open Model 2. Repetitive Extravascular dosing – One Compartment Open model 3. Multiple Dose Regimen – Two Compartment Open Model
Module 5	<b>Nonlinear Pharmacokinetics.</b> 1. Introduction 2. Factors causing non-linearity. 3. Michaelis-menton method of estimating parameters. <b>Noncompartmental Pharmacokinetics.</b> 1. Statistical Moment Theory. 2. MRT for various compartment models. 3. Physiological Pharmacokinetic model
Module 6	<b>Bioavailability and Bioequivalence.</b> 1. Introduction. 2. Bioavailability study protocol. 3. Methods of Assessment of Bioavailability

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Reference Books:

Sl No	Title	Author(s)	Publisher	Year
1	Dissolution, Bioavailability and Bioequivalence	Abdou H.M, Mack,	Pennsylvania	2008
2	Biopharmaceutics and Clinical Pharmacokinetics	Robert F. Notari, Marcel Dekker Inn, New York and Basel	New York and Basel	2018
3	Remington's Pharmaceutical Sciences Mack	Mack	Pennsylvania	1992
4	Applied Biopharmaceutics and Pharmacokinetics	Leon Shargel and Andrew B.C. YU	Prentice-Hall International edition, USA.	2016
5	Biopharmaceutics and Pharmacokinetics	V. Venkateswarlu	Pharma Book Syndicate	2020



## BIO PHARMACEUTICS AND PHARMACOKINETICS (BPPK-P)

COURSE CODE	22PY6405P	MODE	R	LTPS	0-0-3-0	PRE-REQUISITE	Nil
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### Course Outcomes

CO#	CO Description	BTL	PO Mapping
CO1	Compare the <i>in-vitro</i> drug release profile of different marketed products, Perform the solubility enhancement techniques for improvement of drug release of poorly water-soluble drugs.	3	1,2
CO2	Estimate the bioavailability (absolute and relative) and bioequivalence from the given clinical data	3	1,2
CO3	Calculate the drug content in blood sample using Area Under Curve approach, various pharmacokinetic parameters from the given clinical data, Conduct planned experiments and prepare laboratory report in a standard format	3	1,2

### Syllabus

Module 1	Improvement of dissolution characteristics of slightly soluble drugs by some methods. Comparison of dissolution studies of two different marketed products of same drug. Influence of polymorphism on solubility and dissolution. In vitro absorption studies
Module 2	Protein binding studies of a highly protein bound drug and poorly protein bound drug. Extent of plasma-protein binding studies on the same drug (i.e. highly and poorly protein bound drug) at different concentrations in respect of constant time Bioavailability studies of some commonly used drugs on animal/human model Effect on contact time on the plasma protein binding of drugs Bioequivalency studies on the different drugs marketed. (eg) Tetracycline, Sulphamethoxazole, Trimethoprim, Aspirin etc., on animals and human volunteers
Module 3	Calculation of $K_a$ , $K_e$ , $t_{1/2}$ , $C_{max}$ , AUC, AUMC, MRT etc. from blood profile data Calculation of bioavailability from urinary excretion data for two drugs Calculation of AUC and bioequivalence from the given data for two drugs. Absorption studies in animal inverted intestine using various drugs. Studying metabolic pathways for different drugs based on elimination kinetics data. Calculation of elimination half-life for different drugs by using urinary elimination data and blood level data Determination of renal clearance.

### Reference Books:

Sl No	Title	Author(s)	Publisher	Year
1	Pharmaceutical dosage forms - Tablets, volume 1 -3	Larry L Augsburger, Stephen W Hoag	Informa Healthcare	2008
2	Pharmaceutical dosage forms - Capsules	Larry L Augsburger, Stephen W Hoag	Informa Healthcare	2018
3	Pharmaceutical dosage forms - Parenterals volume 1-2	Liberman & Lachman, Kenneth E. Avis	Informa Healthcare	1992
4	Remington: The Science and Practice of Pharmacy, 20th edition Pharmaceutical Science (RPS)	Adeboye Adejare	Elsevier Academic Press	2021
5	Pharmaceutics- The science of dosage form design by M.E.Aulton	Aulton	Elsevier Academic Press	2018

## CLINICAL TOXICOLOGY (CT)

COURSE CODE	22PY6406T	MODE	R	LTPS	2-1-0-0	PRE-REQUISITE	Nil
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### Course Outcomes

CO#	CO Description	BTL	PO Mapping
CO1	Understand the mechanism of action of common poisons and antidotes	2	2
CO2	Understand the concepts of Toxicokinetics	2	2
CO3	To understand the etiology of acute poisoning and its management by various therapeutic agents	2	2
CO4	To understand the etiology of chronic poisoning and its management by various therapeutic agents	2	2
CO5	To understand the poisoning caused by plant and animal sources	2	2
CO6	To understand the etiology and management of substance abuse	2	2

### Syllabus

Module 1	<ol style="list-style-type: none"> <li>General principles involved in the management of poisoning</li> <li>Antidotes and the clinical applications.</li> <li>Supportive care in clinical Toxicology.</li> <li>Gut Decontamination.</li> <li>Elimination Enhancement</li> </ol>
Module 2	<ol style="list-style-type: none"> <li>Toxicokinetics</li> </ol>
Module 3	<p><b>Clinical symptoms and management of acute poisoning with the following agents –</b>  Pesticide poisoning: organophosphorus compounds, carbamates, organochlorines, pyrethroids.</p> <ol style="list-style-type: none"> <li>Opiates overdose.</li> <li>Antidepressants</li> <li>Barbiturates and benzodiazepines.</li> <li>Alcohol: ethanol, methanol.</li> <li>Paracetamol and salicylates.</li> </ol> <p>Non-steroidal anti-inflammatory drugs</p>
Module 4	<ol style="list-style-type: none"> <li>Hydrocarbons: Petroleum products and PEG.</li> <li>Caustics: inorganic acids and alkali.</li> </ol> <p><b>Radiation poisoning</b></p> <ol style="list-style-type: none"> <li>Clinical symptoms and management of chronic poisoning with the following agents – Heavy metals: Arsenic, lead, mercury, iron, copper</li> </ol>
Module 5	<ol style="list-style-type: none"> <li>Venomous snake bites: Families of venomous snakes, clinical effects of venoms, general management as first aid, early manifestations, complications and snake bite injuries.</li> <li>Plants poisoning. Mushrooms, Mycotoxins.</li> <li>Food poisonings</li> <li>Envenomations – Arthropod bites and stings</li> </ol>
Module 6	<p><b>Substance abuse:</b>  Signs and symptoms of substance abuse and treatment of dependence</p> <ol style="list-style-type: none"> <li>CNS stimulants: amphetamine</li> <li>Opioids</li> <li>CNS depressants</li> <li>Hallucinogens: LSD</li> <li>Cannabis group</li> <li>Tobacco</li> </ol>

Reference Books:

Sl No	Title	Author(s)	Publisher	Year
1	Medical Toxicology – Diagnosis And Treatment of Poisoning	Matthew J Ellenhorn. Ellenhorns	Williams and Willkins publication	1996
2	Handbook of Forensic Medicine and Toxicology	V V Pillay	Paras Publication	2003

## CLINICAL RESEARCH (CR)

COURSE CODE	22PY6501T	MODE	R	LTPS	3-1-0-0	PRE-REQUISITE	Nil
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### Course Outcomes

CO#	CO Description	BTL	PO Mapping
CO1	To understand the various approaches for a new drug discovery	2	2
CO2	To understand the principles and phases in clinical trial of drug	2	2
CO3	To understand the various guidelines associated with clinical trials	2	2
CO4	To understand the various regulatory requirements in India and other countries to conduct clinical trials	2	2
CO5	Recognise differing roles and obligations of the Investigator, Sponsor and Institutional Review Board	2	2
CO6	To understand the various documents associated with clinical trials	2	2

### Syllabus

Module 1	<b>Drug development process: Introduction Various Approaches to drug discovery</b> <ol style="list-style-type: none"> <li>1. Pharmacological</li> <li>2. Toxicological</li> <li>3. IND Application</li> <li>4. Drug characterization</li> <li>5. Dosage form</li> </ol>
Module 2	<b>Introduction to Clinical trials</b> <ol style="list-style-type: none"> <li>1. Various phases of clinical trial.</li> <li>2. Methods of post marketing surveillance</li> <li>3. Abbreviated New Drug Application submission.</li> </ol>
Module 3	<ol style="list-style-type: none"> <li>1. Good Clinical Practice – ICH, GCP, Central drug standard control organisation (CDSCO) guidelines</li> <li>2. Challenges in the implementation of guidelines</li> <li>3. Ethical guidelines in Clinical Research</li> <li>4. Composition, responsibilities, procedures of IRB / IEC</li> </ol>
Module 4	Overview of regulatory environment in USA, Europe and India
Module 5	<b>Role and responsibilities of clinical trial personnel as per ICH GCP</b> <ol style="list-style-type: none"> <li>1. Sponsor</li> <li>2. Investigators</li> <li>3. Clinical research associate</li> <li>4. Auditors</li> <li>5. Contract research coordinators</li> <li>6. Regulatory authority</li> </ol>
Module 6	Designing of clinical study documents (protocol, CRF, ICF, PIC with assignment) Informed consent Process Data management and its components Safety monitoring in clinical trials.

Reference Books:

Sl No	Title	Author(s)	Publisher	Year
1	Central Drugs Standard Control Organization. Good Clinical Practices-Guidelines for Clinical Trials on Pharmaceutical Products in India	Ministry of Health: New Delhi	Ministry of Health: New Delhi	2001
2	Textbook of Clinical Trials	David Machin, Simon Day and Sylvan Green	John Wiley and Sons.	March 2005
3	Clinical Data Management	R K Rondels, S A Varley, C F Webbs	Wiley Publications	2000

## PHARMACOEPIDEMIOLOGY AND PHARMACOECONOMICS (PE&PE)

COURSE CODE	22PY6502T	MODE	R	LTPS	3-1-0-0	PRE-REQUISITE	Nil
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### Course Outcomes

CO#	Course Outcome	PO	BTL
CO1	Understand the scope, need, origin and evaluation of Pharmacoepidemiology	1,2	2
CO2	To understand the importance of Measurement of outcomes in Pharmacoepidemiology	1,2	2
CO3	Recommend suitable method for measuring the outcome of Pharmacoepidemiology for a disease	1,2	2
CO4	Suggest an appropriate Pharmacoepidemiological method for a given drug and address the risks associated with Pharmacoepidemiological study	1,2	2
CO5	Understand the basic principles, role and relevance of Pharmacoeconomics in the development of a new drug	1,2	2
CO6	Identify and justify an appropriate evaluation method for Pharmacoeconomics study of a disease	1,2	2

### Syllabus

Module 1	Pharmacoepidemiology: Definition and scope, Origin and evaluation of pharmacoepidemiology need for pharmacoepidemiology, aims and applications. Measurement of outcomes in Pharmacoepidemiology: Outcome measure and drug use measures, Prevalence, incidence and incidence rate. Monetary units, number of prescriptions, units of drugs dispensed, defined daily doses and prescribed daily doses, medication adherence measurement.
Module 2	Concept of risk in Pharmacoepidemiology: Measurement of risk, attributable risk and relative risk, time-risk relationship and odds ratio. Pharmacoepidemiological methods: Includes theoretical aspects of various methods and practical study of various methods with the help of case studies for individual methods, Drug utilization review, case reports, case series, surveys of drug use, cross – sectional studies, cohort studies, case control studies, case – cohort studies, meta – analysis studies, spontaneous reporting, prescription event monitoring and record linkage system.
Module 3	Sources of data for pharmacoepidemiological studies, Ad Hoc data sources and automated data systems. bSelected special applications of Pharmacoepidemiology, Studies of vaccine safety, hospital pharmacoepidemiology, pharmacoepidemiology and risk management, drug induced birth defects.
Module 4	Pharmoeconomics: Definition, history, needs of Pharmacoeconomic evaluations, Role in formulary management decisions, Pharmacoeconomic evaluation Outcome assessment and types of evaluation, Includes theoretical aspects of various methods and practical study of various methods with the help of case studies for individual methods: Cost – minimization, cost-benefit, cost – effectiveness, cost utility. Applications of Pharmacoeconomics: Software and case studies.

Reference Books:

Sl No	Title	Author(s)	Publisher	Year
1.	PHARMACOEPIDEMIOLOGY 3 <sup>rd</sup> edition	Brian L.storm	John Wiley and sons	2000
2.	PHARMACOEPIDEMIOLOGY AND PHARMACOECONOMICS CONCEPTS AND PRACTICE	K.G.Revi kumar	Pharmamedpress	2003

## CLINICAL PHARMACOKINETICS AND PHARMACOTHERAPEUTIC DRUG MONITORING (CP-PDM)

COURSE CODE	22PY6503T	MODE	REGULAR	LTPS	2-1-0-0	PRE-REQUISITE	Nil
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### Course Outcomes

CO#	CO Description	BTL	PO Mapping
CO1	Discuss the pharmacokinetic principles to individualize drug therapy in patient care situations	2	1,2
CO2	To understand the methods to calculate various dosage regimens	2	1,2
CO3	To understand the principles of pharmacokinetics to analyse and predict drug interactions	2	1,2
CO4	To understand the concepts of therapeutic drug monitoring	2	1,2
CO5	To understand the dose adjustment in renal and hepatic disorders	2	1,2
CO6	To understand the concepts of population pharmacokinetics	2	1,2

### Syllabus

Module 1	<p>Introduction to Clinical pharmacokinetics.</p> <p>Design of dosage regimens: Nomograms and Tabulations in designing dosage regimen, Conversion from intravenous to oral dosing, Determination of dose and dosing intervals, Drug dosing in the elderly and pediatrics and obese patients</p>
Module 2	<p>Pharmacokinetics of Drug Interaction:</p> <ol style="list-style-type: none"> <li>Pharmacokinetic drug interactions</li> <li>Inhibition and Induction of Drug metabolism</li> <li>Inhibition of Biliary Excretion.</li> </ol> <p>4Therapeutic Drug monitoring:</p> <ol style="list-style-type: none"> <li>Introduction</li> <li>Individualization of drug dosage regimen (Variability – Genetic, Age and Weight, disease, Interacting drugs).</li> <li>Indications for TDM. Protocol for TDM.</li> <li>Pharmacokinetic/Pharmacodynamic Correlation in drug therapy.</li> <li>TDM of drugs used in the following disease conditions: cardiovascular disease, Seizure disorders, Psychiatric conditions, and Organ transplantations</li> </ol>
Module 3	<p>Dosage adjustment in Renal and hepatic Disease.</p> <ol style="list-style-type: none"> <li>Renal impairment</li> <li>Pharmacokinetic considerations</li> <li>General approach for dosage adjustment in Renal disease.</li> <li>Measurement of Glomerular Filtration rate and creatinine clearance.</li> <li>Dosage adjustment for uremic patients.</li> <li>Extracorporeal removal of drugs.</li> <li>Effect of Hepatic disease on pharmacokinetics.</li> </ol> <p>Population Pharmacokinetics.</p> <ol style="list-style-type: none"> <li>Introduction to Bayesian Theory.</li> <li>Adaptive method or Dosing with feed back.</li> <li>Analysis of Population pharmacokinetic Data</li> </ol>
Module 4	<p>Pharmacogenetics</p> <ol style="list-style-type: none"> <li>Genetic polymorphism in Drug metabolism: Cytochrome P-450 Isoenzymes.</li> <li>Genetic Polymorphism in Drug Transport and Drug Targets.</li> <li>Pharmacogenetics and Pharmacokinetics/Pharmacodynamic considerations</li> </ol>



Reference Books:

Sl No	Title	Author(s)	Publisher	Year
1	Clinical Pharmacology and Therapeutics	JAMES M RITTER LIONEL D LEWIS	Hodder Arnold, an imprint of Hodden Education, part of Hachette Livre UK	2008

### CLERKSHIP (CS)

COURSE CODE	22PY650N4	MODE	REGULAR	LTPS	0-1-0-0	PRE-REQUISITE	Nil
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#### Course Outcomes

CO#	CO Description	BTL	PO Mapping
CO1	Understand the role of Pharmacist in clinical pharmacy services	2	1,2
CO2	Demonstrate the skills of a clinical Pharmacist	2	1,2
CO3	Understand the available therapeutic options in the management of diseases	2	1,2
CO4	Prepare a pharmaceutical care plan for a given case	2	1,2
CO5	Detect, Interpret and report medication errors	2	1,2
CO6	Detect, Interpret and report drug interactions	2	1,2

### INTERNSHIP (IS)

COURSE CODE	22PY660N1	MODE	REGULAR	LTPS	0-0-40-0	PRE-REQUISITE	Nil
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#### Course Outcomes

CO#	CO Description	BTL	PO Mapping
CO1	Understand the pathophysiology of disease states and the rationale for drug therapy	2	1,2
CO2	Acquire the knowledge on available therapeutic options to provide patient care in co-operation with patients, prescribers, and other members of an interprofessional health care team	2	1,2
CO3	Identify, manage and use resources of the health care system, in cooperation with patients,	2	1,2
CO4	prescribers, other health care providers	3	1,2
CO5	Analyse the therapeutic approaches to promote health improvement, wellness, and disease prevention	3	1,2
CO6	Develop leadership qualities to function effectively as a member of the health care team	3	1,2

### PROJECT WORK (PW)

COURSE CODE	22PY650E5	MODE	REGULAR	LTPS	0-0-20-0	PRE-REQUISITE	Nil
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#### Course Outcomes

CO#	CO Description	BTL	PO Mapping
CO1	Address a problem related to Pharmacy practice in hospital, community service or clinical set up with a wider perspective and generality	3	1
CO2	address and translate the problem into a statement of aim,	3	1
CO3	objectives, scope and plan for the project	3	1
CO4	Preparation of report an information survey and take account of findings in executing project	3	1
CO5	Evaluate, select and apply relevant theories and techniques from the full range of courses studied using conceptual models and frameworks to enhance depth of understanding	3	1
CO6	Select appropriate methodology for investigative work, taking into account the pros and cons of the alternatives available and develop solution proposals based on reasoned judgement	3	1