(DEEMED TO BE UNIVERSITY)

CATEGORY 1 UNIVERSITY BY MHRD, Govt. of India

45 YEARS OF EDUCATIONAL LEADERSHIP

nirf 2025 NATIONAL INSTITUTIONAL RANKING FRAMEWORK

RANKED 26 AMONG ALL UNIVERSITIES

BACHELOR OF PHARMACY

PROGRAM HANDBOOK 2025

For Students Admitted in Academic Year 2025-26

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.


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NATIONAL INSTITUTIONAL RANKING FRAMEWORK
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45 YEARS OF
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AWARDS

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, TSEMCET 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. K Rajasekhara Rao

Pro-Vice Chancellor

Dr. Kurra Rajasekhara Rao, Pro-Vice Chancellor is a professor of Computer Science and Engineering (C.S.E.) having more than 35 years of teaching and research as well as administrative experience. His current research interests include topics related to Embedded Systems, Software Engineering, Software Testing, Data Sciences, Image Processing and Knowledge Management. He has authored a book and has more than 240 research publications in various International/National Journals and Conferences. Dr. KRR is a recognized as 'Research Guide' in many reputed universities and 32 doctorates were awarded under his guidance till now.

Prior to this, he discharged duties in various organizations, as a Director, Usha Rama College of Engineering & Technology (Autonomous), Telaprolu, A.P, Director, Sri Prakash College of Engineering (SPCE), Tuni and as a faculty member in various positions in KLCE/K.L.University, Andhra Pradesh for over 20 years. He contributed as a Member in Board of Studies for CSE & IT, at various prestigious institutions like Acharya Nagarjuna University, Krishna University, Sree Vidyaniketan Engineering College, Tirupathi and Bapatla Engineering College, Bapatla. He extended his services to K.L. University as Member in Board of Management, Dean's Council, Academic Council, Standing Committee, Research Board & Board of Studies [CSE].

Dr. KRR' s outstanding contributions have been honoured by various organizations. He received the "Patron Award" from Computer Society of India (CSI), India's prestigious professional society in the years 2011 (Ahemadabad) and 2020 (Bhuvaneswar). Recognising his administrative capabilities, Association of Scientists, Developers and Faculties (ASDF) through Puducherry CM honoured him with the "Best Dean" award in the year 2012. He was felicitated with the "Aacharya Ratna" from Indian Servers, IMPACT and Lions Club in the year 2019. Received "Bhishmacharya" Award in 2022 by Bharath Educational Excellence Awards. He got honoured as "Global Faculty" by AKS Education awards in 2023 and "Lifetime Achievement Award" by AIMER Society for the year 2024.

Dr. N Venkatram

Pro-Vice Chancellor

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 KLEFand 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.

Dr. A V S Prasad

Pro-Vice Chancellor

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.

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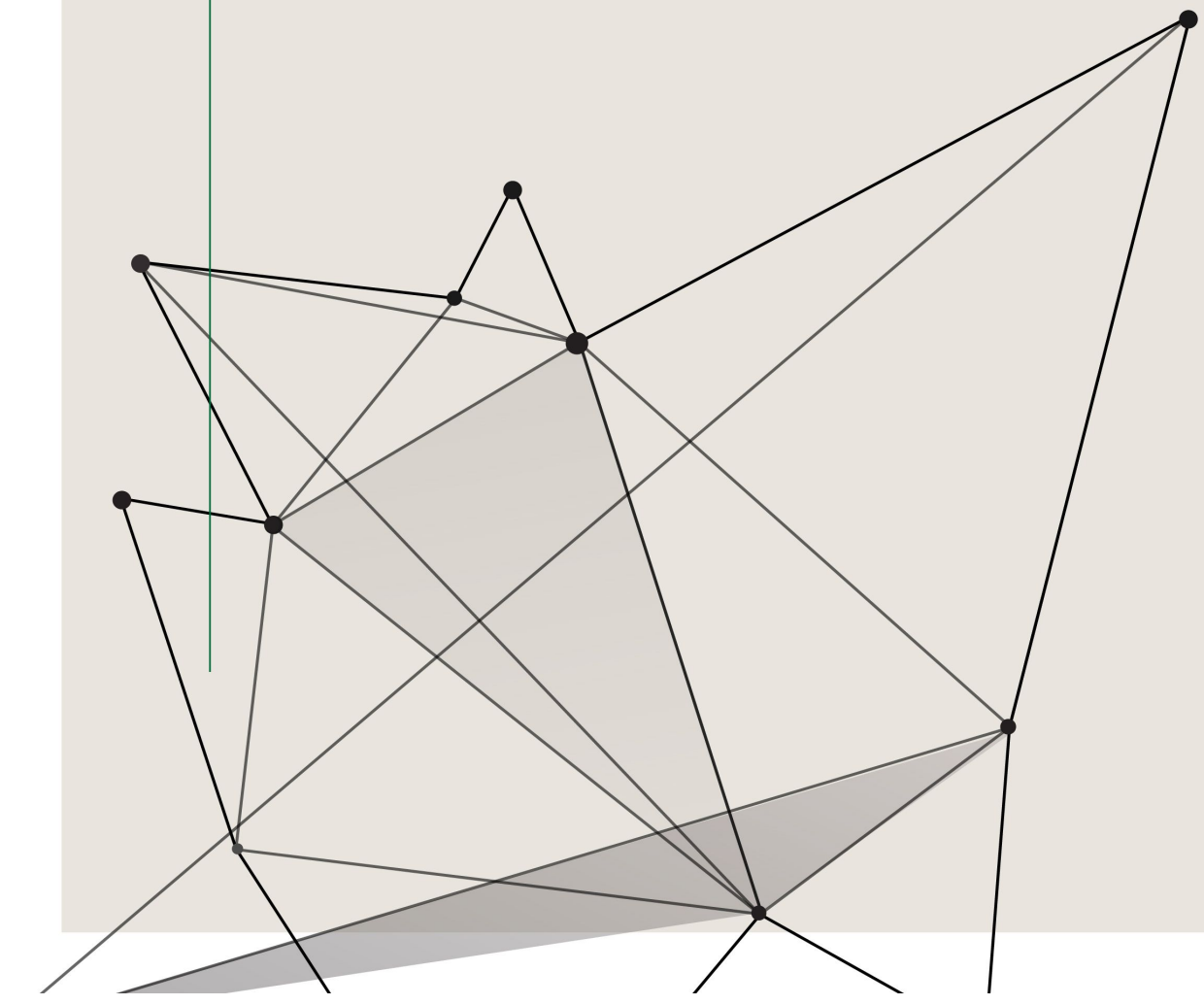
ABOUT THE DEPARTMENT

KL College of Pharmacy (KLCP), part of Koneru Lakshmaiah Education Foundation, is a premier institution dedicated to pharmaceutical education and research. Established in 2016 with the goal of preparing skilled professionals for the pharmaceutical and healthcare sectors, KLCP offers undergraduate (B. Pharmacy), postgraduate (M. Pharm in Pharmaceutics and Pharm. D), and doctoral programs (Full time and part time PhD) in pharmacy. The college emphasizes a blend of theoretical knowledge and practical skills, facilitated by state-of-the-art laboratories, advanced research facilities, and experienced faculty.

KLCP focuses on research-driven education and innovation in areas such as drug formulation, pharmaceutical technology, pharmacology, pharmaceutical chemistry and pharmacotherapeutics. With strong industry partnerships and a curriculum aligned with global standards, the college prepares students for successful careers in research, healthcare, and pharmaceutical industries. Its commitment to excellence is reflected in its collaborations with government agencies, industry bodies, and reputed international universities, positioning KLCP as a hub for advancing pharmaceutical sciences.



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VISION

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

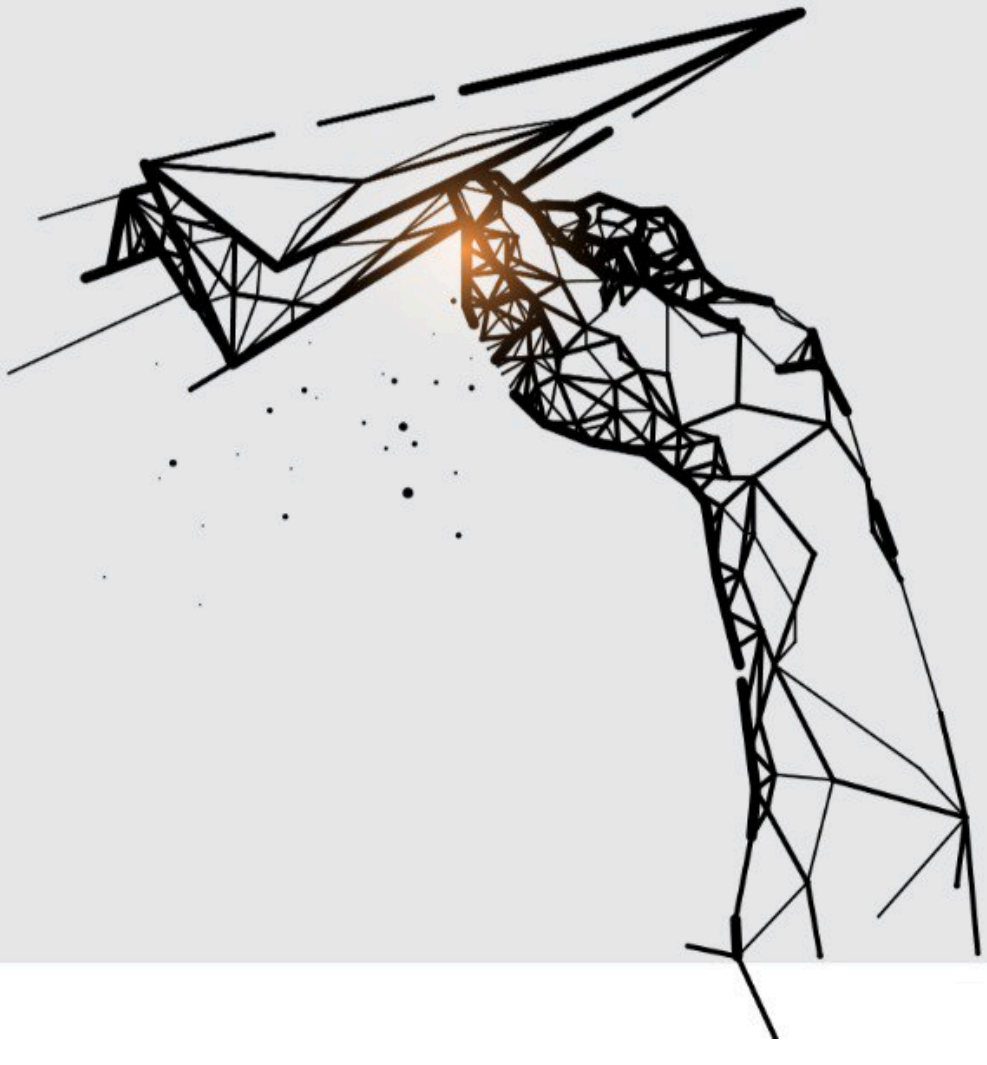
MISSION

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.

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

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.

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.



Y25: B.Pharmacy

Program Handbook

Program Educational Objectives (PEOs)

PEOs

PEO	PEO Description
1	Pharmaceutical Education: To showcase comprehensive knowledge in key pharmaceutical subjects to support the design and development of affordable herbal or synthetic drugs for the benefit of society.
2	Research: To assess pharmaceutical research trends aimed at discovering and developing new drugs to treat emerging and unmet medical conditions.
3	Attitude: To demonstrate a productive and supportive environment that encourages professional skills, ethical values, and a positive attitude in students.

Program Outcomes & Program Specific Outcomes (PO & PSO)

PO & PSO

PO/PSO	PO/PSO Description
PO1	Pharmacy Knowledge: Provide basic knowledge for understanding the principles and their applications in the area of Pharmaceutical Sciences and Technology
PO2	Technical Skills: Develop an ability to use various instruments and equipments with an in-depth knowledge on standard operating procedures for the same.
PO3	Modern tool usage: Develop/apply appropriate techniques, resources, and IT tools including prediction and modeling to complex health issues and medicine effect with an understanding of the limitations.
PO4	Research and Development: To demonstrate knowledge of identifying a problem, critical thinking, analysis and provide rational solutions in different disciplines of Pharmaceutical Sciences and Technology.
PO5	Pharmaceutical Product development: To apply the knowledge of manufacturing, formulation and quality control of various pharmaceutical and cosmetic products.
PO6	The Pharmacist and Society: Apply reasoning informed by the contextual knowledge to comprehend medical prescription, perform patient counselling and issue or receive clear instructions on drug safety and the consequent responsibilities relevant to the professional pharmacy practice.
PO7	Lifelong Learning: Develop an aptitude for continuous learning and professional development with ability to engage in pharmacy practice and health education programs.
PO8	Environment and Sustainability: Understand the impact of the professional pharmacy solutions in societal and environmental contexts and demonstrate the knowledge for sustainable development.
PO9	Ethics: Follow the code of ethics and commit to professional values and responsibilities and norms of the pharmacy practice.
PO10	Communication: Communicate effectively on health care activities with the medical community and with society at large, to comprehend drug regulations, write health reports and provide drug information.
PO11	Invention and entrepreneurship: Application of technical skills to integrate health care systems, design effective product with commercial advantage and societal benefit, perform risk analysis and become entrepreneur.

Program Rules & Regulations

Admission Eligibility Criteria

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

Program Structure and Curriculum

For each academic program, the curriculum serves as a framework that specifies the credits, course category, codes, titles, and delivery methods (Lectures, Tutorials, Practice, Skills, Projects, Self-Study, Capstone Design, etc.) under the **Choice-Based Credit System (CBCS)**. The curriculum is designed, implemented, and assessed following the **Outcome-Based Education (OBE)** framework.In designing the curriculum, we ensure the integration of key contemporary and traditional values by embedding Indian Knowledge Systems (IKS), Sustainable Development Goals (SDGs), and Design Thinking principles into courses at their inception.

- Each **Academic Year** consists of two regular semesters, each approximately 20 weeks including classwork and exams:
    - **Odd Semester:** July to December
    - **Even Semester:** December to May
- A **Summer Term** may be offered from May to June but is not considered a regular semester for calculating program duration.
- Students have the flexibility to choose courses as prescribed by KLEF.
- Each course has a **Lecture-Tutorial-Practice-Skill (L-T-P-S)**component.

Course Credit Structure:

Credits are allocated to courses based on the **L-T-P-S** structure:

- Every **Lecture** or **Tutorial** hour equals **1 credit**.
- Every **Practical** hour equals **0.5 credits**.
- Every **Skill-based practice** hour equals **0.25 credits**.

Course Precedence:

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

- A 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.

Registration Process

Key Guidelines:

- **Course Availability:** Students are permitted to register only for courses offered in the specific semester of enrollment.
- **Prerequisites:** Any prerequisite courses must be successfully completed before registering for subsequent courses.
- **Timely Registration:** Students must register on the designated registration day. KLEF reserves the right to deny late registrations.
- **Add/Drop/Change Period:** Students have a one-week window from the start of classes to add a course and two-weeks to drop or change courses.

- **Credit Limits:**
  - The recommended credit load is 22-24.
  - The maximum credit load per semester is 30.
  - If a student finds the standard load overwhelming, they can opt for deceleration, taking fewer courses now and making up the credits in a future summer semester.
  - Students in honors programs or pursuing a minor may be allowed to take on a heavier load through overloading, subject to eligibility criteria.

- **Elective Course Availability:** KLEF may cancel elective courses with low enrollment within the first week. Students will be able to switch to another elective if they meet its prerequisites.

- **Re-registration:** If a student wants to improve their grade in a course, they can re-register for it with approval from the Dean of Academics.

- **Registration Cancellation:** KLEF can cancel a student's registration for disciplinary reasons or plagiarism.

- **Timetable Clashes:** Students are responsible for resolving any timetable conflicts. They should contact their Department Year Coordinator immediately if any clashes arise.

- **Irregularities:** If any irregularities are found in a student's registration later on, KLEF may cancel their registration for a course or even the entire semester.

Registration Flexibilities:

- **Choice of electives:** Students have the flexibility to choose from a diverse set of elective courses that align with their personal interests or career objectives.

- **Choice of faculty:** Students have the flexibility to choose their preferred faculty members for certain courses, depending on departmental policies and course availability.

- **Acceleration & Overloading:** Students can accelerate their progress by taking courses from the next semester in advance, or overload by taking more credits than the standard limit. Prior permission from the Dean of Academics is required for either of these.

- **Deceleration & Underloading:** If students need to lighten their course load, they can decelerate by postponing some courses to the next semester, or underload by taking fewer credits than usual. Students who do not register on time, may also be forced to decelerate to compensate the classwork that they missed due to late registration. In both the cases of deceleration, permission must be sought from Office of Dean Academics through proper channel.

Summer Term Registration:

The Summer Term is designed to help students catch up or get ahead. Here are the guidelines:

- **Eligibility:** Students can register for summer courses if they have backlogs to clear, need to fulfill pre-requisites, or have been approved for acceleration.

- **Credit Limit:** The maximum credit load for the summer term is 12.

- **Timetable Clashes:** Students should ensure there are no conflicts in their summer course schedule.

- **Attendance & Promotion:** The same policies apply as in regular semesters, except that attendance condonation is not available in the summer.

Course Categories

- **Humanities, Arts and Social Sciences (HAS)**: The Humanities, Arts, and Social Sciences (HAS) category encompasses a diverse range of academic disciplines designed to broaden students' perspectives beyond their core areas of study. As part of the undergraduate curriculum, students can choose from a variety of courses within this category, including Foreign Language Electives and Management Electives. These courses offer valuable opportunities for students to develop skills in communication, cultural understanding, and management, complementing their technical education and fostering a well-rounded academic experience.

- **Basic Science Courses (BSC):** The Basic Science category covers key courses in subjects like Mathematics, Physics, and Chemistry, providing a strong scientific foundation for undergraduate students. This category includes Mathematics Electives and Science Electives, offering students the flexibility to choose courses that align with their interests. These courses help develop essential problem-solving and analytical skills, which are critical for understanding advanced concepts in their field. Basic Science courses also play a vital role in applying scientific principles to real-world engineering and research challenge.

- **Professional Core Courses (PCC):** Professional Core Courses (PCC) are essential courses within each engineering discipline that provide foundational knowledge and skills critical to the field. These courses are integral to the curriculum and ensure that students acquire the core competencies necessary for their professional practice.

- **Skill Development Courses (SDC):** Skill Development Courses are designed to equip students with practical, hands-on skills that enhance their employability and professional capabilities. These courses often focus on soft skills, technical proficiency, and industry-relevant competencies, such as communication, teamwork, leadership, digital literacy, and industry-specific software tools. By offering both theoretical knowledge and practical training, these courses help bridge the gap between academia and the professional world.

- **Professional Elective Courses (PEC)**: Professional Elective Courses (PEC) are required for students who wish to pursue a specific specialization within their field of study. These courses allow students to focus on advanced topics and gain in-depth knowledge in their area of interest, tailoring their education to align with their career goals. By completing the designated PECs, students can achieve a degree of specialization that enhances their expertise and prepares them for specific roles or industries in their professional journey.

- **Project Research and Internship (PRI):** Project Research and Internship courses provide students with real-world experience by engaging them in research projects and internships in industry or academia. These courses are essential for developing practical problem-solving skills, fostering innovation, and giving students the opportunity to apply the theoretical knowledge gained in the classroom to real-life scenarios. Through internships and research projects, students can gain industry exposure, improve their technical skills, and prepare themselves for professional careers or advanced studies.

- **Open Elective Courses (OEC):** Open Elective Courses offer students the flexibility to explore subjects outside their core discipline, fostering interdisciplinary learning and intellectual diversity. Available across all university programs, these courses encourage students to integrate knowledge from various fields, promoting innovation and a holistic understanding of global issues. Open Electives play a key role in broadening student academic perspectives and preparing them for multifaceted professional challenges.

- **Value-Added Courses (VAC):** Value-Added Courses are designed to enhance employability by providing students with training that leads to globally recognized certifications or specialized skills. These courses focus on industry-relevant knowledge and practical applications, ensuring students are well-prepared for current job market demands. By offering advanced skills and certifications, Value-Added Courses give students a competitive edge in their careers.

- **Audit Courses (AUC):** Audit courses are courses that students can attend without receiving a formal grade or credit towards their degree. These courses are often chosen by students who want to learn a subject for personal enrichment or to gain knowledge in areas outside of their major.

Requirements for the award of Degree

To be eligible for the award of a B.Pharmacy. degree, a student must successfully fulfill the following criteria:

- **Credit Requirements:** Earn the minimum number of credits specified in the program structure.
- **Focused Training:** Successfully undertake specific training in focused areas that enable students to be successful in their chosen career tracks. The focused areas are: (a) Employment in MNCs, (b) Civil Services (c) Higher Studies (d) Research and (e) Entrepreneurship.
- **Certifications:** Successfully complete at least three global certifications or value-added courses in the chosen discipline.
- **Internships:** Successfully complete Technical Internship.
- **Audit Courses:** Successfully complete all audit courses outlined in the program structure.
- **Minimum CGPA:** Achieve a minimum Cumulative Grade Point Average (CGPA) of 5.00 by the end of the program.
- **Extra Courses:** Students with extra courses having 'DT' or 'F' grades can still graduate if they meet all other requirements. However, these courses will be factored into the CGPA calculation.
- **Time Limit:** Complete all requirements within:
  - A minimum of 8 regular semesters (excluding summer terms)
  - A maximum of 8 years.

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.
- 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.

Award of Class

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

- Minimum of 5 CGPA is considered as Pass criteria for a student.
- CGPA of 5.00 to 5.99 will be awarded Second class.
- CGPA of 6.00 to 7.49 will be awarded First class.
- CGPA of 7.5 and above will be awarded First class with Distinction provided the student has cleared all the courses in first attempt

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:

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

Course Flexibilities

In line with the institution's commitment to personalized learning, courses are offered in multiple modes, allowing students to tailor their academic journey based on personal preferences, career goals, and learning styles. The available modes include:

- **Regular Mode:** It is the traditional method of learning, involving in-person classroom instruction, a structured curriculum, and traditional assessments. This mode provides students with a structured and predictable learning environment, facilitating direct interaction with professors and classmates. It is suitable for students who prefer a traditional learning approach and value face-to-face interaction.

- **MOOCs Mode:** Massive Open Online Courses (MOOCs) are utilized to support independent learners, such as students engaged in internships or practice school. Students can earn credits by completing accredited online courses at their own pace. Assessments in this mode may include online quizzes, certifications, and institutional evaluations.

- **Work-in-lieu Mode:** It allows students to substitute certain coursework with relevant work experience, internships, or on-the-job training. Credits are awarded based on the work performed, and evaluations are typically centered around performance reports, supervisor evaluations, and reflective essays. This mode is ideal for students who want to gain practical experience while fulfilling academic requirements.

Attendance calculation in a course

- **Attendance calculation for LTPS:** Attendance of a student on a course is calculated based on the credit-weighted average of the student's attendance in each of the LTPS components of the course.

- **Attendance start date:** Attendance is counted from the class commencement date. However, for transferred or newly admitted students, attendance in their admitted semester is counted from the date of admission.

Attendance requirements leading to promotion

- **Minimum Attendance:** 80% attendance is required for course promotion and appearing for the semester-end exam.
- **Condonation:** Up to 10% condonation by Principal, College of Pharmacy, is possible for medical emergencies with proper documentation submitted within a week. Students will be levied a condonation fee to appear for the semester-end exam.
- **Marginal Cases:** Attendance slightly below 70% due to severe medical or valid reasons may be considered for further relaxation by the condonation board appointed and headed by the Vice-Chancellor.

Attendance-based marks

- **Marks:** Course coordinators can allocate up to 4% of the total marks for attendance for theory based courses and 2% of total marks for attendance for practical/skill based courses, clearly stated in the course handout and approved by the Dean of Academics through proper channel.

- **Mark Distribution:** Marks are awarded based on attendance ranges: For theory component, if the attendance percentage is 95-100% = 4 marks, 90-94% = 3 marks, 85-89% = 2 marks, 80-84% = 1 mark and less than 80% = 0 mark. Further, for Practical and skill Component, if the attendance percentage is 95-100% = 2 marks, 90-94% = 1.5 marks, 85-89% = 1 mark, 80-84% = 0.5 mark and less than 80% = 0 mark.

- **Applicability:** Attendance marks, apply to all L-T-P-S components.

Attendance waiver

- **Eligibility:** Students with a CGPA and SGPA of 9.00 or higher in the previous semester can get an attendance waiver for up to three courses in the next semester, with prior approval from the Dean of Academics through proper channel.

- **Conditions:** Students using the attendance waiver can participate in all assessments and evaluation components without being marked ineligible due to attendance-based regulations.

Compensatory (Extra) attendance policy

- **Eligibility:** Students representing KLEF in events or participating in co-curricular / extracurricular activities can get compensatory attendance with prior written approval.

- **Limit:** Compensation is limited to 10% of total classes per course per semester and doesn't apply to the summer term.

Course-based promotion and detention policy

- **Minimum Attendance:** Students must meet the minimum attendance requirement to be promoted in a course. If a student fails to meet this requirement, their grade in the course will be marked as "DT", indicating that the student is detained in the course.

- **Next Steps after detention:** Student must re-register in a detained course and study it completely by attending the classwork, submitting all assessments, taking all evaluation components

Eligibility for appearing Sem-End Examination

A Student registered for a course and got promoted 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.
- Acts of indiscipline.
- Withdrawal from a course.
- Non-payment of examination fees.
- Without a hall ticket.

Assessment & Evaluation

The assessment in each theory subject consists of Sem In Exams, in class quizzes/tutorials/home-assignments/Active Learning Methods (continuous assessment) and the Semester End Exanimation (SEE). Students are advised to refer to the course handout to get more detailed information on assessment.

- Sem In Examinations and the Semester End Examinations will be conducted as per the Academic Calendar.
- As per the necessity, the Supplementary examinations will be conducted at the discretion of Dean Academics with the approval of the Vice Chancellor.
- Students may have to take more than one examination in a day during Sem In exams, Semester End Examinations /Supplementary examinations.

College / School Name	Semester-In Evaluation (Weightage in percent) (A)	Sem End Examination (Weightage in percent) (B)	Minimum requirement for pass percent	
			(A+B)	B
College of Pharmacy	25	75	50	25

Semester-In Evaluation

The following guidelines are followed for the Semester In evaluation.

- The process of evaluation is continuous throughout the semester
- The distribution of marks for Semester In evaluation is 25 percent of aggregate marks of the course.
- The distribution of weightage for various evaluation components 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.
- In order 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.
- The pattern and duration of such examination are decided and notified by the Course Coordinator through the Course handout, after approval from the Dean Academic.
- 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.

Semester-End Evaluation

The following guidelines are followed for the End Semester evaluation.

- The end-semester evaluation typically includes a variety of components such as Sem End Exams, projects, presentations, or practical assessments, skill assessments as detailed in the course handout.
- Each component is evaluated based on the criteria outlined in the course handout.
- The distribution of weightage for various evaluation components 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.
- To pass in a course, student must meet or exceed the minimum passing marks specified for each end semester summative assessment component mentioned in the course handout.
- The 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 Sem end summative evaluation component owing to hospitalization, participation in extra/ co-curricular activities representing KLEF/ state/ country; student can request for re-examination by taking prior permission from Dean Academics.

- 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.

Absence in Assessment and Examination

If a student misses a formative assessment component (quizzes, assignments, etc.) due to illness or other valid reasons, no retakes will be permitted, and a score of zero will be recorded. However, in cases of an excused absence, the instructor may allow the student to retake the assessment, subject to written approval from both the Principal and the relevant Head of Department.

Make-up Exams:

A student's absence from Semester In or Semester End Exams will only be considered for a make-up exam under the following circumstances.

- Pre-approved participation in university/state/national/international co-curricular or extracurricular activities.
- Illness or medical emergencies resulting in hospitalization, with a doctor's certification explicitly stating the student's inability to attend the exam within the designated period.
- Death of an immediate family member.

Remedial Exams:

- Remedial exams are conducted for students who score less than 60% on Semester In Exam I and have attended at least 85% of the remedial classes.
- For courses without remedial classes, no remedial exam will be scheduled.
- If a student does not take or scores less than 60% on Semester In Exam I, they must attend remedial classes and maintain a minimum 85% attendance to be eligible for the remedial exam. The remedial exam score will then be considered.
- The number of remedial classes will be 33% of the regular classes held prior to Semester In Exam I. However, there are no remedial exams for Semester In Exam II or laboratory exams.

Remedial Classes Policy

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

- Students who did not attend or obtain a minimum of 60 percent marks in the Sem In exam1.
- Students for whom CO1/CO2 is (are) not attained in Sem In Exam 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 which are scheduled to be conducted usually one or two weeks post conclusion of Sem In exam1.
- The number of remedial classes to be conducted shall be 33 percent of regular classes held till the Sem In exam I.
- Remedial classes MUST NOT be scheduled during regular class work hours.

Assessment of Project/Research based Courses

- All project or research-based subjects must have a defined time limit for completion.

- The specific time limits for completion and schedule for monitoring and evaluation of performance of students will be announced each term.

- The final project report, after getting the plagiarism certificate, only will be considered and evaluated by the panel of examiners.

- Student project reports must follow the guidelines prescribed by the office of Dean Academics.

Grading Process

At the end of all evaluation components based on the performance of the student, each student is awarded based on absolute grading system.

Absolute Grading:

The list of absolute grades and its connotation are given below:

Performance	Letter Grade	Grade Point	Percentage of marks
Outstanding	O	10	90 - 100
Excellent	A	9	80 - 89
Good	B	8	70 - 79
Fair	C	7	60 - 69
Average	D	6	50 - 59
Fail	F	0	0 - 49
Absent	AB	0	Absent

Course handout

A course handout is a document that provides essential information about a specific course. It's like a roadmap that guides you through the course, helping you understand the expectations, assignments, and grading criteria.

Significance of Course Handout:

- **Clarity and Organization:** Course handouts help you stay organized and focused by outlining the course structure, topics, and deadlines.
- **Expectations:** They communicate the instructor's expectations for your participation, assignments, and overall performance.
- **Grading:** Course handouts outline the grading criteria, so you know exactly how your work will be evaluated.
- **Resources:** They often list valuable resources, such as textbooks, articles, or online tools, that can aid your learning.

Expectations from the course handout:

- **Course Description:** A brief overview of the course, its goals, and its relevance to your studies.
- **Learning Outcomes:** Clear goals for what you should be able to do by the end of the course. These outcomes will help you understand the skills and knowledge that are expected to gain.
- **Instructor Information:** Contact details, office hours, and specific communication preferences.
- **Course Schedule:** A tentative timeline of topics, assignments, and exams.
- **Required Materials:** A list of textbooks, articles, or other materials essential for the course.
- **Assessment Methods:** A breakdown of how your final grade will be determined, including the weight of assignments, exams, and participation.
- **Assignment Guidelines:** Detailed instructions for each assignment, including due dates, submission requirements, and expectations.

Effective use of the course handout:

- **Refer to it regularly:** Check back to keep track of important dates and assignments.
- **Highlight key points:** Make notes or highlight sections that are particularly important to you.
- **Ask questions:** If something isn't clear, bring it up in class or during office hours.

Betterment

- A student may reappear for the semester-end examination for betterment, only in the theory part of a course to improve their grade, provided that the student has passed the course, his/her CGPA is less than or equal to 6.75 and the grade in the respective course is equal to or lower than a 'D'. In case of reappearing for a course, the best of the two grades will be considered.

- A student may re-register for any course in any semester during the program to improve their grade if the current grade in the course is lower than 'C', with the approval of the Dean Academics and in accordance with academic regulations.

- A student cannot reappear for the semester-end examination in courses with an L-T-P-S structure such as 0-0-X-X, 0-0-X-0, 0-0-0-X, Social Internship, Technical Internship, Seminar, Term Paper, Project, Capstone Project, Practice School, Industrial Internship.

Supplementary

- A student is eligible for a supplementary exam if they don't meet the minimum passing marks for a course or if they fail any component of the end-of-semester assessments listed in the course handout.

- If a student has failed courses from a previous odd semester that are not offered in the current semester, the supplementary exams for those courses will be scheduled for the summer supply.

- As per the end semester assessment components listed in the course handout (i.e. end semester summative) if student fail any component, they are eligible for a supplementary exam. Only the component(s) student failed will be considered for this supplementary attempt, though in some cases, you might be allowed to retake all components to improve your marks.

- In cases where there is a clash between supplementary exams and other scheduled exams, students may take the supplementary exams during the summer supply.

- If a student fails any of the end-of-semester examinations in an even semester, supplementary exams will be scheduled either within one month after the release of the results (i.e. summer supply) or during the summer term.

- Student must register for supplementary exams within a specified period after the results are declared.

- Student may be required to pay a supplementary exam fee. Details on the fee structure and payment process will be provided along with the supplementary exam notification.

- A student is not eligible for the award of a degree with first class with Distinction, if they opt for the Supplementary option.

Revaluation

Students desirous of seeing their Semester End Examination answer scripts have to apply online to the COE for the same within the timeframe as declared by the COE by paying the prescribed fee through ERP.

- There is no provision for re evaluation in case of Lab/Practical/skilling exams, project, viva voce exam or seminar / design / mini project courses.
- The final grades awarded to each course shall be announced by the COE and the same will be made available to students through the website/notice boards.

Credit Transfer

Credit transfer between KLEF and other Institution:

Credit transfer from other institutions to KLEF or vice versa is permitted only for undergraduate program.

Credit transfer from KLEF to other institutions: Student studying in KLEF can take transfer to another institution under the following conditions:

- KLEF has signed MOU with the institution
- However, a student, after seeking transfer from KLEF can return to KLEF after a semester or year. Based on courses done in the other institution, equivalent credits shall be awarded to such students.

Credit transfer from another institution to KLEF:

A student studying in another institution can take transfer to KLEF under the following conditions:

- When a student seeks transfer, equivalent credits will be assigned to the student based on the courses studied by the student.
- To determine the equivalent credits for a course from a previous institution on a 10-point scale at KLEF, the number of credits of the course is multiplied by the equivalent grade point of the previous institution and then divided by the number of credits of the corresponding course at KLEF.
- If a course from the previous institution has zero credits and no grade assigned, the student must sit for the final examination for the equivalent course at KLEF.
- A transfer student seeking improvement in any course can take the final examination at KLEF, where the grade received at KLEF becomes the final grade recorded on their grade sheets.
- The student, when transferred from other institutions, must stick to the rules and regulations of KLEF.
- To graduate from KLEF, a student must study at least half of the minimum duration prescribed for a program at KLEF.

Credit Transfer Through MOOCs:

- Undergraduate students can get credits for MOOCs courses recommended by KLEF up to a maximum of 20% of their minimum credits required for graduation. The discretion of allocation of MOOCs courses equivalent to the courses in the curriculum lies with the office of the Dean Academics.
- A student may also be permitted to obtain 20 credits through MOOCs in addition to the minimum credits required for graduation. These 20 credits can also be utilized to acquire a Minor degree or an Honors degree if the courses are pronounced equivalent to those specified for the respective degrees by the office of the Dean Academics. These additional credits through MOOCs if to be considered for CGPA/Minor/Honors degree must be approved by Dean Academics prior to enrollment in the respective MOOCs.
- Students acquiring additional credits for Honors/Minor degree must adhere to the rules governing the award of the respective degree, otherwise, a student applying for registering into additional credits through MOOCs must possess a minimum CGPA of 7.5 till that semester.

Semester Promotion policy

- A student shall be eligible to carry forward all the courses of I, II and III semesters till the IV semester examinations. However, he/she shall not be eligible to attend the courses of V semester until all the courses of I and II semesters are successfully completed.
- A student shall be eligible to carry forward all the courses of III, IV and V semesters till the VI semester examinations. However, he/she shall not be eligible to attend the courses of VII semester until all the courses of I, II, III and IV semesters are successfully completed.
- A student shall be eligible to carry forward all the courses of V, VI and VII semesters till the VIII semester examinations. However, he/she shall not be eligible to get the course completion certificate until all the courses of I, II, III, IV, V and VI semesters are successfully completed.

Counselling procedure

KLEF is committed to fostering a supportive and nurturing environment for our students, addressing not only their academic needs but also their psychological well-being. To achieve this, KLEF is implementing a comprehensive Mentor-Mentee Scheme aimed at providing holistic support through academic, career, and psychological counselling. To achieve this, KLEF implement a comprehensive Mentor-Mentee Scheme and establish the Central Academic Counselling Board (CACB) in addressing academic, career and student-psychological issues.

The Mentor-Mentee Scheme aims to provide personalized guidance and support to students throughout their academic journey. Each student shall be assigned a mentor from the faculty, who will act as a guide, counselor, and advocate for the student's academic and personal growth. The mentor-mentee relationship is intended to facilitate communication, goal-setting, and problem-solving.

The primary objectives of the Mentor-Mentee Scheme are:

- To facilitate a strong and positive mentor-mentee relationship that supports students' academic growth, personal development, and psychological well-being.
- To offer career counselling, guiding mentees in exploring career options, developing professional skills, and making informed career-related decisions.
- To provide psychological counselling, offering a safe space for mentees to discuss psychological concerns and providing appropriate support or referrals when needed.
- To provide tailored academic counselling, helping mentees set academic goals, plan their course of study, and navigate academic challenges effectively.

Academic Counselling:
The mentors oversee the following academic counselling activities which are not limited to:

- Providing guidance during academic registration sessions
- Monitoring attendance and addressing attendance-related concerns
- Communicating attendance and marks information to parents/guardians
- Addressing concerns related to backlogs and providing advice
- Advising on domain specializations and academic flexibilities
- Assisting students in exploring study abroad opportunities
- Conducting student and parent meetings to address academic concerns

Career Counselling:
The mentors oversee the following career counselling activities which are not limited to:

- Recommending technical skilling courses and certificate programs
- Facilitating internship opportunities and competitive exam preparations
- Guiding students through term papers, projects, hackathons, and coding challenges
- Providing information on higher education options and entrance exams
- Encouraging entrepreneurship awareness and guiding start-ups initiatives
- Assisting students in preparing for placements and future career goals
- Conducting student and parent meetings to discuss career aspirations

Psychological Counselling:
The Mentors oversee the following psychological counselling activities which are not limited to:

- Providing guidance on time management and classroom activities
- Addressing anti-ragging issues and promoting a positive attitude
- Providing support for managing mental stress and promoting well-being
- Addressing hostel, room, home, and food-related concerns
- Conducting student and parent meetings to address personal well-being

Mentor-Mentee allocation

- The Department Academic Counselling Board (DACB) is responsible for assigning approximately 20 students to each faculty member, who will act as their mentor. The mentors will guide and support their assigned students throughout their academic journey.
- Counsellors/mentors. From the second year onwards, counsellors/mentors will be appointed from the students' respective parent departments, and these faculty members will continue as mentors until the students complete their course.
- The counselling program aims to help students develop their character, academic abilities, professional skills, and social responsibilities. Mentors play a vital role in this process by:
    - Maintaining detailed records of mentor-mentee interactions in the ERP system. Mentors are required to update the ERP with counselling remarks for both students and their parents every fortnight.
    - Providing regular updates to parents about students' academic progress, career developments, and physiological status through various communication channels, including phone calls, SMS, WhatsApp, and Telegram.
    - Ensuring that counselling remarks are accurately recorded in the ERP system, and reflecting these updates in DACB monthly reports and CACB semester reports.

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:
    - Has CGPA of less than 6.00.
    - 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.

Rustication policy

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

Malpractice penalty policy

The following actions constitute malpractice during examinations and are subject to disciplinary actions as outlined below:

Clause 1: Possession of unauthorized material in the examination hall (e.g., paper, notebooks, programmable calculators, cell phones, or any material related to the exam subject). This includes any marks on the candidate's body that could be used as an aid.

Penalty: Immediate expulsion from the examination hall, without cancelling the paper.

Clause 2: a) Providing or receiving assistance, or communicating with others via oral means, body language, or electronic devices (such as cell phones), either inside or outside the examination hall. b) Smuggling in or out answer sheets, additional sheets, or arranging to send out the question paper or answer sheets during or after the exam. c) Using objectionable or offensive language in the answer paper or in communication with examiners, or attempting to influence examiners to award passing marks. d) Exchanging answer scripts or additional sheets in the examination hall

Penalty: Expulsion from the examination hall and cancellation of the comprehensive examination performance in that subject only of all the candidates involved. In case of an outsider, he will be handed over to the police and a case is registered against him

Clause 3: Copying from any unauthorized material (e.g., paper, books, programmable calculators, palm computers) during the exam.

Penalty: Expulsion from the examination hall, cancellation of the exam performance in that subject, and a fine of Rs. 1000.

Clause 4: a) Taking the answer script outside the exam hall, tearing the script or any part of it inside or outside the hall. b) Appearing for the exam in a drunken condition.
Penalty: Expulsion from the examination hall and cancellation of comprehensive examination performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining comprehensive examinations of the subjects of that semester/year.

Clause 5: a) Disobeying examination authorities, creating disturbances, organizing or instigating a walk-out, threatening or assaulting officials, or damaging property inside or outside the exam hall. b) Possession of any lethal weapon or firearm in the examination hall.
Penalty: Expulsion from the exam hall and cancellation of exam performance in all subjects. The student will be debarred from future exams and may forfeit their seat. Outsiders will be handed over to the police.

Clause 6: Impersonation during the examination.

Penalty: Both the impersonator and the original candidate will be expelled from the exam hall. The original candidate's performance will be cancelled in all subjects, including practical and project work, and they will be barred from exams for two consecutive semesters. Continuation in the course is subject to academic regulations. The impersonator (if an outsider) will be handed over to the police.

Clause 7: Repeated offenses.

Penalty: For a second offense, the candidate will face expulsion from the exam hall and cancellation of all exam performances for that term, with a fine of Rs. 1000. Repeated academic dishonesty may result in the issuance of a transfer certificate (TC).

Clause 8: Any other form of malpractice not specified.

Penalty: Punishment will be determined by the Examination Malpractice Committee and approved by the Vice-Chancellor.

Plagiarism Penalty Policy

Plagiarism is considered a serious breach of academic integrity, compromising both the ethical standards of the university and the intellectual development of students. The university enforces a strict zero-tolerance policy regarding plagiarism, and all students are expected to uphold the highest standards of academic honesty.

Penalties for plagiarism will be applied as follows:

First Offense:

- Minor Plagiarism (e.g., improper citation, small portions of copied work): The student will receive a warning and be required to resubmit the work with proper citations. Marks may be reduced up to 50%.
- Major Plagiarism (e.g., copying significant portions, submitting another person's work): The assignment will receive a grade of zero. The student may be required to attend a mandatory workshop on academic integrity.

Second Offense:

- Any second offense, regardless of severity, will result in a zero for the assignment and an official letter of reprimand placed in the student's record. The student will be placed on academic probation.

Third Offense:

- The student will face suspension from the university for one academic term. A record of academic misconduct will be permanently placed in the student's academic file.

Repeated Violations:

- Further violations after the third offense may lead to expulsion from the university.

In cases of group work, if plagiarism is identified, all group members will be held equally accountable unless it can be demonstrated that the act of plagiarism was isolated to specific individuals.

Terminology

Absolute Grading: Absolute grading is a method of assigning grades based on predetermined criteria or standards rather than comparing student performance to other students in the class (See: Relative Grading where the performances are compared).

Academic Bank of Credits (ABC): Academic Bank of Credits, an initiative of Government of India, is a digital platform that stores the academic credits earned by a student throughout their educational journey. It's essentially a virtual repository of a student's academic achievements.

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 has the right to decide 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 regular semesters i.e., Odd and Even semesters.

Acceleration: Acceleration of courses refers to a student's ability to progress through their academic program at a faster pace than traditional timelines.

Attendance: Attendance refers to the record of a student's presence or absence in educational institutions. It is a critical factor influencing academic performance, overall development, and future success.

Audited Course: It is a course of study which has zero credits and has a "Satisfactory" or an "Unsatisfactory" grade.

Backlog Course: A course is considered to be a backlog if the student has obtained 'F' grade or detained in the course.

Basic Sciences: The courses of foundational nature in the areas of Mathematics, Physics, Chemistry, Biology etc., are offered in this category.

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.)

Bridge Courses: Courses which are required to bridge the continuity among the Basic sciences/Engineering Sciences/professional courses (both core and electives) and are identified through gap analysis carried out using feedback obtained from various academic stakeholders are termed as Bridge Courses. These courses also do not yield any credits but require a "Satisfactory" result to register into the attached professional courses.

Capstone Project: A capstone project is the culminating academic experience for many students, typically undertaken in the final year of a degree program. It's designed to integrate and apply the knowledge and skills acquired throughout the course of study.

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.

Course Withdrawal: Withdrawing from a Course means that a student can drop from a course within the first two weeks of the odd or even Semester (deadlines are different for summer sessions). 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.

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.

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.

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 up to 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.

Deceleration: Deceleration of courses typically refers to a student's decision to reduce their course load or extend the time taken to complete a degree program.

Degree: A student who fulfils all the Program requirements is eligible to receive a degree.

Degree Requirements: Degree requirements are the specific courses, credits, and academic standards that a student must fulfill to earn a particular 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.

Designing Your Own Degree: Designing your own degree is a revolutionary concept that empowers students to create a customized educational path aligned with their passions, career goals, and unique learning styles.

Dissertation: Dissertation is a substantial piece of original research written and defended by a candidate for a degree.

Detention in a course: Student who does not obtain minimum prescribed marks in continuous in-semester evaluation and /or minimum prescribed attendance in a course shall be detained in that course.

Double Major Degree: A double major degree allows students to specialize in two academic fields while earning a single bachelor's degree.

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.

End-semester Evaluation: End-semester evaluation is a summative assessment conducted at the conclusion of an academic term to measure students' overall performance.

Elective Course: A course that can be chosen from a set of courses. An elective can be Professional Elective, Open Elective, Management Elective and Humanities Elective.

Engineering Sciences: The courses belonging to basic evolutionary aspects of engineering from Mechanical Sciences, Electrical Sciences and Computing like Engineering Mechanics, Data structures, Network Theory, Signal Analysis.

EPICS: EPICS stands for Engineering Projects in Community Service. It's a unique program that combines engineering education with community service.

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.

Experiential Learning: Experiential learning is a process through which students develop knowledge, skills, and values from direct experiences outside a traditional academic setting. It involves learning by doing, where students engage in hands-on activities, real-world problem-solving, and reflective practices to gain deeper understanding and practical application of the concepts they are studying.

Flexi-Core course: A Flexi-Core course typically refers to an elective or optional course within a degree program that offers students flexibility in choosing subjects based on their interests and career goals.

Formative Assessment: Formative assessment is ongoing evaluation of student understanding to inform instruction and facilitate learning.

Flipped Learning: Flipped learning is an instructional strategy that reverses the traditional teaching model. In flipped learning, students are introduced to new content outside of class, usually through video lectures, readings, or other materials. The in-class time is then used for more interactive activities, such as discussions, problem-solving, group work, and applying the concepts learned at home.

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.

Grade Point Average (GPA): Grade Point Average is a numerical representation of a student's academic performance. It is calculated by averaging the numerical equivalents of letter grades earned in courses, considering the number of credit hours for each course.

Honors Degree: A student who fulfills all the Program requirements of her/his discipline and successfully completes a specified set of additional courses within the same program is eligible to receive an Honors degree.

Humanities, Arts and Social Sciences (HAS): It is a broad term that groups together the academic disciplines of humanities, arts and social sciences.

Industrial Training: Training program undergone by the student as per the academic requirement in any company/firm.

Industrial Visit: Visit to a company/firm as per the academic requirement.

Internship: Internship is a temporary work experience offered by an organization for a limited period. It provides students, graduates, or career changers with an opportunity to gain practical skills and experience in a specific field.

In-Semester Evaluation: Summative assessments used to evaluate student learning, acquired skills, and academic attainment during a course.

Induction Courses: Student who gets admitted into program must complete a set of Induction courses for a minimum period of 3 weeks and obtain a "Satisfactory" result prior to registering into 1st Semester of the Program.

Innovation Semester: An Innovation Semester is a dedicated academic term focused on cultivating a culture of creativity, problem-solving, and entrepreneurial thinking.

Lecture: A lecture is a formal instructional session where an instructor presents information to a large group of students.

Make-up Test: An additional test scheduled on a date other than the originally scheduled date.

Malpractice: Malpractice typically refers to academic dishonesty or misconduct during examinations or coursework. This can include a wide range of behaviors that compromise the integrity of the evaluation process.

Management elective: A course that develops managerial skills and inculcates entrepreneurial skills.

Minor Degree: A student who fulfills all the Program requirements of her/his discipline and successfully completes a specified set of courses from another discipline is eligible to receive a minor degree in that discipline.

Multiple Entry and Multiple Exit (MEME): It is an educational framework designed to provide flexibility in learning pathways, allowing students to enter and exit educational programs at various stages based on their individual needs, prior knowledge, and career goals.

National Education Policy (NEP): NEP 2020 is a comprehensive framework for transforming India's Education System. It aims to create an equitable and vibrant knowledge society by providing high-quality education to all.

NHEQF: NHEQF stands for National Higher Education Qualifications Framework. It's a comprehensive framework designed to standardize and classify higher education qualifications in India. The primary goal of NHEQF is to ensure that qualifications from different institutions are comparable and recognized nationally and internationally.

Open Elective: This is a course of interdisciplinary nature. It is offered across the University for all Programs.

Overloading: Registering for more number of credits than normally prescribed by the Program in a semester.

Peer Learning: Peer learning is a collaborative learning process where students learn from each other. It involves sharing knowledge, skills, and experiences among peers.

Practical: A practical is a hands-on session where students apply theoretical knowledge in a real-world or laboratory setting. Practical sessions are designed to develop students' technical skills, problem-solving abilities, and understanding of experimental procedures.

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 final year to meet the final requirements for the award of degree.

Pre-requisite: A course, the knowledge required for registration into higher level course.

Product Development Semester: A Product Development Semester is an academic term dedicated to the process of creating new products or improving existing ones.

Professional Core: The courses that are essential constituents of each engineering discipline are categorized as Professional Core courses for that discipline.

Professional Elective: A course that is discipline centric. An appropriate choice of minimum number of such electives as specified in the program will lead to a degree with specialization.

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 Educational Objectives: The broad career, professional, personal goals that every student will achieve through a strategic and sequential action plan.

Program Outcome (PO): Program outcomes are statements that describe what students are expected to know, understand, and be able to do upon completing a specific academic program.

Project: Course that a student must 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.

Project-Based Learning (PBL): Project-Based Learning is an instructional approach where students actively engage in real-world and personally meaningful projects.

Rapid Prototyping Semester: A Rapid Prototyping Semester is an academic term dedicated to the practical application of rapid prototyping techniques to create physical models or prototypes of products or designs.

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.

Relative Grading: Relative grading is a method of assigning grades based on a student's performance compared to the rest of the class.

Remedial Exam: A remedial Exam is an assessment designed to identify specific areas of weakness or gaps in a student's knowledge or skills. It is typically administered after a student has performed poorly on a regular assessment.

Research Project: A research project is a systematic investigation undertaken to answer a specific question or address a particular problem.

Research Semester: A research semester is a dedicated period within an academic program focused on independent research or scholarly inquiry.

Research Seminar: A research seminar is a formal academic gathering where researchers present their ongoing work to a group of peers, faculty, and other interested individuals.

Self-learning: Self-learning is the process of acquiring knowledge and skills independently without formal instruction.

Semester: It is a period of study consisting of 15+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.

Skilling: It is a process of developing and enhancing specific skills that are essential for performing particular tasks or activities effectively. It involves structured training and practice aimed at equipping individuals with the practical abilities, knowledge, and competencies required for professional success and personal development.

Social Immersive Learning (SIL): Social Immersive Learning is a pedagogical approach that combines the power of social interaction with immersive technologies to create engaging and impactful learning experiences.

Social Service: An activity designed to promote social awareness and generate well-being; to improve the life and living conditions of 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.

Substitution of Elective course: Replacing an elective course with another elective course as opted by the student.

Summative Assessment: Summative Assessment is a type of evaluation that occurs at the end of a learning period.

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.

Supplementary: A student can reappear only in the semester end examination for the Theory component of a course, subject to the regulations contained herein.

Term paper: A 'term paper' is a research report written by students that evolves their course-based knowledge, accounting for a grade. Term paper is a written original research work discussing a topic in detail. It is a credit-based course.

Tutorial: A tutorial is a small group session designed to provide personalized guidance and support to students. Tutorials often involve discussions, problem-solving activities, and hands-on practice to reinforce concepts learned in lectures.

Under-loading: Registering for lesser number of credits than normally prescribed for a semester in that Program.

Value-Added Courses: Courses leading to global certification and those which are conducted exclusively for employability are referred to as value added courses.

FAQs

Q:What is the Choice-Based Credit System (CBCS) and how does it work?
A: CBCS allows student to choose courses from various categories based on your interests and career goals. Each course has a credit value assigned to it, and you need to earn a minimum number of credits in each category and in total to complete your program.

Q: Can I choose electives based on my interests?
A: Yes, student has the flexibility to choose electives that align with your personal interests and career objectives.

Q: Can I choose my preferred faculty members for certain courses?
A: During registrations prior to commencement of each semester, if a course is offered for multiple sections and if multiple faculty are teaching the same course, you will then have a choice of selecting the section being taught by that faculty under whom you wish to study.

Q: When and how do I register for courses?
A: Student must register for courses on the designated registration day. There is a one-week window for adding courses and a two-week window for dropping or changing them.

Q: Can I get an attendance waiver?
A: Students with a CGPA and SGPA of 9.00 or higher in the previous semester can get an attendance waiver for up to three courses with prior approval.

Q: What is the minimum attendance requirement for promotion?
A: 80% attendance is required for course promotion and appearing for the semester-end exam.

Q: Are there any extracurricular activities or clubs available?

A: Yes, KLEF offers various extracurricular activities and clubs, such as sports, cultural events, and student organizations.

Q: What happens if I have less than 80% attendance?
A: Upto 70% attendance, student may be eligible for condonation or marginal case consideration, but need to provide proper documentation and may be subject to fees. But falling below 70% will make you detain in the course.

Q: What happens if I detain a course?
A: Student who detained in a course must re-register for the course and study it again in summer term. If the detained course is not offered by the department, then the student can study other equivalent course from the same category upon taking approval from office of Dean Academics.

Q: What is ABC?
A: ABC enables you to digitally store your earned credits and potentially use them towards future studies at other institutions.

Q: Can I accelerate or decelerate my studies?
A: Students are generally recommended to register for 20 to 24 credits in each semester. Students who cannot cope up with such load, may consult their counsellor and Head of the Department to register in lower number of credits. This process is called "Deceleration". Students who do not register on time, may also be forced to decelerate to compensate the classwork that they missed due to late registration. In both the cases of deceleration, permission must be sought from Office of Dean Academics through proper channel. On the contrary, Students who wish to accelerate can register for upto 30 credits by selecting courses that are usually offered in later semesters and complete them in advance. Students may also use the optional Summer Term for accelerating courses upto 12 credits. In Similarly, a student may also register for credits lower than. However, you'll need approval from the Dean of Academics.

Q: Will I get my degree upon acquiring all the required credits?

A: Apart from fulfilling the total credit requirement, it is required to fulfill category and sub-category wise credit requirements and outcome requirements (which are clearly mentioned in the degree-wise credit requirements section) to be eligible for award of specific degree.

Program - Degrees(Design your own Degree)

S#	Major Flexibility	Program Addon
1	No Flexibility	No Add-on

Degree-wise Credit Requirements

1. No Flexibility with No Add-on

a) Credit Requirement **Total Credit Required: 221**

S#	Category	Sub-Category	Min-Credit	Max-Credit	Min-Courses	Max-Courses	Grouping
1	HAS	HAS-CORE	10.0	10.0	5	5	
2	BSC	BSC-CORE	9.0	10.0	4	5	
3	PCC	PCC-CORE	180.0	180.0	56	56	
4	SDC	SDC-CORE	3.0	3.0	3	3	
5	PEC	PE-1	4.0	4.0	1	1	
6	PEC	PE-2	4.0	4.0	1	1	
7	PRI	PRI-CORE	12.0	12.0	2	2	
8	OEC	OE-1	0.0	4.0	0	1	
9	OEC	OE-2	0.0	4.0	0	1	
10	OEC	OE-3	0.0	4.0	0	1	
11	VAC	VAC-CERT	0.0	0.0	3	3	
12	AUC	AUC-CAREER	0.0	0.0	1	1	

b) Outcome Requirement

- Earn a minimum of 221 credits as stipulated in the curriculum of the respective program.
- Complete all the mandatory courses (University core and College core) as prescribed in the curriculum of the respective program.
- Have obtained a minimum CGPA of 5 at the end of the program.
- Must have finished all the above-mentioned requirements in less than twice the period of the program, which includes deceleration period chosen by the student, deceleration imposed by KLEF or debarred from the KLEF.

Program Structure

S#	Cat	Sub-Cat	CourseCode	Course Title	Mode	Acrym	L	T	P	S	CR	CH	Pre-req
1	HAS	HAS-CORE	25PY1105P	COMMUNICATION SKILLS (PRACTICAL)	R	CS-P	0	0	2	0	1	2	
2	HAS	HAS-CORE	25PY1105T	COMMUNICATION SKILLS (THEORY)	R	CS-T	2	0	0	0	2	2	
3	HAS	HAS-CORE	25UC1103	LANGUAGE SKILLS	R	LS	0	0	4	0	2	4	
4	HAS	HAS-CORE	25UC1203	DESIGN THINKING FOR INNOVATION	R	DTI	0	0	4	0	2	4	
5	HAS	HAS-CORE	25UC0026	HUMAN VALUES, GENDER EQUALITY AND PROFESSIONAL ETHICS	R	UHV	2	0	0	0	2	2	
6	BSC	BSC-CORE	25PY1106RBP	REMEDIAL BIOLOGY (PRACTICAL)	R	RB-P	0	0	2	0	1	2	
7	BSC	BSC-CORE	25PY1106RBT	REMEDIAL BIOLOGY (THEORY)	R	RB-T	2	0	0	0	2	2	
8	BSC	BSC-CORE	25PY1106RMT	REMEDIAL MATHEMATICS (THEORY)	R	RM-T	2	0	0	0	2	2	
9	BSC	BSC-CORE	25PY1211P	COMPUTER APPLICATIONS IN PHARMACY (PRACTICAL)	R	CAP-P	0	0	2	0	1	2	
10	BSC	BSC-CORE	25PY1211T	COMPUTER APPLICATIONS IN PHARMACY (THEORY)	R	CAP-T	3	0	0	0	3	3	
11	BSC	BSC-CORE	25PY1212T	ENVIRONMENTAL SCIENCE (THEORY)	R	ES-T	3	0	0	0	3	3	
12	PCC	PCC-CORE	25PY2113P	PHARMACEUTICAL ORGANIC CHEMISTRY-II (PRACTICAL)	R	POC II-P	0	0	4	0	2	4	
13	PCC	PCC-CORE	25PY2113T	PHARMACEUTICAL ORGANIC CHEMISTRY-II (THEORY)	R	POC II-T	3	1	0	0	4	4	
14	PCC	PCC-CORE	25PY2114P	PHYSICAL PHARMACEUTICS I (PRACTICAL)	R	PP I-P	0	0	4	0	2	4	
15	PCC	PCC-CORE	25PY2114T	PHYSICAL PHARMACEUTICS I (THEORY)	R	PP I-T	3	1	0	0	4	4	
16	PCC	PCC-CORE	25PY2115P	PHARMACEUTICAL MICROBIOLOGY (PRACTICAL)	R	PMB-P	0	0	4	0	2	4	
17	PCC	PCC-CORE	25PY2115T	PHARMACEUTICAL MICROBIOLOGY (THEORY)	R	PMB-T	3	1	0	0	4	4	
18	PCC	PCC-CORE	25PY2116P	PHARMACEUTICAL ENGINEERING (PRACTICAL)	R	PE-P	0	0	4	0	2	4	
19	PCC	PCC-CORE	25PY2116T	PHARMACEUTICAL ENGINEERING (THEORY)	R	PE-T	3	1	0	0	4	4	
20	PCC	PCC-CORE	25PY2217T	PHARMACEUTICAL ORGANIC CHEMISTRY-III (THEORY)	R	POC III-T	3	1	0	0	4	4	
21	PCC	PCC-CORE	25PY2218P	MEDICINAL CHEMISTRY-I (PRACTICAL)	R	MC I-P	0	0	4	0	2	4	
22	PCC	PCC-CORE	25PY2218T	MEDICINAL CHEMISTRY-I (THEORY)	R	MC I-T	3	1	0	0	4	4	
23	PCC	PCC-CORE	25PY2219P	PHYSICAL PHARMACEUTICS II (PRACTICAL)	R	PP II-P	0	0	4	0	2	4	
24	PCC	PCC-CORE	25PY2219T	PHYSICAL PHARMACEUTICS II (THEORY)	R	PP II-T	3	1	0	0	4	4	

S#	Cat	Sub-Cat	CourseCode	Course Title	Mode	Acrym	L	T	P	S	CR	CH	Pre-req
25	PCC	PCC-CORE	25PY2221P	PHARMACOGNOSY AND PHYTOCHEMISTRY I (PRACTICAL)	R	PH. COG-I-	0	0	4	0	2	4	
26	PCC	PCC-CORE	25PY2221T	PHARMACOGNOSY AND PHYTOCHEMISTRY I (THEORY)	R	PH. COG-I-	3	1	0	0	4	4	
27	PCC	PCC-CORE	25PY3122T	MEDICINAL CHEMISTRY-II (THEORY)	R	MC II-T	3	1	0	0	4	4	
28	PCC	PCC-CORE	25PY3123P	INDUSTRIAL PHARMACY-I (PRACTICAL)	R	IP I-P	0	0	4	0	2	4	
29	PCC	PCC-CORE	25PY1207P	HUMAN ANATOMY AND PHYSIOLOGY II (PRACTICAL)	R	HAP II-P	0	0	4	0	2	4	
30	PCC	PCC-CORE	25PY1207T	HUMAN ANATOMY AND PHYSIOLOGY II (THEORY)	R	HAP II-T	3	1	0	0	4	4	
31	PCC	PCC-CORE	25PY1208P	PHARMACEUTICAL ORGANIC CHEMISTRY-I (PRACTICAL)	R	POC I-P	0	0	4	0	2	4	
32	PCC	PCC-CORE	25PY1208T	PHARMACEUTICAL ORGANIC CHEMISTRY-I (THEORY)	R	POC I-T	3	1	0	0	4	4	
33	PCC	PCC-CORE	25PY1209P	BIOCHEMISTRY (PRACTICAL)	R	BC-P	0	0	4	0	2	4	
34	PCC	PCC-CORE	25PY1209T	BIOCHEMISTRY (THEORY)	R	BC-T	3	1	0	0	4	4	
35	PCC	PCC-CORE	25PY1210T	PATHOPHYSIOLOGY (THEORY)	R	PATHO	3	1	0	0	4	4	
36	PCC	PCC-CORE	25PY1101P	HUMAN ANATOMY AND PHYSIOLOGY I (PRACTICAL)	R	HAP I-P	0	0	4	0	2	4	
37	PCC	PCC-CORE	25PY1101T	HUMAN ANATOMY AND PHYSIOLOGY I (THEORY)	R	HAP I-T	3	1	0	0	4	4	
38	PCC	PCC-CORE	25PY1102P	PHARMACEUTICAL ANALYSIS (PRACTICAL)	R	PA-P	0	0	4	0	2	4	
39	PCC	PCC-CORE	25PY1102T	PHARMACEUTICAL ANALYSIS (THEORY)	R	PA-T	3	1	0	0	4	4	
40	PCC	PCC-CORE	25PY1103P	PHARMACEUTICS (PRACTICAL)	R	PC-P	0	0	4	0	2	4	
41	PCC	PCC-CORE	25PY1103T	PHARMACEUTICS (THEORY)	R	PC-T	3	1	0	0	4	4	
42	PCC	PCC-CORE	25PY1104P	PHARMACEUTICAL INORGANIC CHEMISTRY (PRACTICAL)	R	PIC-P	0	0	4	0	2	4	
43	PCC	PCC-CORE	25PY1104T	PHARMACEUTICAL INORGANIC CHEMISTRY (THEORY)	R	PIC-T	3	1	0	0	4	4	
44	PCC	PCC-CORE	25PY3123T	INDUSTRIAL PHARMACY-I (THEORY)	R	IP I-T	3	1	0	0	4	4	
45	PCC	PCC-CORE	25PY3124P	PHARMACOLOGY II (PRACTICAL)	R	P.COL	0	0	4	0	2	4	
46	PCC	PCC-CORE	25PY3124T	PHARMACOLOGY II (THEORY)	R	P.COL	3	1	0	0	4	4	
47	PCC	PCC-CORE	25PY3125P	PHARMACOGNOSY AND PHYTOCHEMISTRY -II (PRACTICAL)	R	P. COG II-P	0	0	4	0	2	4	
48	PCC	PCC-CORE	25PY3125T	PHARMACOGNOSY AND PHYTOCHEMISTRY -II (THEORY)	R	P. COG II-T	3	1	0	0	4	4	
49	PCC	PCC-CORE	25PY3126T	PHARMACEUTICAL JURISPRUDENCE (THEORY)	R	PJ-T	3	1	0	0	4	4	

S#	Cat	Sub-Cat	CourseCode	Course Title	Mode	Acrym	L	T	P	S	CR	CH	Pre-req
50	PCC	PCC-CORE	25PY3227P	MEDICINAL CHEMISTRY III (PRACTICAL)	R	MC II-P	0	0	4	0	2	4	
51	PCC	PCC-CORE	25PY3227T	MEDICINAL CHEMISTRY III (THEORY)	R	MC II-T	3	1	0	0	4	4	
52	PCC	PCC-CORE	25PY3228P	PHARMACOLOGY III (PRACTICAL)	R	P.COL	0	0	4	0	2	4	
53	PCC	PCC-CORE	25PY3228T	PHARMACOLOGY III (THEORY)	R	P.COL	3	1	0	0	4	4	
54	PCC	PCC-CORE	25PY3229P	HERBAL DRUG TECHNOLOGY (PRACTICAL)	R	HDT-P	0	0	4	0	2	4	
55	PCC	PCC-CORE	25PY3229T	HERBAL DRUG TECHNOLOGY (THEORY)	R	HDT-T	3	1	0	0	4	4	
56	PCC	PCC-CORE	25PY3230T	BIOPHARMACEUTICS AND PHARMACOKINETICS (THEORY)	R	BPPK	3	1	0	0	4	4	
57	PCC	PCC-CORE	25PY3231T	PHARMACEUTICAL BIOTECHNOLOGY (THEORY)	R	PBT	3	1	0	0	4	4	
58	PCC	PCC-CORE	25PY3232T	QUALITY ASSURANCE (THEORY)	R	QA	3	1	0	0	4	4	
59	PCC	PCC-CORE	25PY4133P	INSTRUMENTAL METHODS OF ANALYSIS (PRACTICAL)	R	IMA-P	0	0	4	0	2	4	
60	PCC	PCC-CORE	25PY4133T	INSTRUMENTAL METHODS OF ANALYSIS (THEORY)	R	IMA-T	3	1	0	0	4	4	
61	PCC	PCC-CORE	25PY4134T	INDUSTRIAL PHARMACY II (THEORY)	R	IP II	3	1	0	0	4	4	
62	PCC	PCC-CORE	25PY4135T	PHARMACY PRACTICE (THEORY)	R	PP	3	1	0	0	4	4	
63	PCC	PCC-CORE	25PY4136T	NOVEL DRUG DELIVERY SYSTEM (THEORY)	R	NDDS	3	1	0	0	4	4	
64	PCC	PCC-CORE	25PY4238T	BIOSTATISTICS AND RESEARCH METHODOLOGY (THEORY)	R	BSRM	3	1	0	0	4	4	
65	PCC	PCC-CORE	25PY4239T	SOCIAL AND PREVENTIVE PHARMACY (THEORY)	R	SPP	3	1	0	0	4	4	
66	PCC	PCC-CORE	25PY2220T	PHARMACOLOGY I (THEORY)	R	P. COL	3	1	0	0	4	4	
67	PCC	PCC-CORE	25PY2220P	PHARMACOLOGY I (PRACTICAL)	R	P. COL	0	0	4	0	2	4	
68	SDC	SDC-CORE	25PY3122S	AI AND PYTHON PROGRAMMING FOR PHARMACY	R	AIPP	0	0	0	4	1	4	
69	SDC	SDC-CORE	25PY4133S	OPERATION OF ANALYTICAL INSTRUMENTS	R	OAI	0	0	0	4	1	4	
70	SDC	SDC-CORE	25PY3123S	PRODUCTION PROCESS FOR API/BULK DRUG/INTERMEDIATES	R	PP	0	0	0	4	1	4	
71	PEC	PE-1	25PY4240ET	PHARMA MARKETING MANAGEMENT (THEORY)	R	PMM	3	1	0	0	4	4	
72	PEC	PE-1	25PY4241ET	PHARMACEUTICAL REGULATORY SCIENCE (THEORY)	R	PRS	3	1	0	0	4	4	
73	PEC	PE-1	25PY4242ET	PHARMACOVIGILANCE (THEORY)	R	PV	3	1	0	0	4	4	

S#	Cat	Sub-Cat	CourseCode	Course Title	Mode	Acrym	L	T	P	S	CR	CH	Pre-req
74	PEC	PE-1	25PY4243ET	QUALITY CONTROL AND STANDARDIZATION OF HERBALS (THEORY)	R	QCSH	3	1	0	0	4	4	
75	PEC	PE-1	25PY4244ET	COMPUTER AIDED DRUG DESIGN (THEORY)	R	CADD	3	1	0	0	4	4	
76	PEC	PE-2	25PY4245ET	CELL AND MOLECULAR BIOLOGY (THEORY)	R	CMB	3	1	0	0	4	4	
77	PEC	PE-2	25PY4246ET	COSMETIC SCIENCE (THEORY)	R	CS	3	1	0	0	4	4	
78	PEC	PE-2	25PY4247ET	EXPERIMENTAL PHARMACOLOGY (THEORY)	R	EP	3	1	0	0	4	4	
79	PEC	PE-2	25PY4248ET	ADVANCED INSTRUMENTATION TECHNIQUES (THEORY)	R	AIT	3	1	0	0	4	4	
80	PEC	PE-2	25PY4249ET	DIETARY SUPPLEMENTS AND NUTRACEUTICALS (THEORY)	R	DSN	3	1	0	0	4	4	
81	PRI	PRI-CORE	25PY4250PW	PROJECT WORK	R	PW	0	0	12	0	6	12	
82	PRI	PRI-CORE	25PY4137PS	PRACTICE SCHOOL	R	PS	0	0	12	0	6	12	
83	OEC	OE-1	OEBT1001	IPR AND PATENT LAWS	R	IPRPL	3	0	0	0	3	3	
84	OEC	OE-1	OEGN1001	NATIONAL CADET CORPS - 1	R	NCC-1	2	0	4	0	4	6	
85	OEC	OE-1	OEGN1002	NATIONAL SERVICE SCHEME - 1	R	NSS-1	2	0	4	0	4	6	
86	OEC	OE-2	OEGN2007	NATIONAL SERVICE SCHEME - 2	R	NSS-2	2	0	4	0	4	6	
87	OEC	OE-2	OEME2007	TOTAL QULAITY MANAGEMENT	R	TQM	3	0	0	0	3	3	
88	OEC	OE-2	OEGN2006	NATIONAL CADET CORPS - 2	R	NCC-2	2	0	4	0	4	6	
89	OEC	OE-3	OEGN3011	NATIONAL CADET CORPS - 3	R	NCC-3	2	0	4	0	4	6	
90	OEC	OE-3	OEGN3012	NATIONAL SERVICE SCHEME - 3	R	NSS-3	2	0	4	0	4	6	
91	OEC	OE-3	OEAD3011	MEDICAL DATA ANALYTICS	R	MDA	3	0	0	0	3	3	
92	VAC	VAC-CERT	25CC3016	BASE SAS	R	BSAS	0	0	0	8	0	8	
93	VAC	VAC-CERT	25CC3069	PHARMACOVIGILANCE	R	PCV	0	0	0	8	0	8	
94	VAC	VAC-CERT	25CC3077	REGULATORY AFFAIRS	R	RGA	0	0	0	8	0	8	
95	AUC	AUC-CAREER	CRTVQRL1V1	CAMPUS RECRUITMENT: VERBAL APTITUDE TRAINING	R	CRT: VAT	0	0	0	8	0	8	
96	AUC	AUC-CAREER	CRTVQRL2V2	CAMPUS RECRUITMENT: QUANTITATIVE APTITUDE TRAINING	R	CRT: QAT	0	0	0	8	0	8	
97	AUC	AUC-CAREER	CRTVQRL3V3	CAMPUS RECRUITMENT: REASONING APTITUDE TRAINING	R	CRT: RAT	0	0	0	8	0	8	
98	AUC	AUC-CAREER	CRTCSSL1V1	CAMPUS RECRUITMENT: COMMUNICATION SKILLS TRAINING	R	CRT: CST	0	0	0	8	0	8	
99	AUC	AUC-CAREER	CRTCSSL2V2	CAMPUS RECRUITMENT: SOFT SKILLS TRAINING	R	CRT: SST	0	0	0	8	0	8	

S#	Cat	Sub-Cat	CourseCode	Course Title	Mode	Acrym	L	T	P	S	CR	CH	Pre-req
100	AUC	AUC-CAREER	CADCORL1V1	CAREER ADVANCEMENT: TRAINING IN CORE DOMAIN	R	CAD: TICD	0	0	0	8	0	8	
101	AUC	AUC-CAREER	CADUPSL1V1	CAREER ADVANCEMENT: UPSC-CIVIL SERVICES EXAM TRAINING	R	CAD: UPSC	0	0	0	8	0	8	
102	AUC	AUC-CAREER	CADENTL1V1	CAREER ADVANCEMENT:ENTREPRENEURIAL CAREER PATHWAY TRAINING	R	CAD: ECPT	0	0	0	8	0	8	
103	AUC	AUC-CAREER	CRTCODL1V1	CAMPUS RECRUITMENT: LOGIC BUILDING SKILLS TRAINING	R	CRT: LBST	0	0	0	8	0	8	
104	AUC	AUC-CAREER	CADCOML1V1	CAREER ADVANCEMENT:COMPETITIVE EXAM TRAINING	R	CAD: COM	0	0	0	8	0	8	

Program Articulation Matrix

S#	Cat	Course	CO	CO Description	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
1	HAS	25PY1105P - CS-P	CO1	Understand different types of communication process and their importance and personalize barriers & perspectives of communication.						2	2			2	
2	HAS	25PY1105P - CS-P	CO2	Determine which listening process is effective while note taking and report them based on the situation and practice written communication.	1					3	3			3	
3	HAS	25PY1105T - CS-T	CO1	Identify different types of communication process and their importance and personalize barriers & perspectives of communication							2		2	2	
4	HAS	25PY1105T - CS-T	CO2	Describe the elements of communication and employ different types of communicative styles							2		2	2	
5	HAS	25PY1105T - CS-T	CO3	Determine which listening process is effective based on the situation and practice written communication							2		3	3	
6	HAS	25PY1105T - CS-T	CO4	Apply the skills necessary for personal interview demonstrating presentation skills and illustrate the do\\'s and don\\'ts of group discussion							2		3	3	
7	HAS	25UC0026 - UHV	CO1	Understanding the basic concepts of value education						1		2			
8	HAS	25UC0026 - UHV	CO2	Gain basic understanding of principles in harmony among human beings						1		2			
9	HAS	25UC0026 - UHV	CO3	Gain knowledge in the concept of Harmony in the family and society						3		3			
10	HAS	25UC0026 - UHV	CO4	Acquire knowledge in the concepts of harmony in the nature						3		3			
11	HAS	25UC1103 - LS	CO1	Understand the essential listening, speaking, and reading skills										2	

S#	Cat	Course	CO	CO Description	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
12	HAS	25UC1103 - LS	CO2	Apply and produce essential writing and non-verbal communication skills										2	
13	HAS	25UC1203 - DTI	CO1	Understand the importance of Design thinking mindset for identifying contextualized	1										
14	HAS	25UC1203 - DTI	CO2	Analyze the problem statement by empathizing with user								2			
15	HAS	25UC1203 - DTI	CO3	Develop ideation and test the prototypes made			2								
16	HAS	25UC1203 - DTI	CO4	Explore the fundamentals of entrepreneurship skills for transforming the challenge			2								
17	BSC	25PY1106RBP - RB-P	CO1	Demonstration of experiments in biology and application of In silico models to demonstrate experiments on frog	3										
18	BSC	25PY1106RBP - RB-P	CO2	Demonstration and Identification of tissues, Determination of BP, Blood group and TV				3							
19	BSC	25PY1106RBT - RB-T	CO1	understand and Introduce biology to non-biology students	2										
20	BSC	25PY1106RBT - RB-T	CO2	remember the classification and salient features of five kingdoms of life	1										
21	BSC	25PY1106RBT - RB-T	CO3	Understand the basic components of anatomy & physiology of plant				2							
22	BSC	25PY1106RBT - RB-T	CO4	Understand the basic components of anatomy & physiology animal with special reference to human				2							
23	BSC	25PY1106RMT - RM-T	CO1	Apply the types of matrices, addition, multiplication of matrices, transpose, determinant of a matrix, of a matrix using it to solve simultaneous equations	3	3		2							

S#	Cat	Course	CO	CO Description	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
24	BSC	25PY1106RMT - RM-T	CO2	Understand the concept of different types of functions and also write the functions in terms of graphs, straight line, slopes, intersection points	2	2		2							
25	BSC	25PY1106RMT - RM-T	CO3	Understand the derivatives of constants, Derivative of the sum or difference of two functions, Conditions for a function to be a maximum or a minimum at a poin	2	2		2							
26	BSC	25PY1106RMT - RM-T	CO4	Understand the derivatives of different functions with single independent variable order, degree and solving the differential equations by using different methods	2	2		2							
27	BSC	25PY1211P - CAP-P	CO1	Apply knowledge on creating a HTML web page to show personal information, design a questionnaire , and retrieve the information of a drug				3							
28	BSC	25PY1211P - CAP-P	CO2	Apply knowledge for Drug information storage and retrieval using MS Access and Creating invoice table using MS Access.				3							
29	BSC	25PY1211T - CAP-T	CO1	Understand the Number system and different types of numbering systems, Concept of Information Systems and Software, Web technologies		2									
30	BSC	25PY1211T - CAP-T	CO2	Understand the various types of application of computers in pharmacy		2									
31	BSC	25PY1211T - CAP-T	CO3	Understand the computers in Pharmacy Drug information storage and retrieval, Pharmacokinetics, Mathematical model in Drug design		2									

S#	Cat	Course	CO	CO Description	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
32	BSC	25PY1211T - CAP-T	CO4	Understand the web-based tools for pharmacy practice		2									
33	BSC	25PY1212T - ES-T	CO1	Understand the importance of Environmental education and conservation of natural resources				3				3			
34	BSC	25PY1212T - ES-T	CO2	Understand the importance of renewable natural resources				3				3			
35	BSC	25PY1212T - ES-T	CO3	Understand the importance of ecosystems and biodiversity				3				3			
36	BSC	25PY1212T - ES-T	CO4	Understand the environmental science knowledge on solid waste management, disaster management and EIA process				3				3			
37	PCC	25PY1101P - HAP I-P	CO1	Applying the gross anatomy and functions of microscope, connective tissues, skeletal system, and understanding and performance of bleeding and clotting time	2						2				
38	PCC	25PY1101P - HAP I-P	CO2	Applying and performs the blood group analysis, ESR rate, heart rate, pulse, BP, and measurement of haemoglobin, RBC, and WBC counts	2						2				
39	PCC	25PY1101T - HAP I-T	CO1	Understand he cellular level and tissue level organisation of an organ in human body	2					2					
40	PCC	25PY1101T - HAP I-T	CO2	Understand the anatomical features and physiology of skin bone and skeletal muscle and joints and their related disorders	2					2					
41	PCC	25PY1101T - HAP I-T	CO3	Understand the anatomical and physiological functions of blood and heart and their related disorders	2					2					
42	PCC	25PY1101T - HAP I-T	CO4	Understand the physiological aspects and pathological peripheral nervous system	2					2					

S#	Cat	Course	CO	CO Description	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
43	PCC	25PY1102P - PA-P	CO1	Analyze the exact amount and concentration of chemical substances	3		3								
44	PCC	25PY1102P - PA-P	CO2	Analyze the exact amount, concentration and normality of chemical substances	3		3								
45	PCC	25PY1102T - PA-T	CO1	Outline Preparation and standardization of different molar and normal solutions. Enlist Sources, types and methods of Minimizing errors	1										
46	PCC	25PY1102T - PA-T	CO2	Understand the theories and Classifications of Volumetric titrations.	2										
47	PCC	25PY1102T - PA-T	CO3	Understand the importance of Complexometry, Masking and Demasking agents. Concepts of Redox titrations	2										
48	PCC	25PY1102T - PA-T	CO4	Illustrate Construction and working of Reference and indicator electrodes		2									
49	PCC	25PY1103P - PC-P	CO1	Apply the knowledge of preparation and labeling techniques of different solid and monophasic liquid dosage forms		3		3							
50	PCC	25PY1103P - PC-P	CO2	Apply the knowledge of preparation and labeling techniques of different types of Biphasic dosage forms and semi-solid dosage forms with its preparation, dispense and label		3		3							
51	PCC	25PY1103T - PC-T	CO1	Understand the history of profession of pharmacy, Understand the basics of different dosage forms, Understand the professional way of handling the prescription	2			2							
52	PCC	25PY1103T - PC-T	CO2	Understand the basics of pharmaceutical calculations, Understand the different powder dosage forms	2			2							

S#	Cat	Course	CO	CO Description	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
53	PCC	25PY1103T - PC-T	CO3	Understand the liquid dosage forms	2			2							
54	PCC	25PY1103T - PC-T	CO4	Understand the different semi-solid dosage forms	2			2							
55	PCC	25PY1104P - PIC-P	CO1	To Apply and Test the Limit tests for the ions and Identification tests				2							
56	PCC	25PY1104P - PIC-P	CO2	To apply and Determine the purity of various inorganic compounds and preparation of inorganic pharmaceuticals				3							
57	PCC	25PY1104T - PIC-T	CO1	To remember and classify various inorganic compounds, sources of Impurities and test for purity of Impurities	2										
58	PCC	25PY1104T - PIC-T	CO2	To Understand the monograph study of various inorganic compounds belongs to Acid base regulators, Intra & Extracellular Electrolytes	2										
59	PCC	25PY1104T - PIC-T	CO3	To Understand the monograph study of various inorganic compounds belongs to Dental products Gastro-intestinal agents	2										
60	PCC	25PY1104T - PIC-T	CO4	To Understand the monograph study of various inorganic compounds belongs to Miscellaneous agents & Radiopharmaceuticals	2										
61	PCC	25PY1207P - HAP II-P	CO1	Analysis on organization of nervous system, endocrine, integumentary and special senses; and knowledge on the , neurological, visual and reflex activity.	2						2				
62	PCC	25PY1207P - HAP II-P	CO2	Analysis on digestive, respiratory, reproductive, urinary systems, negative feedback mechanism. Analysis on family planning devices and pregnancy diagnosis test, vital organs and gonads.	2						2				

S#	Cat	Course	CO	CO Description	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
63	PCC	25PY1207T - HAP II-T	CO1	Understand the gross morphology, structure and functions of Central Nervous system and Brain.	2			2							
64	PCC	25PY1207T - HAP II-T	CO2	Understand the gross morphology, structure and functions of digestive system. Formation and role of ATP, Creatinine Phosphate and BMR	2			2							
65	PCC	25PY1207T - HAP II-T	CO3	Understand the gross morphology, structure and functions of respiratory and urinary system.	2			2							
66	PCC	25PY1207T - HAP II-T	CO4	Understand the gross morphology, structure and functions of endocrine and reproductive system. Introduction to genetics	2			2							
67	PCC	25PY1208P - POC I-P	CO1	To Apply the knowledge on the basic qualitative analysis of organic compounds	2			2							
68	PCC	25PY1208P - POC I-P	CO2	To Apply the knowledge on Synthesis of derivatives of organic compounds	2			2							
69	PCC	25PY1208T - POC I-T	CO1	To Understand the structure, name and the type of isomerism of the organic compound	2			2							
70	PCC	25PY1208T - POC I-T	CO2	To Understand the name of the reaction and orientation of reactions	2			2							
71	PCC	25PY1208T - POC I-T	CO3	To Understand the reactivity and stability of compound	2			2							
72	PCC	25PY1208T - POC I-T	CO4	To Understand the Named reactions in Organic chemistry	3			3							
73	PCC	25PY1209P - BC-P	CO1	Application and identification by qualitative and quantitative examination of carbohydrates, cholesterol, proteins and determining blood cholesterol.	3	3									
74	PCC	25PY1209P - BC-P	CO2	Application of enzymatic hydrolysis of biomolecules and salivary enzyme activity	3	3									

S#	Cat	Course	CO	CO Description	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
75	PCC	25PY1209T - BC-T	CO1	Understand the principles of chemistry in biology	2										
76	PCC	25PY1209T - BC-T	CO2	Understand the metabolic process and reactions involved in body for Carbohydrates and biological oxidation	2										
77	PCC	25PY1209T - BC-T	CO3	Understand the metabolism of lipid and amino acid molecules in physiological and pathological conditions	2										
78	PCC	25PY1209T - BC-T	CO4	Understand the genetic organization of mammalian genome and functions of DNA in the synthesis of RNAs and proteins. Understand the role of enzymes in physiology of human body	2										
79	PCC	25PY1210T - PATHO	CO1	Understand the causes, progression of injury, inflammation and repair		2									
80	PCC	25PY1210T - PATHO	CO2	Understand the causes and pathogenesis of diseases related to cardio vascular system and Central nervous system		2									
81	PCC	25PY1210T - PATHO	CO3	Understand the pathophysiology of diseases related to respiratory system and Gastro Intestinal system		2									
82	PCC	25PY1210T - PATHO	CO4	Understand the concepts of pathogenesis of different communicable diseases and cancer		2									
83	PCC	25PY2113P - POC II-P	CO1	Apply the concepts of different named reactions to synthesize organic compounds		2									
84	PCC	25PY2113P - POC II-P	CO2	Estimate quality and purity of various oils by Acid value, Saponification value, and Iodine value and discuss the purification techniques and their importance in chemistry		2									
85	PCC	25PY2113T - POC II-T	CO1	Understand Aromatic nature and type of chemical reactions of organic compound	2										

S#	Cat	Course	CO	CO Description	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
86	PCC	25PY2113T - POC II-T	CO2	Understand the reactivity of Polycyclic Aromatic compounds and different Strain theories	2										
87	PCC	25PY2113T - POC II-T	CO3	Understand about substituted Aromatic compounds, their preparation and properties	2										
88	PCC	25PY2113T - POC II-T	CO4	Understand the study of sugars, amino acids, proteins, fats and oils and effects of various parameters	2										
89	PCC	25PY2114P - PP I-P	CO1	Understand the Solubility of drugs and mechanisms of solute solvent interactions, States of Matter and properties of matter and Physicochemical properties of drug molecules				2							
90	PCC	25PY2114P - PP I-P	CO2	Apply the Concepts of Surface and interfacial phenomenon, Complexation and protein binding and determination of PH in biological systems				2							
91	PCC	25PY2114T - PP I-T	CO1	Understand the principles of colloidal systems and their properties and rheological behaviour of pharmaceutical systems	2										
92	PCC	25PY2114T - PP I-T	CO2	Understand the physical parameters in designing of dispersed systems				2							
93	PCC	25PY2114T - PP I-T	CO3	Understand the principles of particle surface characteristics in study of powdered materials and application of these concepts in designing of dosageforms				2							
94	PCC	25PY2114T - PP I-T	CO4	Understand the principles of chemical kinetics & to use them for stability testing nad determination of expiry date of formulations				2							

S#	Cat	Course	CO	CO Description	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
95	PCC	25PY2115P - PMB-P	CO1	Analysis of different equipments used in experimental microbiology, to perform the preparation of culture media and sterilization of glassware. Applying the knowledge of sterilization techniques and isolation of Pure Cultures		3		3							
96	PCC	25PY2115P - PMB-P	CO2	Analysis and apply the staining techniques of bacteria, demonstration of bacterial motility by hanging drop technique. To perform the microbiological assays of antibiotics, sterility testing of pharmaceuticals, biochemical tests of Microorganisms		3		3							
97	PCC	25PY2115T - PMB-T	CO1	Understand nutritional requirements, cultivation and preservation of various microorganisms	1										
98	PCC	25PY2115T - PMB-T	CO2	understand the importance and implementation of sterilization in pharmaceutical processing and industry	1	2									
99	PCC	25PY2115T - PMB-T	CO3	Understand the sterility testing of pharmaceutical products.and morphology,cultivation and replication of fungi and virus.	1	2									
100	PCC	25PY2115T - PMB-T	CO4	Understand microbiological standardization of Pharmaceuticals.	1	2		3							
101	PCC	25PY2116P - PE-P	CO1	Apply various unit operations used in pharmaceutical industries and material handling techniques		2									
102	PCC	25PY2116P - PE-P	CO2	Apply various processes involved in pharmaceutical manufacturing and the operation of pharmaceutical manufacturing equipment		2									

S#	Cat	Course	CO	CO Description	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
103	PCC	25PY2116T - PE-T	CO1	Understand the concept of flow of fluids and various principles and equipments involved in size separation and size reduction techniques		2									
104	PCC	25PY2116T - PE-T	CO2	Understand the concept of Heat transfer and principles and equipments involved in evaporation and distillation		2									
105	PCC	25PY2116T - PE-T	CO3	Apply the concepts of drying and mixing in operation of pharmaceutical manufacturing dosage forms		2									
106	PCC	25PY2116T - PE-T	CO4	Understand various materials involved in pharmaceutical manufacturing process, principles and equipments involved in filtration and centrifugation		2									
107	PCC	25PY2217T - POC III-T	CO1	Learn stereoisomerism and racemic modification of compound	2										
108	PCC	25PY2217T - POC III-T	CO2	Understand sterereo specific reactions and its nomenclature of given organic compounds	2										
109	PCC	25PY2217T - POC III-T	CO3	Understand nomenclature rules, synthesis and its reactions for heterocyclic compounds	2										
110	PCC	25PY2217T - POC III-T	CO4	Understand preparative methods, medicinal uses of heterocyclic drugs and Study of Named reactions.	2										
111	PCC	25PY2218P - MC I-P	CO1	Apply the various chemical reactions to perform chemical synthesis of some drugs and their intermediates.				3							
112	PCC	25PY2218P - MC I-P	CO2	Apply qualitative technique to perform the assays for few drugs to identify its purity and to determination of a physical property, partition coefficient for few drugs				3							

S#	Cat	Course	CO	CO Description	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
113	PCC	25PY2218T - MC I-T	CO1	Understand the correlation of pharmacology of a disease with physico-chemical properties of drugs	2										
114	PCC	25PY2218T - MC I-T	CO2	Understand the chemistry, metabolic pathways, structure activity relationship and therapeutic value of adrenergic drugs	2										
115	PCC	25PY2218T - MC I-T	CO3	Understand the chemistry, metabolic pathways, structure activity relationship and therapeutic value of cholinergic drugs				2							
116	PCC	25PY2218T - MC I-T	CO4	Understand the chemistry, metabolic pathways, structure activity relationship and therapeutic value of CNS drugs				2							
117	PCC	25PY2219P - PP II-P	CO1	Apply the principles of colloidal systems and their properties and rheological behaviour of pharmaceutical systems and physical parameters in designing of dispersed systems	2										
118	PCC	25PY2219P - PP II-P	CO2	Apply the principles of particle surface characteristics in study of powdered materials and application of these concepts in designing of dosage forms and the principles of chemical kinetics & to use them for stability testing and determination of expiry date of formulations	2										
119	PCC	25PY2219T - PP II-T	CO1	Apply the principles of colloidal systems and their properties and rheological behaviour of pharmaceutical systems	3			3							
120	PCC	25PY2219T - PP II-T	CO2	Application of physical parameters in designing of dispersed systems	3			3							

S#	Cat	Course	CO	CO Description	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
121	PCC	25PY2219T - PP II-T	CO3	Apply the principles of particle surface characteristics in study of powdered materials and application of these concepts in designing of dosageforms	3			3							
122	PCC	25PY2219T - PP II-T	CO4	Apply the principles of chemical kinetics & to use them for stability testing nad determination of expiry date of formulations	3			3							
123	PCC	25PY2220P - P. COL I-P	CO1	Apply basic principles of pharmacology and common laboratory techniques		2	3								
124	PCC	25PY2220P - P. COL I-P	CO2	Analyse the effect of drugs using various pharmacological equipments(Insilico)		2	3								
125	PCC	25PY2220T - P. COL I-T	CO1	Understand the pharmacological actions of different categories of drugs	3			2							
126	PCC	25PY2220T - P. COL I-T	CO2	Understand the mechanism of drug action at the organ system/subcellular/macromolecular level	3			2							
127	PCC	25PY2220T - P. COL I-T	CO3	Apply the basic knowledge of pharmacology in PNS	3			2							
128	PCC	25PY2220T - P. COL I-T	CO4	Apply the principles of pharmacology of drugs on CNS	3			2							
129	PCC	25PY2221P - PH. COG-I-P	CO1	Applying the knowledge of chemical evaluation in identifying and physical evaluation of crude drugs	2			2							
130	PCC	25PY2221P - PH. COG-I-P	CO2	Applying the knowledge of microscopical evaluation of crude drugs by linear measurements and leaf constants	2			2							
131	PCC	25PY2221T - PH. COG-I-T	CO1	Understand the knowledge of crude drugs and its evaluation	2			2							

S#	Cat	Course	CO	CO Description	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
132	PCC	25PY2221T - PH. COG-I-T	CO2	Understand the cultivation, collection and processing of crude drugs	2			2							
133	PCC	25PY2221T - PH. COG-I-T	CO3	Understand the traditional systems of medicine and a brief introduction about secondary metabolites	2			2							
134	PCC	25PY2221T - PH. COG-I-T	CO4	Understand primary metabolites and marine source of drugs	2			2							
135	PCC	25PY3122T - MC II-T	CO1	Understanding the nomenclature, chemistry, metabolism, structure- activity relationship, mechanism of action, synthesis (few drugs) and uses of antihistamine and antineoplastic drugs	2			2							
136	PCC	25PY3122T - MC II-T	CO2	Understanding the nomenclature, chemistry, metabolism, structure- activity relationship, mechanism of action, synthesis (few drugs) and uses of anti-anginal, antihypertensive and diuretic drugs	2			2							
137	PCC	25PY3122T - MC II-T	CO3	Applying the knowledge of the nomenclature, chemistry, metabolism, structure-activity relationship, mechanism of action, synthesis (few drugs) and uses of anti-arrhythmic, anticoagulant, antihyperlipidemic and local anaesthetic drugs and drug used in cardiac failure	3			2							
138	PCC	25PY3122T - MC II-T	CO4	Applying the knowledge of the nomenclature, chemistry, metabolism, structure-activity relationship, mechanism of action, synthesis (few drugs) and uses of antidiabetic drugs, hormones and steroid drugs	3			2							

S#	Cat	Course	CO	CO Description	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
139	PCC	25PY3123P - IP I-P	CO1	Estimate the Physicochemical properties of drug that influences the performance of drug and dosage from and preparation and evaluation of capsules and coated tablets		2									
140	PCC	25PY3123P - IP I-P	CO2	examine preparation and evaluation of injections and creams			2								
141	PCC	25PY3123T - IP I-T	CO1	Know about Physicochemical properties of drug that influences the performance of drug and dosage from.	2	2									
142	PCC	25PY3123T - IP I-T	CO2	Understand the formulation, manufacturing, evaluation of tablets, liquid orals, capsules and pelletization.	2	2									
143	PCC	25PY3123T - IP I-T	CO3	understand different considerations related to parenterals and ophthalmic products	2	2									
144	PCC	25PY3123T - IP I-T	CO4	Understand the formulation, preparation and evaluation of cosmetics and aerosols. A note on packaging materials for pharmaceutical products	2	2									
145	PCC	25PY3124P - P.COL II-P	CO1	Analyse the pharmacological activity of drugs on Cardiac and Renal system and dose responses on isolated tissues (Insilco		2									
146	PCC	25PY3124P - P.COL II-P	CO2	Analyse the potency of drugs by Bioassays and the effect of drugs on analgesic and inflammation			2								
147	PCC	25PY3124T - P.COL II-T	CO1	Understand the pharmacology of cardio vascular system drugs: congestive heart failure drugs, Anti hypertensive drugs, Anti anginal drugs, Anti arrhythmic drugs, Anti hyperlipidemic drugs	2			2							

S#	Cat	Course	CO	CO Description	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
148	PCC	25PY3124T - P.COL II-T	CO2	Understand the pharmacology of shock, Hematinics, coagulants and anticoagulants, Fibrinolytics and anti - platelet drugs, diuretics and autocoids	2			2							
149	PCC	25PY3124T - P.COL II-T	CO3	Understand the Pharmacology of drugs acting on endocrine system. Anterior Pituitary hormones, Thyroid hormones, Insulin, Oral Hypoglycemic agents and glucagon, ACTH and corticosteroids.	2			2							
150	PCC	25PY3124T -	CO4	Apply the principles of Bio -Assays	2			2							
151	PCC	25PY3125P - P. COG II-P	CO1	Apply various chemical tests to Identification of phytoconstituents in the crude drugs			2								
152	PCC	25PY3125P - P. COG II-P	CO2	Examine the Isolation and detection of Phytoconstituents from crude drugs			2								
153	PCC	25PY3125T - P. COG II-T	CO1	Understand the importance of the basic metabolic pathways occurring in higher plants	2										
154	PCC	25PY3125T - P. COG II-T	CO2	Understand the importance of biological sources of various crude drugs	2										
155	PCC	25PY3125T - P. COG II-T	CO3	Understand the extraction procedures of crude drugs		2									
156	PCC	25PY3125T - P. COG II-T	CO4	Application of various techniques involved in production of the phytoconstituents and identification of it.		2									
157	PCC	25PY3126T - PJ-T	CO1	Understand Pharmaceutical legislations and their implications in the development and marketing of pharmaceuticals.									2		
158	PCC	25PY3126T - PJ-T	CO2	Understand Various Indian Pharmaceutical Acts and Laws such as Drugs and Cosmetics Act and its rules									2		

S#	Cat	Course	CO	CO Description	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
159	PCC	25PY3126T - PJ-T	CO3	Understand The regulatory authorities and agencies governing the manufacture and sale of pharmaceuticals									2		
160	PCC	25PY3126T - PJ-T	CO4	Understand The code of ethics, laws and regulations during the pharmaceutical practice									3		
161	PCC	25PY3227P - MC II-P	CO1	Analysing the Preparation of drugs and intermediates like 1. Sulphanilamide,2. 7 Hydroxy, 4 methyl coumarin 3. Chlorobutanol 4. Triphenyl imidazole 5. Tolbutamide 6. Hexamine. Assay of drugs like 1. Isonicotinic acid hydrazide 2. Chloroquine 3. Metronidazole 4. Dapsone 5. Chlorpheniramine maleate 6. Benzyl penicillin		3		3							
162	PCC	25PY3227P - MC II-P	CO2	Analysing the Preparation of medicinally important compounds or intermediateslike aspirin, paracetamol by Microwave irradiation technique.Drawing structures and reactions using chem draw Determination of physicochemical properties such as logP, clogP, MR, Molecular weight, Hydrogen bond donors and acceptors for class of drugs course content using drug design software Drug likeliness screening Lipinskies RO5		3		3							
163	PCC	25PY3227T - MC II-T	CO1	Understand the chemistry, SAR, classification of different Beta lactam, Aminoglycoside, Tetracyclines, Macrolides antibiotics, the concept of prodrug.	2		2						2		
164	PCC	25PY3227T - MC II-T	CO2	Understand the chemistry, SAR, classification of different Antimalarials, Anti tubercular agents, Anti protozoal, Anthelmintics antibiotics.	2		2						2		

S#	Cat	Course	CO	CO Description	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
165	PCC	25PY3227T - MC II-T	CO3	Understand the chemistry, SAR, classification of different Urinary tract Anti-Infective agents, Anti- viral, Anti-fungal antibiotics.	2		2						2		
166	PCC	25PY3227T - MC II-T	CO4	Understand the chemistry, SAR, classification of different Sulfonamides and sulfones. Know the importance of QSAR of drugs rug design and combinatorial chemistry	2		2						2		
167	PCC	25PY3228P - P.COL III-P	CO1	Obtain the knowledge on introduction to experimental Pharmacology, common laboratory animals, agonist and antagonist activities of drugs on isolated tissues Get trained on screening of anti allergic drugs , anti ulcer drugs and gastro intestinal activity.	3	3		3							
168	PCC	25PY3228P - P.COL III-P	CO2	Estimation of different biochemical parameters using semi auto analyzer and obtain a Knowledge on screening of hypo glyceamic drugs, Pyrogen testing. Trained in performing of toxicity studies, and get knowledge in application of Biostatistics in Pharmacological research.	3	3		3							
169	PCC	25PY3228T - P.COL III-T	CO1	understand the pharmacology of drugs acting on Respiratory and digestive system	2			2							
170	PCC	25PY3228T -	CO2	understand the pharmacology of chemotherapy	2			2							
171	PCC	25PY3228T - P.COL III-T	CO3	understand the immuno pharmacology and principles of animal toxicology	2			2							
172	PCC	25PY3228T - P.COL III-T	CO4	Comprehend the principles of toxicology and treatment of various poisonings	2			2							
173	PCC	25PY3229P - HDT-P	CO1	Analyze the preliminary screening and determination of phytochemical constituents			2								

S#	Cat	Course	CO	CO Description	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
174	PCC	25PY3229P - HDT-P	CO2	Analyze and Evaluation of natural origins and application of herbal products in cosmetics		2									
175	PCC	25PY3229T - HDT-T	CO1	Apply the knowledge on formulation of Ayurvedic dosage form understand raw material as source of herbal drugs from cultivation to herbal drug product.			2								
176	PCC	25PY3229T - HDT-T	CO2	Understand the concept of Nutraceuticals and their role in ailments like Diabetes, CVS diseases, Cancer, Irritable bowel syndrome and various Gastrointestinal diseases		2									
177	PCC	25PY3229T - HDT-T	CO3	Apply the knowledge on formulation of Herbal Cosmetics using Herbal excipients			2								
178	PCC	25PY3229T - HDT-T	CO4	Understand the WHO and ICH guidelines for evaluation of herbal drugs. Understand Regulatory Issues -Regulations in India and Schedule T		2									
179	PCC	25PY3230T - BPPK	CO1	Understand the basic concepts in biopharmaceutics and pharmacokinetics and their significance.	2										
180	PCC	25PY3230T - BPPK	CO2	understand the concepts of bioavailability and bioequivalence of drug products and their significance.	2										
181	PCC	25PY3230T - BPPK	CO3	understand the Use of plasma drug concentration-time data to calculate the pharmacokinetic parameters to describe the kinetics of drug absorption, distribution, metabolism, excretion, elimination	2										
182	PCC	25PY3230T - BPPK	CO4	Understand various pharmacokinetic parameters, their significance & applications.	2										

S#	Cat	Course	CO	CO Description	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
183	PCC	25PY3231T - PBT	CO1	Understand the importance of Immobilized enzymes and fermentation technology in Pharmaceutical Industries	3			3							
184	PCC	25PY3231T - PBT	CO2	Understand Genetic engineering applications in relation to production of pharmaceuticals	3			3							
185	PCC	25PY3231T - PBT	CO3	Understand the importance of immunity and Importance of preparation of immunological preparation and Monoclonal antibodies in Industries	3			3							
186	PCC	25PY3231T - PBT	CO4	Understand the use of microorganisms in biotransformation with fermentation technology	3			3							
187	PCC	25PY3232T - QA	CO1	Understand the cGMP aspects in a pharmaceutical industry	2								2		
188	PCC	25PY3232T - QA	CO2	Understand the importance of organization and personnel	2								2		
189	PCC	25PY3232T - QA	CO3	Understand the scope of quality certifications applicable to pharmaceutical industries	2								2		
190	PCC	25PY3232T - QA	CO4	Understand the responsibilities of QA & QC departments	2								2		
191	PCC	25PY4133P - IMA-P	CO1	Application through estimation of samples by spectroscopic methods	3			3							
192	PCC	25PY4133P - IMA-P	CO2	Application through determination of samples by Chromatographic and Spectroscopic methods	3			3							
193	PCC	25PY4133T - IMA-T	CO1	Understand the intensity and wavelength distribution of absorption and emission spectrum after excitation by a certain spectrum of light		2		2							

S#	Cat	Course	CO	CO Description	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
194	PCC	25PY4133T - IMA-T	CO2	Understand and Interpret chemical compounds by molecular vibrations and identify chemical elements by measuring emitted light intensity, on absorption of optical radiation by free atoms and measuring intensities of scattered and emitted light through samples		2		2							
195	PCC	25PY4133T - IMA-T	CO3	Understand the concepts of Chromatography and techniques used in resolving complex mixtures into individual compounds.		2		2							
196	PCC	25PY4133T - IMA-T	CO4	Understand and acquire knowledge on various instrumental procedure involving Chromatographic principles.		2		2							
197	PCC	25PY4134T - IP II	CO1	Understand the process of pilot plant and scale up of pharmaceutical dosage forms	2			2							
198	PCC	25PY4134T - IP II	CO2	Understand the process of technology transfer from lab scale to commercial batch	2			2							
199	PCC	25PY4134T - IP II	CO3	Understand different Laws and Acts that regulate pharmaceutical industry	2			2							
200	PCC	25PY4134T - IP II	CO4	Application of the approval process and regulatory requirements for drug products	2			2							
201	PCC	25PY4135T - PP	CO1	Understand hospital organization and its functions along with application of ADRs.	3		3					3			
202	PCC	25PY4135T - PP	CO2	Understand various drug distribution methods, TDM and medication adherence of patients	3							3			
203	PCC	25PY4135T - PP	CO3	Understand in detail about PTC, Drug information services and patient counselling	3		3					3			
204	PCC	25PY4135T - PP	CO4	Understand and apply the activities of clinical pharmacists along with investigation of laboratory data	3		3								

S#	Cat	Course	CO	CO Description	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
205	PCC	25PY4136T - NDDS	CO1	Understand the Various approaches of controlled drug delivery system and Microspheres	2			2							
206	PCC	25PY4136T - NDDS	CO2	Understand the various approaches for development of Mucosal and implantable drug delivery system.	2			2							
207	PCC	25PY4136T - NDDS	CO3	Understand the approaches and Evaluation of Transdermal, Gastro retentive and Naso pulmonary drug delivery system.	2			2							
208	PCC	25PY4136T - NDDS	CO4	Apply the concept and approaches ocular and targeting methods such as liposomes, niosomes, and nanoparticles.	2			2							
209	PCC	25PY4238T - BSRM	CO1	Apply Graphical representation of a given numerical data through its frequency distribution and also calculation of various measures of location and dispersion.	3		3								
210	PCC	25PY4238T - BSRM	CO2	Apply the chances of occurrences of an event through various probability distributions and fit a curve by using principle of least squares	3		3								
211	PCC	25PY4238T - BSRM	CO3	Apply ANOVA technique to construct Completely randomized design, randomized block design, Latin square design	3		3								
212	PCC	25PY4238T - BSRM	CO4	Apply statistical tests for large and small samples to test the hypothesis. and Analyze the variance by using completely randomized, randomized, Latin square designs and also apply queuing models to the real world problems	3										

S#	Cat	Course	CO	CO Description	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
213	PCC	25PY4239T - SPP	CO1	Understand current issues related to health and pharmaceutical problems within the country and worldwide.	3					3			3		
214	PCC	25PY4239T - SPP	CO2	Applying current healthcare development for a critical way of thinking.						3			3		
215	PCC	25PY4239T - SPP	CO3	Understanding alternative ways of solving problems related to health issues through various healthcare programs.						3			3		
216	PCC	25PY4239T - SPP	CO4	Understanding alternative ways of solving problems related to sanitation and hygiene						3			3		
217	PRI	25PY4137PS - PS	CO1	Educational initiatives seeking to introduce industry perspective in education.	3										
218	PRI	25PY4137PS - PS	CO2	Acquire learning by applying the knowledge and the skills they possess		3									
219	PRI	25PY4137PS - PS	CO3	Simulation of the Industry environment into the process of education		3									
220	PRI	25PY4137PS - PS	CO4	Industrial training through experimental and cooperative learning			3	3							
221	PRI	25PY4137PS - PS	CO5	Promotes Partnership and intellectual exchange between academia and industry							3				
222	PRI	25PY4250PW - PW	CO1	Application of Pharmacy in clinical settings							3				
223	PRI	25PY4250PW - PW	CO2	Application of modern tools usage			3								
224	PRI	25PY4250PW - PW	CO3	Application of pharmacy knowledge in communication skills and ethics									3		3
225	PRI	25PY4250PW - PW	CO4	Application of Pharmacy knowledge in research development				3							
					2.2	2.2	2.5	2.3	NaN	2.4	2.2	2.8	2.4	2.4	3

Y25: B.Pharmacy

Category: Humanities Arts And Social Sciences (HAS)

25PY1105P - COMMUNICATION SKILLS (PRACTICAL) (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
25PY1105P	COMMUNICATION SKILLS (PRACTICAL)	CS-P	R	0	0	2	0	1

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Understand different types of communication process and their importance and personalize barriers & perspectives of communication.	2	PO6, PO7, PO10
CO2	Determine which listening process is effective while note taking and report them based on the situation and practice written communication.	3	PO1, PO6, PO7, PO10

Syllabus

Meeting people Asking questions Making friends What did you do? Dos and Donts Pronunciation (Consonant sounds) Pronunciation and Nouns Pronunciation (Vowel sounds) Listening Comprehension Figures of speech

Effective communication (note making, note taking, agenda) Minutes, briefing, di-briefing, summarizing Interview handling skills Interview handling skills E-mail etiquette Presentation skills Presentation skills

Reference Books

1 Basic Communication skills for Technology, Andreja. J. Rutherford, 2nd Edition, 2011, Pearson Edition.

2 Communication skills, Sanjay Kumar, Pushalatha, 1st edition, 2011, Oxford press.

3 Developing your influencing skills, Deborah Dalley, Lois Burton, Margaret, Green hall, 1st edition, 2010, Universe of Learning LTD.

4 Personality development and Soft skills, Barun K Mitra, 1st edition, 2011, Oxford Press.

5 Soft Skill for everyone, Butter Field, 1st edition, 2011, Cengage Learning India Pvt ltd.

25PY1105T - COMMUNICATION SKILLS (THEORY) (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
25PY1105T	COMMUNICATION SKILLS (THEORY)	CS-T	R	2	0	0	0	2

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Identify different types of communication process and their importance and personalize barriers & perspectives of communication	2	PO7, PO9, PO10
CO2	Describe the elements of communication and employ different types of communicative styles	2	PO7, PO9, PO10
CO3	Determine which listening process is effective based on the situation and practice written communication	3	PO7, PO9, PO10
CO4	Apply the skills necessary for personal interview demonstrating presentation skills and illustrate the do\\'s and don\\'ts of group discussion	3	PO7, PO9, PO10

Syllabus

Communication skills: Introduction, definition, the importance of communication, communication process: source, message, encoding, channel, decoding, receiver, feedback, context. Barriers to communication: Physiological barriers, physical barriers, cultural barriers, language barriers, gender barriers, gender barriers, interpersonal barriers, psychological barriers, emotional barriers. Perspectives of communication: Introduction, visual perception, language, other factors affecting our perspective past experiences, prejudices, feelings, environment

Elements of communication: Introduction, face to face communication: tone of voice, body language, non-verbal communication, verbal communication, physical communication. Communication styles: Introduction, the communication styles matrix with example for each direct communication style, spirited communication style, systematic communication style, considerate communication style

Basic listening skills : Introduction, self awareness, active listening, becoming an active listener, listening in difficult situations Effective written communication: Introduction, when and when not to use written communication complexity of the topic, amount of discussion required, shades of meaning, formal communication Writing effectively: Subject lines, put the main point first, know your audience, organisation of the message

Interview Skills: Purpose of an interview, Dos and Donts of an interview, Giving presentations: Dealing with fears, planning your presentation, structuring your presentation, delivering your presentation, techniques of delivery. Group discussion: Introduction, communication skills in group discussion, Dos and Donts of group discussion

Reference Books

1 Basic Communication skills for Technology, Andreja. J. Rutherford, 2nd Edition, 2011., Pearson Edition.

2 Communication skills, Sanjay Kumar, Pushalatha, 1st edition, 2011, Oxford press.

3 Organizational behaviour, Stehen.P.Robbins, 1st edition, 2013, Pearson.

4 Soft Skill for everyone, Butter Field, 1st edition, 2011, Cengage Learning India Pvt ltd.

5 The Ace of Soft Skills: Attitude, Communication and Etiquette for Success, Gopala Swamy Ramesh, 5th edition, 2013, Pearson.

25UC0026 - HUMAN VALUES, GENDER EQUALITY AND PROFESSIONAL ETHICS (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
25UC0026	HUMAN VALUES, GENDER EQUALITY AND PROFESSIONAL ETHICS	UHV	R	2	0	0	0	2

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Understanding the basic concepts of value education	2	PO6, PO8
CO2	Gain basic understanding of principles in harmony among human beings	2	PO6, PO8
CO3	Gain knowledge in the concept of Harmony in the family and society	3	PO6, PO8
CO4	Acquire knowledge in the concepts of harmony in the nature	4	PO6, PO8

Syllabus

Introduction to Human Values Understanding Value, Self-exploration as the Process for identifying Value, Continuous Happiness and Prosperity The Basic Human Aspirations, Right Understanding, Relationship and Physical Facilities, Happiness and Prosperity Current Scenario, Method to fulfil the Basic Human Aspirations Harmony in the Human Being Understanding the Human Being as Coexistence of Self I and Body, Discriminating between the Needs of the Self and the Body, The Body as an Instrument of I, Understand Harmony in the Self I, Harmony of the Self I with the Body.

Understanding Harmony in the Family and Society The Basic Unit of Human Interaction, Values in Human to Human Relationships, Vision for the Universal Human Order Harmony in the Nature Existence Understand Harmony in the Nature, Interconnectedness, Self regulation and Mutual Fulfillment among the Four Orders of Nature, Realizing Existence is Coexistence at All Levels, The Holistic Perception of Harmony in Existence.

What is Gender, and Why Should We Study It? Gender Equality Milestones, The Context Today Socialisation Making Women, Making Men Preparing for Womanhood, Preparing for Manhood, Different Masculinities, Unrecognised and Unaccounted For, Wage Differentials between Women and Men, Women in the Working Environment . Being Boy A Village Boyhood, School Days, College Styles, Ek Ladki Ko Dekha Toh Sexual Harassment SAY NO! Sexual Harassment, Not EveTeasing, Consent and Relationships, Coping with Everyday Harassment Becoming Man A Dangerous Model of Masculinity, Changing Masculinities, Imprints of Masculinity, Family

Implications of the Right Understanding a Look at Professional Ethics Natural Acceptance of Human Values, Definitiveness of Ethical Human Conduct, A Basis for Humanistic Education, Humanistic Constitution and Universal Human Order, Competence in Professional Ethics, Holistic Technologies, Production Systems and Management Models Typical Case Studies, Strategies for Transition towards Valuebased Life and Profession

Reference Books

1. A Foundation Course in Human Values and Professional Ethics, R R Gaur, R Sangal and G PBagaria, 1, Penguin press,Excel Books.
2. Seeing like a Feminist, Menon, Nivedita, 1, Excel Books. , Zubaan.
3. A Foundation Course in Human Values and Professional Ethics, R.R. Gaur, R. Sangal, G.P. Bagaria, 1, Excel Books / Penguin Press.

25UC1103 - LANGUAGE SKILLS (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
25UC1103	LANGUAGE SKILLS	LS	R	0	0	4	0	2

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Understand the essential listening, speaking, and reading skills	2	PO10
CO2	Apply and produce essential writing and non-verbal communication skills	3	PO10

Syllabus

Techniques of Effective Listening, Listening and Comprehension Probing Questions, Barriers to Listening. Speaking: Pronunciation, Enunciation, Vocabulary Fluency, Common Errors Reading :Techniques of Effective Reading, Gathering Ideas and Information from a Given Text

WritingWriting: Clearly State the Claims, Avoid Ambiguity, Vagueness, Unwanted Generalizations, and Oversimplification of Issues, provide Background Information, Effectively Argue the Claim, Provide Evidence for the Claims. , Non- verbal Communication

Reference Books

1 On Writing Well: The Classic Guide to Writing Nonfiction, William Zinsser, 1st Edition, 2016, Harper Perennial.

2 Speaking English Effective (English) , Krishna Mohan & N P Singh, 2nd Edition, 2005, Laxmi Publications-New Delhi,.

3 Effective speech, Richard W.Clark,, 1st Edition, 1988, Glencoe Pub..

4 The Ace of Soft skills, Mr. Gopalaswamy Ramesh et alMr. Gopalaswamy Ramesh et al, 1st edition,2010, Pearson Publications.

5 Body Language: How to Read Others' Thoughts by Their Gestur, Allan Pease, 1st Edition, Sheldon Press.

25UC1203 - DESIGN THINKING FOR INNOVATION (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
25UC1203	DESIGN THINKING FOR INNOVATION	DTI	R	0	0	4	0	2

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Understand the importance of Design thinking mindset for identifying contextualized	2	PO1
CO2	Analyze the problem statement by empathizing with user	4	PO8
CO3	Develop ideation and test the prototypes made	3	PO3
CO4	Explore the fundamentals of entrepreneurship skills for transforming the challenge	2	PO3

Syllabus

Introduction to Design Thinking and Innovation: Introduction to design thinking and its principles, Design definitions and stories, desirability, feasibility, viability, mystery, heuristics, algorithm, requirements, patterns, connect, blind spots; Laws of Design Thinking: less is more, last 2% equals 200%, theory of prioritization; Design mind: definitions, 5 forces of growth (SEPIA), 5 frictional forces (DCAFE), 3 capacity levers (VAL), Design thinking for contextualized problem-solving, Incorporating sustainable development goals into design thinking

Design Thinking Process: Overview of the design thinking process, Design framework (L0); Empathy research: understanding user needs and perspectives, Persona development: creating user profiles; Customer journey mapping: visualizing user experiences, Define phase: asking the right questions and problem statement formulation.

Ideation, Prototyping and Testing: Ideation techniques, brainstorming and generating creative ideas, Identifying patterns and anti-patterns in ideation, Evaluation of ideas using different criteria (10/100/1000 gm): Prototyping and testing: translating ideas into tangible prototypes.

Entrepreneurial Innovation: Introduction to innovation management, Basics of business models and their role in innovation, Financial estimation for innovation projects: Pitch decks: creating persuasive presentations for innovation, Considerations for intellectual property rights (IPR) in innovation.

Reference Books

1 Design Thinking in the Classroom, David Lee, Kindle, Ulysses Press.

2 Unmukt Science and Art of Design Thinking, Arun Jain, 2019, School of Design Thinking.

3 The Design Thinking Play Book, Michael Lewrick, Patrick Link, Larry Leifer, 2018, Wiley Press.

4 The Art of Innovation: Lessons in Creativity from IDEO, America, Tom Kelley, Jonathan Littman, Tom Peters, 2001, Doubleday Broadway Publishing, USA.

Y25: B.Pharmacy

Category: Basic Science Courses (BSC)

25PY1106RBP - REMEDIAL BIOLOGY (PRACTICAL) (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
25PY1106RBP	REMEDIAL BIOLOGY (PRACTICAL)	RB-P	R	0	0	2	0	1

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Demonstration of experiments in biology and application of In silico models to demonstrate experiments on frog	3	PO1
CO2	Demonstration and Identification of tissues, Determination of BP, Blood group and TV	3	PO4

Syllabus

1. Introduction to experiments in biology: Study of Microscope, Section cutting techniques, Mounting and staining, Permanent slide preparation 2. Study of cell and its inclusions 3. Study of Stem, Root, Leaf, seed, fruit, flower and their modifications 4. Detailed study of frog by using computer models

1. Microscopic study and identification of tissues pertinent to Stem, Root Leaf, seed, fruit and flower 2. Identification of bones 3. Determination of blood group 4. Determination of blood pressure 5. Determination of tidal volume

Reference Books

1 A Text book of Biology , S. B. Gokhale (Author), Dr. M. G. Kalaskar (Author), Dr. Y. A. Kulkarni (Author), 2nd edition,2019, Nirali Prakashan.

2 A Text book of Biology, Dr. Thulajappa and Dr. Seetaram, 2nd edition, June 1, 2015, Cengage Learning India Private Limited;.

3 A Text book of Biology, Naidu and Murthy, 1st edition,1988, Bangalore Prakasha Sahithya .

4 A Text book of Biology, B.V. Sreenivasa Naidu, 1st edition, 1988, Bangalore Prakasha Sahithya.

25PY1106RBT - REMEDIAL BIOLOGY (THEORY) (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
25PY1106RBT	REMEDIAL BIOLOGY (THEORY)	RB-T	R	2	0	0	0	2

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	understand and Introduce biology to non-biology students	2	PO1
CO2	remember the classification and salient features of five kingdoms of life	1	PO1
CO3	Understand the basic components of anatomy & physiology of plant	2	PO4
CO4	Understand the basic components of anatomy & physiology animal with special reference to human	2	PO4

Syllabus

Living world: Definition and characters of living organisms, Diversity in the living world, Binomial nomenclature.

Five kingdoms of life and basis of classification. Salient features of Monera, Potista, Fungi, Animalia and Plantae, Virus. Morphology of Flowering plants: Morphology of different partsof flowering plants Root, stem,inflorescence, flower, leaf, fruit,seed. General Anatomy of Root, stem, leaf of monocotyledons and Dicotylidones.

Plants and mineral nutrition: Essential mineral, macro and micronutrients, Nitrogen metabolism, Nitrogen cycle, biological nitrogen fixation. Photosynthesis: Autotrophic nutrition, photosynthesis, Photosynthetic pigments, Factors affecting photosynthesis. Plant respiration: Respiration, glycolysis,fermentation (anaerobic). Plant growth and development: Phases and rate of plant growth, Conditionof growth, Introduction to plant growth regulators. Cell The unit of life: Structure and functions of cell and cell organelles. Cell division. Tissues: Definition, types of tissues, location and functions

Body fluids and circulation: Composition of blood, blood groups, coagulation of blood. Compositionand functions of lymph. Human circulatory system. Structure of human heart and blood vessels. Cardiac cycle, cardiac output and ECG. Digestion and Absorption: Human alimentary canal and digestive glands. Role of digestive enzymes. Digestion, absorption and assimilation of digested food. Breathingand respiration: Human respiratory system. Mechanism of breathing and its regulation. Exchange of gases, transport of gases and regulation ofrespiration. Respiratory volumes Excretory products and their elimination: Modes of excretion, Human excretory systemstructure and function, Urine formation, Rennin angiotensin system. Neural control and coordination: Definition and classification of nervous system, Structure of a neuron, Generation and conduction of nerve impulse, Structure of brain and spinal cord, Functions of cerebrum, cerebellum, hypothalamus and medullaoblongata. Chemical coordination and regulation: Endocrine glands and theirsecretions,Functions of hormones secreted by endocrine glands. Human reproduction: Parts of female reproductive system, Parts of male reproductive system, Spermatogenesis and Oogenesis, Menstrual cycle

Reference Books

1. A Text book of Biology, S. B. Gokhale (Author), Dr. M. G. Kalaskar (Author), Dr. Y. A. Kulkarni (Author), 2nd edition,2019, Nirali Prakashan .
2. A Text book of Biology, Dr. Thulajappa and Dr. Seetaram, 2nd edition, June 1, 2015, Cengage Learning India Private Limited; 2nd edition.
3. A Text book of Biology, Naidu and Murthy, 1st edition,1988, Bangalore Prakasha Sahithya 1988.
4. A Text book of Biology, B.V. Sreenivasa Naidu, 1st edition,1988, Bangalore Prakasha Sahithya.

25PY1106RMT - REMEDIAL MATHEMATICS (THEORY) (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
25PY1106RMT	REMEDIAL MATHEMATICS (THEORY)	RM-T	R	2	0	0	0	2

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Apply the types of matrices, addition, multiplication of matrices, transpose, determinant of a matrix, of a matrix using it to solve simultaneous equations	3	PO1, PO2, PO4
CO2	Understand the concept of different types of functions and also write the functions in terms of graphs, straight line, slopes, intersection points	2	PO1, PO2, PO4
CO3	Understand the derivatives of constants, Derivative of the sum or difference of two functions, Conditions for a function to be a maximum or a minimum at a poin	2	PO1, PO2, PO4
CO4	Understand the derivatives of different functions with single independent variable order, degree and solving the differential equations by using different methods	2	PO1, PO2, PO4

Syllabus

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, Cramer s rule, Characteristic equation and roots of a square matrix

Proper and Improper fractions, Partial fraction , Resolving into Partial fraction, Application of Partial Fraction in Chemical Kinetics and Pharmacokinetics Logarithms: Introduction, Definition, Theorems/Properties of logarithms, Common logarithms

Introductions, 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 (product formula), Derivative of the quotient of two functions (Quotient formula) Without Proof, Derivative of x n w.r.tx,where n is any rational number, Derivative of e x ,, Derivative of loge x , Derivative of ax ,Derivative of trigonometric functions from first principles (without Proof), Successive Differentiation, Conditions for a function to be a maximum or a minimum at a point

Order and degree, Equations in separable form , Homogeneous equations, Linear Differential equations, Exact equations

Reference Books

1 Higher Engineering Mathematics, Dr.B.S.Grewal, 2020, Khannan.

2 Integral Calculus , Shanthinarayan, 2005, Schand.

3 Pharmaceutical Mathematics with application , Panchaksharappa Gowda D.H., 2014, SChand.

4 Differential Calculus, D H Panchaksharappa Gowda, 2005, Schand.

25PY1211P - COMPUTER APPLICATIONS IN PHARMACY (PRACTICAL) (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
25PY1211P	COMPUTER APPLICATIONS IN PHARMACY (PRACTICAL)	CAP-P	R	0	0	2	0	1

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Apply knowledge on creating a HTML web page to show personal information, design a questionnaire , and retrieve the information of a drug	3	PO4
CO2	Apply knowledge for Drug information storage and retrieval using MS Access and Creating invoice table using MS Access.	3	PO4

Syllabus

Design a questionnaire using a word processing package to gather information about a particular disease, Create a HTML web page to show personal information, Retrieve the information of a drug and its adverse effects using online tools, Creating mailing labels Using Label Wizard , generating label in MSWORD, Create a database in MS Access to store the patient information with the required fields Using access, Design a form in MS Access to view, add, delete and modify the patient recording the database

Generating report and printing the report from patient database, Creating invoice table using MS Access, Drug information storage and retrieval using MSAccess, Creating and working with queries in MS Access, Exporting Tables, Queries, Forms and Reports to web page. Exporting Tables, Queries, Forms and Reports to XMLpages

Reference Books

1 Computer Application in Pharmacy, William E.Fassett , 1st Edition, 1986, Lea and Febiger.

2 Computer Application in Pharmaceutical Research and Development, Sean Ekins Wiley, A John Willey , 1st edition, 1975, INC., Publication.

3 Bioinformatics (Concept, Skills and Applications), S.C.Rastogi , 5th Edition, 2022, CBS Publishers.

4 Microsoft office Access , Cary N.Prague , 1st Edition, 2004, Wiley Dreamtech India (P) Ltd.

25PY1211T - COMPUTER APPLICATIONS IN PHARMACY (THEORY) (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
25PY1211T	COMPUTER APPLICATIONS IN PHARMACY (THEORY)	CAP-T	R	3	0	0	0	3

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Understand the Number system and different types of numbering systems, Concept of Information Systems and Software, Web technologies	2	PO2
CO2	Understand the various types of application of computers in pharmacy	2	PO2
CO3	Understand the computers in Pharmacy Drug information storage and retrieval, Pharmacokinetics, Mathematical model in Drug design	2	PO2
CO4	Understand the web-based tools for pharmacy practice	2	PO2

Syllabus

Number system Binary number system, Decimal number system, Octal number system, Hexadecimal number systems, conversion decimal to binary, binary to decimal, octal to binary, etc, binary addition, binary subtraction Ones complement, Twos complement method, binary multiplication, binary division. Concept of Information Systems and Software Information gathering, requirement and feasibility analysis, data flow diagrams, process specifications, input output design, process life cycle, planning and managing the project

Web technologies Introduction to HTML, XML, CSS and Programming languages, introduction to web servers and Server Products. Introduction to databases, MYSQL, MS ACCESS, Pharmacy Drug database

Application of computers in Pharmacy Drug information storage and retrieval, Pharmacokinetics, Mathematical model in Drug design, Hospital and Clinical Pharmacy, Electronic Prescribing, and discharge (EP) systems, barcode medicine identification and automated dispensing of drugs, mobile technology and adherence monitoring. Diagnostic System, Lab-diagnostic System, Patient Monitoring System, Pharma Information System

Bioinformatics Introduction, Objective of Bioinformatics, Bioinformatics Databases, Concept of Bioinformatics, Impact of Bioinformatics in Vaccine Discovery. Computers as data analysis in Preclinical development Chromatographic dada analysis (CDS), Laboratory Information management System (LIMS) and Text Information Management System (TIMS)

Reference Books

1 Computer Application in Pharmacy, William E.Fassett , 1st Edition, 1986, Lea and Febiger.

2 Computer Application in Pharmaceutical Research and Development , Sean Ekins Wiley, A John Willey , 1st edition, 1975, INC., Publication.

3 Bioinformatics (Concept, Skills and Applications) , S.C.Rastogi , 5th Edition, 2022, CBS Publishers.

4 4. Microsoft office Access - 2003, Application Development Using VBA, SQLServer, DAP and Infopath , Cary N.Prague , 1st Edition, 2004, Wiley Dreamtech India (P) Ltd.

25PY1212T - ENVIRONMENTAL SCIENCE (THEORY) (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
25PY1212T	ENVIRONMENTAL SCIENCE (THEORY)	ES-T	R	3	0	0	0	3

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Understand the importance of Environmental education and conservation of natural resources	2	PO4, PO8
CO2	Understand the importance of renewable natural resources	2	PO4, PO8
CO3	Understand the importance of ecosystems and biodiversity	2	PO4, PO8
CO4	Understand the environmental science knowledge on solid waste management, disaster management and EIA process	2	PO4, PO8

Syllabus

The Multidisciplinary nature of Environmental Studies Introduction to Environment Definition scope importance Multidisciplinary nature of Environmental Studies, Need for public awareness. Institutions and people in Environment. Natural Resources Renewable and Non Renewable Resources Forest resources Uses Deforestation causes, effects, and impacts, Afforestation Programmes-Socio-forestry, Agro forestry, Vanasamrakshana programs.

Mining its impact on the environment mining, dams and their effects on forests and tribal people. Water resources: Distribution of surface and groundwater, Aquifers, floods drought conflicts over water, dams benefits and problems, Water conservation rain water harvesting watershed management, Cloud seeding Mineral resources: Use exploitation environmental effects. Food resources Changes in agricultural methodologies, comparison between old and new methods of farming, Green Revolution, Environmental Impact Assessment of conversion of agricultural lands effects of modern agriculture, Drip Irrigation fertilizer-pesticide problems, Eutrophication, Vermicompost water logging, blue baby syndrome Energy resources Growing energy needs renewable and non-renewable energy sources Solar, wind, geothermal, tidal, bioenergies. Land resources Land as a resource land degradation Soil erosion: Importance of soil, Types of soil erosion, Causes and effects of soil erosion. How to control soil erosion. Role of an individual in conservation of natural resources.

Ecosystems Concept of an ecosystem Structure and function of an ecosystem Producers consumers decomposers with examples, Energy flow in the ecosystem Ecological succession Food chains food webs and ecological pyramids. Types of ecosystems characteristic features, structure, and function of the following ecosystem a. Forest ecosystem b. Grassland ecosystem c. Desert ecosystem e. Aquatic ecosystems ponds, streams, lakes, rivers, oceans, estuaries. Biodiversity and its Conservation: Introduction Definition: genetic, species and ecosystem diversity. Biogeographical classification of India Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values Biodiversity at global, National, and local levels India as a mega-diversity nation Hotspots of biodiversity. Threats to biodiversity: habitat loss, poaching of wildlife, man wildlife conflicts. Endangered and endemic species of India Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

Environmental Pollution Definition Causes, effects, and control measures of a. Air pollution b. Water pollution c. Soil pollution d. Marine pollution. e. Noise pollution f. Thermal pollution g. nuclear hazards Solid waste Management Causes, effects, and control measures of urban and industrial wastes. Role of an individual in the prevention of pollution. Pollution case studies. Disaster management floods, earthquakes, cyclones, and landslides. Social Issues and the Environment from Unsustainable to Sustainable development Urban problems related to energy Water conservation. rainwater harvesting, watershed management.

Reference Books

1 Environmental science, Anubha Kaushik, 2021, 7, New age international publishers.

2 Text Book of Environmental Studies, Erach Bharucha, 2021, 3, United Grants Commission, Universities Press (India) Pvt Ltd., Hyderabad .

3 Textbook of Environmental Studies, Deeksha Deve and S.S. Kateswa, 2012, 4, Cengage Learning India Pvt ltd, New Delhi.

4 Environmental Biology, P.D. Sharma, 2015, 13, Rastogi Publications, Meerut.

Y25: B.Pharmacy

Category: Professional Core Courses (PCC)

25PY1101P - HUMAN ANATOMY AND PHYSIOLOGY I (PRACTICAL) (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
25PY1101P	HUMAN ANATOMY AND PHYSIOLOGY I (PRACTICAL)	HAP I-P	R	0	0	4	0	2

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Applying the gross anatomy and functions of microscope, connective tissues, skeletal system, and understanding and performance of bleeding and clotting time	3	PO1, PO7
CO2	Applying and performs the blood group analysis, ESR rate, heart rate, pulse, BP, and measurement of haemoglobin, RBC, and WBC counts	3	PO1, PO7

Syllabus

Study of compound microscope Microscopic study of epithelial and connective tissue Microscopic study of muscular and nervous tissue Identification of axial bones Identification of appendicular bones Introduction to hemocytometry

Determination of bleeding time Determination of clotting time Determination of blood group Determination of erythrocyte sedimentation rate(ESR) Determination of heart rate and pulse rate Recording of blood pressure Estimation of haemoglobin content Introduction to haemocytometer 15 Enumeration of white blood cell (WBC)count Enumeration of total red blood corpuscles (RBC) count

Reference Books

1 Text book of Medical Physiology, Guyton and John E Hall, 14, 2020, Elsevier.

2 Ross and Wilson Anatomy and Physiology in Health and Illness, Waugh A, 14, 2022, Elsevier.

3 Physiological basis of Medical Practice, Best and Tailor, 13, 2011, Williams Wilkins Co.

4 Human Physiology, Dr C C Chatterrje, 2, 2018, Academic Publishers.

25PY1101T - HUMAN ANATOMY AND PHYSIOLOGY I (THEORY) (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
25PY1101T	HUMAN ANATOMY AND PHYSIOLOGY I (THEORY)	HAP I-T	R	3	1	0	0	4

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Understand he cellular level and tissue level organisation of an organ in human body	2	PO1, PO6
CO2	Understand the anatomical features and physiology of skin bone and skeletal muscle and joints and their related disorders	2	PO1, PO6
CO3	Understand the anatomical and physiological functions of blood and heart and their related disorders	2	PO1, PO6
CO4	Understand the physiological aspects and pathological peripheral nervous system	2	PO1, PO6

Syllabus

Introduction to human body Definition and scope of anatomy and physiology Levels of structural organization and body systems Basic life processes Homeostasis Basic anatomical terminology Cellular level of organization Structure and functions of cell Transport across cell membrane Cell division Cell junctions General principles of cell communication intracellular signalling pathway activation by extracellular signal molecule Forms of intracellular signalling Contact dependent Paracrine Synaptic Endocrine Tissue level of organization Classification of tissues Structure location and functions of epithelial muscular and nervous and connective tissues

Skin Introduction to skin Skin structure Disease related to skin Skeletal system Divisions of skeletal system Types of bone salient features and functions of bones Axial and appendicular skeletal system Organization of skeletal muscle Physiology of muscle contraction Neuromuscular junction 6. Joints Structural and functional classification of joints Types of joints movements and its articulation

Body fluids blood lymph and Heart Body fluids composition and functions of blood Hemopoiesis formation of haemoglobin anaemia Mechanisms of coagulation blood grouping Rh factors transfusion its significance Disorders of blood Reticuloendothelial system Cardiovascular system anatomy of heart Blood circulation blood vessels structure and functions of artery vein and capillaries Elements of conduction system of heart and heartbeat its regulation by autonomic nervous system Cardiac output cardiac cycle Regulation of blood pressure Pulse Electrocardiogram Disorders of heart Lymphatic system Lymphatic organs and tissues Lymphatic vessels Lymph circulation Functions of lymphatic system

Peripheral nervous system Classification of peripheral nervous system Structure and functions of sympathetic and parasympathetic nervous system Origin and functions of spinal and cranial nerves Special senses Structure and functions of eye ear nose tongue and skin and their disorders

Reference Books

1 Text book of Medical Physiology, Guyton and John E Hall, 14, 2020, Elsevier.

2 Physiological basis of Medical Practice, Best and Tailor, 13, 2011, Williams Wilkins Co.

3 Human Physiology, Dr C C Chatterrje, 2, 2018, Academic Publishers.

4 Ross and Wilson Anatomy and Physiology in Health and Illness, Waugh A, 14, 2022, Elsevier.

25PY1102P - PHARMACEUTICAL ANALYSIS (PRACTICAL) (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
25PY1102P	PHARMACEUTICAL ANALYSIS (PRACTICAL)	PA-P	R	0	0	4	0	2

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Analyze the exact amount and concentration of chemical substances	3	PO1, PO3
CO2	Analyze the exact amount, concentration and normality of chemical substances	3	PO1, PO3

Syllabus

Preparation and Standardization of Sodium hydroxide, Sulphuric acid, Sodium thiosulphate, Potassium permanganate, Ceric ammonium sulphate. Assay of following compounds along with standardization of titrant: Ammonium chloride by Acid Base titration, Sodium benzoate by Non-Aqueous titration, Sodium chloride by precipitation titration.

Assay of following compounds along with standardization of titrant: Ferrous sulphate by Cerimetry, Copper sulphate by Iodometry, Calcium Gluconate by Complexometry. Determination of Normality by Electro-analytical methods : Conductometric titration of strong acid against strong base; Conductometric titration of strong acid and weak acid against strong base; Potentiometric titration of strong acid against strong base.

Reference Books

1 Practical Pharmaceutical Chemistry Vol I & II, A.H. Beckett & J.B. Stenlake's, 4th edition (2005), Stahlone Press of University of London.

2 Text Book of Quantitative Inorganic analysis, A.I. Vogel , 6th edition (2023), Longman Group UK Limited.

3 Inorganic Pharmaceutical Chemistry, P. Gundu Rao, 2nd edition (2008), Delhi Vallabh Prakashan.

4 Textbook of Pharmaceutical Chemistry , Bentley and Driver's, 8th edition (2020), Oxford / BSP Books.

5 Analytical chemistry principles , John H. Kennedy, 2nd edition (2011), Saunders College Pub.

25PY1102T - PHARMACEUTICAL ANALYSIS (THEORY) (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
25PY1102T	PHARMACEUTICAL ANALYSIS (THEORY)	PA-T	R	3	1	0	0	4

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Outline Preparation and standardization of different molar and normal solutions. Enlist Sources, types and methods of Minimizing errors	2	PO1
CO2	Understand the theories and Classifications of Volumetric titrations.	2	PO1
CO3	Understand the importance of Complexometry, Masking and Demasking agents. Concepts of Redox titrations	2	PO1
CO4	Illustrate Construction and working of Reference and indicator electrodes	2	PO2

Syllabus

Pharmaceutical analysis, Definition and scope of Different techniques of analysis; Methods of expressing concentration. Primary and secondary standards. Preparation and standardization of various molar and normal solutions, Oxalic acid, sodium hydroxide, hydrochloric acid, sodium thiosulphate, sulphuric acid, potassium permanganate and ceric ammonium sulphate. Errors: Sources of errors, types of errors, methods of minimizing errors, accuracy, precision and significant figures.

Acid base titration: Theories of acid base indicators, classification of acid base titrations and theory involved in titrations of strong, weak, and very weak acids and bases, neutralization curves. Nonaqueous titration: Solvents, Acidimetry and Alkalimetry titration and estimation of Sodium benzoate and Ephedrine HCl. Precipitation titrations: Mohrs method, Volhards, Modified Volhards, Fajans method, estimation of sodium chloride. Gravimetry: Principle and steps involved in gravimetric analysis. Purity of the precipitate: coprecipitation and post precipitation, Estimation of barium sulphate.

Complexometric titration: Classification, metal ion indicators, masking and demasking reagents, estimation of Magnesium sulphate, and calcium gluconate. Diazotization titration: Basic Principles, methods and application of diazotization titration. Redox titrations: Concepts of oxidation and reduction; Types of redox titrations (Principles and applications); Cerimetry, Iodimetry, Iodometry, Bromatometry, Dichrometry, Titration with potassium iodate

Electrochemical methods of analysis: Conductometry, Introduction, Conductivity cell, Conductometric titrations, applications. Potentiometry, Electrochemical cell, construction and working of reference (Standard hydrogen, silver chloride electrode and calomel electrode) and indicator electrodes (metal electrodes and glass electrode), methods to determine end point of potentiometric titration and applications. Polarography - Principle, Ilkovic equation, construction and working of dropping mercury electrode and rotating platinum electrode, applications.

Reference Books

1. Practical Pharmaceutical Chemistry Vol I & II, A.H. Beckett & J.B. Stenlakes, 4th edition (2005), Stahlone Press of University of London.
2. Text Book of Quantitative Inorganic analysis, A.I. Vogel , 6th edition (2023), Longman Group UK Limited.
3. Inorganic Pharmaceutical Chemistry , P. Gundu Rao , 2nd edition (2008), Delhi Vallabh Prakashan .
4. Textbook of Pharmaceutical Chemistry , Bentley and Driver's, 8th edition (2020), Oxford / BSP Books.
5. Analytical chemistry principles , John H. Kennedy, 2nd edition (2011), Saunders College Pub.

25PY1103P - PHARMACEUTICS (PRACTICAL) (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
25PY1103P	PHARMACEUTICS (PRACTICAL)	PC-P	R	0	0	4	0	2

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Apply the knowledge of preparation and labeling techniques of different solid and monophasic liquid dosage forms	3	PO2, PO4
CO2	Apply the knowledge of preparation and labeling techniques of different types of Biphasic dosage forms and semi-solid dosage forms with its preparation, dispense and label	3	PO2, PO4

Syllabus

To Prepare & dispense ORS powder (WHO), To Prepare & dispense Effervescent granules To Prepare & dispense Dusting powders, To Prepare & dispense Divided powders To Prepare & dispense simple syrup IP To Prepare & dispense compound Syrup BPC

Classification of Biphasic liquid dosage forms and semi-solid dosage forms including its preparation dispensing and labelling of Suspensions, Emulsions suppositories, ointments, gels

Reference Books

1 General & Dispensing Pharmacy , Ashok K Gupta , 1st Edition, 2008, CBS Publishers & Distributors .

2 Remington. Essentials of pharmaceutics, Alfonso R , 23rd Editio, 2020, John Wiley & Sons Australia, Limited .

3 Pharmaceutical Dosage Form and Drug Delivery System , H.C. Ansel , 12th Edition.2021, Wolters Kluwer Health, Baltimore .

4 Aulton's Pharmaceutics The Design and Manufacture of Medicines , Kevin M.G. Taylor, Michael E. Aulton , 6th Edition, 2021, Elsevier Health Sciences.

25PY1103T - PHARMACEUTICS (THEORY) (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
25PY1103T	PHARMACEUTICS (THEORY)	PC-T	R	3	1	0	0	4

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Understand the history of profession of pharmacy, Understand the basics of different dosage forms, Understand the professional way of handling the prescription	2	PO1, PO4
CO2	Understand the basics of pharmaceutical calculations, Understand the different powder dosage forms	2	PO1, PO4
CO3	Understand the liquid dosage forms	2	PO1, PO4
CO4	Understand the different semi-solid dosage forms	2	PO1, PO4

Syllabus

Historical background and development of profession of pharmacy: History of profession of Pharmacy in India in relation to pharmacy education, industry and organization, Pharmacy as a career, Pharmacopoeias: Introduction to IP, BP, USP and Extra Pharmacopoeia. Dosage forms: Introduction to dosage forms, classification and definitions. Prescription: Definition, Parts of prescription, handling of Prescription and Errors in prescription. Posology: Definition, Factors affecting posology. Paediatric dose calculations based on age, body weight and body surface area.

Pharmaceutical calculations Weights and measures Imperial & Metric system, Calculations involving percentage solutions, alligation, proof spirit and isotonic solutions based on freezing point and molecular weight. Powders Definition classification advantages and disadvantages Simple & compound powders official preparations dusting powders effervescent efflorescent and hygroscopic powders eutectic mixtures Geometric dilutions Snuff Insufflations Divided & bulk powders Dentifrices Douches Liquid dosage forms: Advantages and disadvantages of liquid dosage forms Excipients used in formulation of liquid dosage forms Solubility enhancement techniques

Monophasic liquids Definitions and preparations of Gargles, Mouthwashes, Throat Paint, Eardrops, Nasal drops, Enemas, Syrups, Elixirs, Liniments and Lotions. Solutions, Linctuses. Biphasic liquids: Suspensions: Definition, advantages and disadvantages, classifications, Preparation of suspensions; Flocculated and Deflocculated suspension & stability problems and methods to overcome. Emulsions: Definition, classification, emulsifying agent, test for the identification of type of Emulsion, Methods of preparation & stability problems and methods to overcome. Parenterals: Introductions to parenterals and types

Suppositories Definition, types, advantages and disadvantages, types of bases, methods of preparations. Displacement value & its calculations, evaluation of suppositories. Semisolid dosage forms: Definitions, classification, mechanisms and factors influencing dermal penetration of drugs. Preparation of ointments, pastes, creams and gels. Excipients used in semi-solid dosage forms. Evaluation of semi-solid dosages forms. Aerosols: Introductions to aerosols and types. Pharmaceutical incompatibilities: Definition, classification, physical, chemical and therapeutic incompatibilities with examples.

Reference Books

1 General & Dispensing Pharmacy , Ashok K Gupta , 1st Edition, 2008, CBS Publishers & Distributors .

2 Remington. Essentials of pharmaceutics , Alfonso R , 23rd Edition, 2020, John Wiley & Sons Australia, Limited .

3 Pharmaceutical Dosage Form and Drug Delivery System, H.C. Ansel, 12th Edition.2021, Wolters Kluwer Health, Baltimore.

4 Aulton's Pharmaceutics The Design and Manufacture of Medicines, Kevin M.G. Taylor, Michael E. Aulton, 6th Edition, 2021, Elsevier Health Sciences.

25PY1104P - PHARMACEUTICAL INORGANIC CHEMISTRY (PRACTICAL) (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
25PY1104P	PHARMACEUTICAL INORGANIC CHEMISTRY (PRACTICAL)	PIC-P	R	0	0	4	0	2

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	To Apply and Test the Limit tests for the ions and Identification tests	3	PO4
CO2	To apply and Determine the purity of various inorganic compounds and preparation of inorganic pharmaceuticals	3	PO4

Syllabus

Limit tests for following ions: Limit test for Chlorides and Sulphates. Modified limit test for Chlorides and Sulphates. Limit test for Iron. Limit test for Heavy metals. Limit test for Lead. Limit test for Arsenic. Identification test: Magnesium hydroxide, Ferrous sulphate, Sodium bicarbonate, Calcium gluconate, Copper sulphate

Test for purity: Swelling power of Bentonite, Neutralizing capacity of aluminum hydroxide gel, Determination of potassium iodate and iodine in potassium Iodide Preparation of inorganic pharmaceuticals: Boric acid, Potash alum & Ferrous, Sulphate

Reference Books

1 Inorganic Pharmaceutical Chemistry, , P. Gundu Rao , 3rd, Pearson Education .

2 Inorganic Pharmaceutical Chemistry , M.L. Schroff, 1, National book centre .

3 Text Book of Quantitative Inorganic analysis , A.I. Vogel,, new, Pearson Education.

4 Practical Pharmaceutical Chemistry by A.H. Beckett and J. B. Stenlake , A.H. Beckett, 4, The Athlone press, london.

25PY1104T - PHARMACEUTICAL INORGANIC CHEMISTRY (THEORY) (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
25PY1104T	PHARMACEUTICAL INORGANIC CHEMISTRY (THEORY)	PIC-T	R	3	1	0	0	4

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	To remember and classify various inorganic compounds, sources of Impurities and test for purity of Impurities	1	PO1
CO2	To Understand the monograph study of various inorganic compounds belongs to Acid base regulators, Intra & Extracellular Electrolytes	2	PO1
CO3	To Understand the monograph study of various inorganic compounds belongs to Dental products Gastro-intestinal agents	2	PO1
CO4	To Understand the monograph study of various inorganic compounds belongs to Miscellaneous agents & Radiopharmaceuticals	2	PO1

Syllabus

Impurities in pharmaceutical substances: History of Pharmacopoeia, Sources and types of impurities, principle involved in the limit test for Chloride, Sulphate, Iron, Arsenic, Lead and Heavy metals, modified limit test for Chloride and Sulphate. General methods of preparation, assay for the compounds superscripted with asterisk (*), properties and medicinal uses of inorganic compounds belonging to the following classes

Acids, Bases and Buffers: Buffer equations and buffer capacity in general, buffers in pharmaceutical systems, preparation, stability, buffered isotonic solutions, measurements of tonicity, calculations and methods of adjusting isotonicity. Major extra and intracellular electrolytes: 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.

Dental products: Dentifrices, role of fluoride in the treatment of dental caries, Desensitizing agents, Calcium carbonate, Sodium fluoride, and Zinc eugenol cement.Gastrointestinal agents: Acidifiers: Ammonium chloride* and Dil. HCl. Antacid: Ideal properties of antacids, combinations of antacids, Sodium. Bicarbonate*, Aluminum hydroxide gel, Magnesium hydroxide mixture. Cathartics: Magnesium sulphate, Sodium orthophosphate, Kaolin and Bentonite. Antimicrobials: Mechanism, classification, Potassium permanganate, Boric acid, Hydrogen peroxide*, Chlorinated lime*, Iodine and its preparations.

Miscellaneous compounds Expectorants Potassium iodide Ammonium chloride. Emetics Copper sulphate Sodium potassium tartarate Haematinics Ferrous sulphate Ferrous gluconate Poison and Antidote Sodium thiosulphate Activated charcoal Sodium nitrite. Astringents Zinc Sulphate Potash Alum. Radiopharmaceuticals: Radio activity, Measurement of radioactivity, Properties of radiations, Half-life, radio isotopes and study of radio isotopes Sodium iodide I131, Storage conditions, precautions pharmaceutical application of radioactive substance

Reference Books

1 Bentley and Driver's Textbook of Pharmaceutical Chemistry , L.M.Atherden, 8th, oxford.

2 A.I. Vogel, Text Book of Quantitative Inorganic analysis , J. Mendham, 6th, Pearson.

3 Anand & Chatwal, Inorganic Pharmaceutical Chemistry , G.R. Chatwal , 1, Himalaya Publishing house.

4 Inorganic Pharmaceutical Chemistry , Ankita Wal, Pranay Wal, 1st, New Age international publishers.

25PY1207P - HUMAN ANATOMY AND PHYSIOLOGY II (PRACTICAL) (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
25PY1207P	HUMAN ANATOMY AND PHYSIOLOGY II (PRACTICAL)	HAP II-P	R	0	0	4	0	2

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Analysis on organization of nervous system, endocrine, integumentary and special senses; and knowledge on the , neurological, visual and reflex activity.	3	PO1, PO7
CO2	Analysis on digestive, respiratory, reproductive, urinary systems, negative feedback mechanism. Analysis on family planning devices and pregnancy diagnosis test, vital organs and gonads.	3	PO1, PO7

Syllabus

To study the integumentary and special senses using specimen, models, etc., To study the nervous system using specimen, models, etc., To study the endocrine system using specimen, models, etc. To demonstrate the general neurological examination To demonstrate the function of olfactory nerve. To examine the different types of taste. To demonstrate the visual acuity. To demonstrate the reflex activity

Recording of body temperature . To demonstrate positive and negative feedback mechanism. Determination of tidal volume and vital capacity. Study of digestive, respiratory, cardiovascular systems, urinary and reproductive systems with the help of models, charts and specimens. Recording of basal mass index. Study of family planning devices and pregnancy diagnosis test. Demonstration of total blood count by cell analyser. Permanent slides of vital organs and gonads.

Reference Books

1 Practical Manual of Human Anatomy & Physiology, Iswar Hazarika and Anju Das, 1st (2019), Jaypee Brothers Medical Publishers.

2 Human Physiology vol 1 and 2, Dr C C Chatterjee, 1st (2018), Academic Publishers Kolkata.

3 Anatomy and Physiology in Health and Illness, Kathleen J.W. Wilson,, 12th (2014), Churchill Livingstone, New York.

4 Principles of Anatomy and Physiology, Tortora Grabowski, 13th (2011), Palmetto, GA, U.S.A..

25PY1207T - HUMAN ANATOMY AND PHYSIOLOGY II (THEORY) (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
25PY1207T	HUMAN ANATOMY AND PHYSIOLOGY II (THEORY)	HAP II-T	R	3	1	0	0	4

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Understand the gross morphology, structure and functions of Central Nervous system and Brain.	2	PO1, PO4
CO2	Understand the gross morphology, structure and functions of digestive system. Formation and role of ATP, Creatinine Phosphate and BMR	2	PO1, PO4
CO3	Understand the gross morphology, structure and functions of respiratory and urinary system.	2	PO1, PO4
CO4	Understand the gross morphology, structure and functions of endocrine and reproductive system. Introduction to genetics	2	PO1, PO4

Syllabus

Nervous system Organization of nervous system, neuron, neuroglia, classification and properties of nerve fibre, electrophysiology, action potential, nerve impulse, receptors, synapse, neurotransmitters. Central nervous system: Meninges, ventricles of brain and cerebrospinal fluid. Structure and functions of brain (cerebrum, brain stem, and cerebellum), spinal cord (gross structure, functions of afferent and efferent nerve tracts reflex activity)

Digestive system Anatomy of GI Tract with special reference to anatomy and functions of stomach, (Acid production in the stomach, regulation of acid production through parasympathetic nervous system, pepsin role in protein digestion) small intestine and large intestine, anatomy and functions of salivary glands, pancreas and liver, movements of GIT, digestion and absorption of nutrients and disorders of GIT. Energetics Formation and role of ATP, Creatinine Phosphate and BMR.

Respiratory system Anatomy of respiratory system with special reference to anatomy of lungs, mechanism of respiration, regulation of respiration Lung Volumes and capacities transport of respiratory gases, artificial respiration, and resuscitation methods. Urinary system Anatomy of urinary tract with special reference to anatomy of kidney and nephrons, functions of kidney and urinary tract, physiology of urine formation, micturition reflex and role of kidneys in acid base balance, role of RAS in kidney and disorders of kidney.

Endocrine system Classification of hormones, mechanism of hormone action, structure and functions of pituitary gland, thyroid gland, parathyroid gland, adrenal gland, pancreas, pineal gland, thymus and their disorders. Reproductive system Anatomy of male and female reproductive system, Functions of male and female reproductive system, sex hormones, physiology of menstruation, fertilization, spermatogenesis, oogenesis, pregnancy and parturition Introduction to genetics Chromosomes, genes and DNA, protein synthesis, genetic pattern of inheritance.

Reference Books

1 Principles of Anatomy and Physiology, Gerard J. Tortora, Bryan H. Derrickson, 15th (2017), John Wiley & Sons.

2 Physiological basis of Medical Practice, Best & Taylor, 13th (2011), Wolters Kluwer.

3 Textbook of Medical Physiology, Arthur C. Guyton, John E. Hall ., 15th (2020), Elsevier.

4 Human Physiology, C.C. Chatterjee, 14 (2022), CBS Publishers & Distributors Pvt.Ltd.

5 Anatomy and Physiology in Health and Illness, Kathleen J.W. Wilson, Churchill, 8th (1996), Churchill Livingstone.

25PY1208P - PHARMACEUTICAL ORGANIC CHEMISTRY-I (PRACTICAL) (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
25PY1208P	PHARMACEUTICAL ORGANIC CHEMISTRY-I (PRACTICAL)	POC I-P	R	0	0	4	0	2

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	To Apply the knowledge on the basic qualitative analysis of organic compounds	3	PO1, PO4
CO2	To Apply the knowledge on Synthesis of derivatives of organic compounds	3	PO1, PO4

Syllabus

Preliminary test Color odour, aliphatic aromatic compounds, saturation and unsaturation, etc Detection of elements like Nitrogen, Sulphur and Halogen by Lassaignes test Solubility test Functional group test like Phenols, AmidesbUrea, Carbohydrates, Amines, Carboxylic acids, Aldehydes and Ketones, Alcohols, Esters, Aromatic and Halogenated Hydrocarbons, Nitro compounds and Anilides.

Melting point Boiling point of organic compounds Identification of the unknown compound from the literature using melting point boiling point. Minimum 5 unknown organic compounds to be analyzed systematically. Preparation of suitable solid derivatives from organic compound construction of molecular models

Reference Books

1 Practical Organic Chemistry , Mann and Saunders, 4th, Pearson.

2 Vogels textbook of Practical Organic Chemistry , Brain and Hannaford, 5th, pearson.

3 Introduction to Organic laboratory techniques , Pavia Lampman and Kriz, 3rd, Pearson.

4 Advanced Practical Organic laboratory , N.K. Vishnoi, 3rd, ViKas.

25PY1208T - PHARMACEUTICAL ORGANIC CHEMISTRY-I (THEORY) (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
25PY1208T	PHARMACEUTICAL ORGANIC CHEMISTRY-I (THEORY)	POC I-T	R	3	1	0	0	4

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	To Understand the structure, name and the type of isomerism of the organic compound	2	PO1, PO4
CO2	To Understand the name of the reaction and orientation of reactions	2	PO1, PO4
CO3	To Understand the reactivity and stability of compound	2	PO1, PO4
CO4	To Understand the Named reactions in Organic chemistry	2	PO1, PO4

Syllabus

Classification, nomenclature and isomerism Classification of Organic Compounds. Common and IUPAC systems of nomenclature of organic compounds up to 10 Carbons open chain and carbocyclic compounds Structural isomerisms in organic compounds. Alkanes, Alkenes and Conjugated dienes.

SP3 hybridization in alkanes, Halogenation of alkanes, uses of paraffins. Stabilities of alkenes, SP2 hybridization in alkenes, E1 and E2 reactions kinetics, order of reactivity of alkyl halides, rearrangement of carbocations, Saytzeffs orientation and evidences. E1 verses E2 reactions, Factors affecting E1 and E2 reactions. Ozonolysis, electrophilic addition reactions of alkenes

Stability of conjugated dienes, Diel Alder, electrophilic addition, free radical addition reactions of conjugated dienes, allylic rearrangement Alkyl halides SN1 and SN2 reactions kinetics, order of reactivity of alkyl halides, stereochemistry and rearrangement of carbocations. SN1 versus SN2 reactions, Factors affecting SN1 and SN2reactions. Structure and uses of ethyl chloride, Chloroform, trichloroethylene, tetrachloroethylene, dichloromethane, tetrachloromethane and iodoform. Alcohols Qualitative tests, Structure and uses of Ethyl alcohol, Methyl alcohol, chlorobutanol, Cetosteryl alcohol, Benzyl alcohol, Glycerol, Propylene glycol

Acidity of carboxylic acids, effect of substituents on acidity, inductive effect and qualitative tests for carboxylic acids, amide and ester. Structure and Uses of Acetic acid, Lactic acid, Tartaric acid, Citric acid, Succinic acid. Oxalic acid, Salicylic acid, Benzoic acid, Benzyl benzoate, Dimethyl phthalate, Methyl salicylate and Acetyl salicylic acid. Aliphatic amines Basicity, effect of substituent on Basicity. Qualitative test, Structure and uses of Ethanolamine, Ethylenediamine, Amphetamine

Reference Books

1 Essentials of Organic Chemistry, Morrison and Boyd, 7, Pearson.

2 Organic Chemistry , I.L. Finar, 1, Pearson Education .

3 Textbook of Organic Chemistry , B.S. Bahl Arun Bahl, 22, S chand.

4 Advanced Organic Chemistry, Francis A. Carey and Richard J. Sundberg, 1, Springer.

25PY1209P - BIOCHEMISTRY (PRACTICAL) (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
25PY1209P	BIOCHEMISTRY (PRACTICAL)	BC-P	R	0	0	4	0	2

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Application and identification by qualitative and quantitative examination of carbohydrates, cholesterol, proteins and determining blood cholesterol.	3	PO1, PO2
CO2	Application of enzymatic hydrolysis of biomolecules and salivary enzyme activity	3	PO1, PO2

Syllabus

Quantitative & qualitative examination of carbohydrates cholesterol and protein Determination of blood cholesterol measurement of pH

Preparation of buffer solution Study the effect of temperature & Concentration on salivary amylase activity and enzymatic hydrolysis of starch

Reference Books

1 Practical Biochemistr, R C Guptha S Bhargavan, 2018, CBS PUBLISHER.

2 Introduction of Practical Biochemistry, David T Plumme, 2017, McGraw-Hill Publishing Co.

3 Practical Biochemistry , Rajagopal and Ramakrishna, 1983, Orent Logman.

4 Practical Biochemistry , Harold Varley, 2018, William Heinemann.

25PY1209T - BIOCHEMISTRY (THEORY) (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
25PY1209T	BIOCHEMISTRY (THEORY)	BC-T	R	3	1	0	0	4

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Understand the principles of chemistry in biology	2	PO1
CO2	Understand the metabolic process and reactions involved in body for Carbohydrates and biological oxidation	2	PO1
CO3	Understand the metabolism of lipid and amino acid molecules in physiological and pathological conditions	2	PO1
CO4	Understand the genetic organization of mammalian genome and functions of DNA in the synthesis of RNAs and proteins. Understand the role of enzymes in physiology of human body	2	PO1

Syllabus

Biomolecules Introduction, classification chemical nature and biological role of carbohydrate lipids, nucleic acids amino acids and proteins Bioenergetics Concept of free energy endergonic and exergonic reaction Relationship between free energy enthalpy and entropy Redox potential Energy rich compounds classification biological significances of ATP and cyclic AMP

Carbohydrate metabolism Glycolysis Pathway energetics and significance Citric acid cycle Pathway energetics and significance HMP shunt and its significance Glucose-6-Phosphate dehydrogenase (G6PD) deficiency Glycogen metabolism Pathways and glycogen storage diseases (GSD) Gluconeogenesis Pathway and its significance Hormonal regulation of blood glucose level and Diabetes mellitus Biological oxidation Electron transport chain (ETC) and its mechanism Oxidative phosphorylation & its mechanism and substrate level phosphorylation Inhibitors ETC and oxidative phosphorylation or Uncouplers

Lipid metabolism Amino acid metabolism Formation and utilization of ketone bodies ketoacidosis De novo synthesis of fatty acids (Palmitic acid) Biological significance of cholesterol and conversion of cholesterol into bile acids steroid hormone and vitamin D Disorders of lipid metabolism Hypercholesterolemia atherosclerosis fatty liver and obesity

Nucleic acid metabolism and genetic information transfer Enzymes General reactions of amino acid metabolism Transamination deamination & decarboxylation urea cycle and its disorders Catabolism of phenylalanine and tyrosine and their metabolic disorders (Phenyketonuria Albinism alkeptonuria tyrosinemia) Synthesis and significance of biological substances 5-HT melatonin dopamine noradrenaline adrenaline Catabolism of heme hyperbilirubinemia and jaundice

Reference Books

1 Principles of Biochemistry , Lehninger, 2021, W. H. Freeman and Compan.

2 Harpers Illustrated Biochemistry, Robert K Murray Daryl K Granner Peter A Mayes,and Victor W Rodwell , 2009, McGraw Hill Education.

3 Biochemistry, D. Satyanarayan and U.Chakrapani, 2008, Elsevier.

4 Textbook of Biochemistry , Ramarao, 2012, UBS Publishers Distributors Pvt Limited 2006.

25PY1210T - PATHOPHYSIOLOGY (THEORY) (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
25PY1210T	PATHOPHYSIOLOGY (THEORY)	PATHO	R	3	1	0	0	4

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Understand the causes, progression of injury, inflammation and repair	2	PO2
CO2	Understand the causes and pathogenesis of diseases related to cardio vascular system and Central nervous system	2	PO2
CO3	Understand the pathophysiology of diseases related to respiratory system and Gastro Intestinal system	2	PO2
CO4	Understand the concepts of pathogenesis of different communicable diseases and cancer	2	PO2

Syllabus

Basic principles of Cell injury and Adaptation Introduction, definitions, Homeostasis, Components and Types of Feedback systems, Causes of cellular injury, Pathogenesis Cell membrane damage, Mitochondrial damage, Ribosome damage, Nuclear damage, Morphology of cell injury Adaptive changes Atrophy, Hypertrophy, hyperplasia, Metaplasia, Dysplasia, Cell swelling, Intra cellular accumulation, Calcification, Enzyme leakage and Cell Death. Acidosis and Alkalosis, Electrolyte imbalance. Basic mechanism involved in the process of inflammation and repair Introduction, Clinical signs of inflammation, Different types of Inflammation, Mechanism of Inflammation Alteration in vascular permeability and blood flow, migration of WBCs, Mediators of inflammation, Basic principles of wound healing in the skin

Cardiovascular System Definition, symptoms, causes and Pathophysiology Hypertension, congestive heart failure, ischemic heart disease angina, myocardial infarction, and atherosclerosis Haematological Diseases Definition, symptoms, causes and Pathophysiology Iron deficiency, megaloblastic anemia VitB12 and folic acid, sickle cell anemia, thalassemia, hereditary acquired anemia, hemophilia. Nervous system Epilepsy, Parkinsons disease, and stroke, psychiatric disorder depression, schizophrenia and Alzheimers disease.

Definition, causes and Pathophysiology of the following Respiratory system Asthma, Chronic obstructive airways diseases. Renal system Acute and chronic renal failure. Diseases of bones and joints Rheumatoid Arthritis, Osteoporosis, Gout. Endocrine system Diabetes, thyroid diseases, disorders of sex hormones. Gastrointestinal system Peptic Ulcer, Inflammatory bowel diseases, jaundice, hepatitis A, B, C, D, E, F alcoholic liver disease

Definition, symptoms, causes, Modes of transmission and Pathophysiology of the following. Principles of Cancer Classification, Etiology and pathogenesis of Cancer. Infectious diseases Meningitis, Typhoid, Leprosy, Tuberculosis Urinary tract infections. Sexually transmitted diseases AIDS, Syphilis, Gonorrhoea

Reference Books

1. Robbins & Cotran Pathologic Basis of Disease, Vinay Kumar, Abul K. Abas, Jon C. Aster, 9th edition,2014, Elsevier.
2. Text book of Pathology, Harsh Mohan, 6th edition,2010, Jaypee publications .
3. Goodman Gilmans The Pharmacological Basis of Therapeutics, Laurence B, Bruce C, Bjorn K, 12th edition,2011, McGraw Hill.
4. Best and Taylors Physiological basis of medical practice, Best, Charles and Taylor, 12th edition,1991, William and Wilkins.
5. Davidsons Principles and Practice of Medicine, Nicki R. Colledge, Brian R. Walker, 21st edition,2010, ELBS or Churchill Livingstone.

25PY2113P - PHARMACEUTICAL ORGANIC CHEMISTRY-II (PRACTICAL) (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
25PY2113P	PHARMACEUTICAL ORGANIC CHEMISTRY-II (PRACTICAL)	POC II-P	R	0	0	4	0	2

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Apply the concepts of different named reactions to synthesize organic compounds	3	PO2
CO2	Estimate quality and purity of various oils by Acid value, Saponification value, and Iodine value and discuss the purification techniques and their importance in chemistry	3	PO2

Syllabus

Preparation of Benzanilide or Phenyl benzoate or Acetanilide from Aniline or Phenol or Aniline by acylation reaction, 2,4,6 Tribromo aniline or Para bromo acetanilide from Aniline or Acetanilide by halogenation by Bromination reaction, 5 Nitro salicylic acid or Meta di nitro benzene from Salicylic acid or Nitro benzene by nitration reaction, 5 Nitro salicylic acid/Meta di nitro benzene from Salicylic acid or Nitro benzene by nitration reaction, 1 Phenyl azo 2 napthol from Aniline by diazotization and coupling reactions, Benzil from Benzoin by oxidation reaction, Dibenzal acetone from Benzaldehyde by Claison Schmidt reaction, Cinnammic acid from Benzaldehyde by Perkin reaction, K. P-Iodo benzoic acid from P-amino benzoic acid.

Analytical Constants of fats and oils- Determination of purity of various oils by Acid value, Saponification value, and Iodine value Recrystallisation and Steam distillation purification techniques.

Reference Books

1 Practical Organic Chemistry, Mann and Saunders, 4th edition (2009), Orient BlackSwan.

2 Vogels textbook of Practical Organic Chemistry, Furniss, 5th edition (2003), Pearson.

3 Advanced Practical organic chemistry, N.K.Vishnoi, 3rd edition (2010), Vikas.

4 Introduction to Organic Laboratory Techniques, Pavia, Lampman and Kriz, 3rd edition (2010), Thomson.

25PY2113T - PHARMACEUTICAL ORGANIC CHEMISTRY-II (THEORY) (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
25PY2113T	PHARMACEUTICAL ORGANIC CHEMISTRY-II (THEORY)	POC II-T	R	3	1	0	0	4

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Understand Aromatic nature and type of chemical reactions of organic compound	2	PO1
CO2	Understand the reactivity of Polycyclic Aromatic compounds and different Strain theories	2	PO1
CO3	Understand about substituted Aromatic compounds, their preparation and properties	2	PO1
CO4	Understand the study of sugars, amino acids, proteins, fats and oils and effects of various parameters	2	PO1

Syllabus

Aromaticity and aromatic chemistry Concept of aromaticity Huckel rule and its use in determining the aromatic and nonaromatic character of a compound A brief coverage of structure of benzene Detailed coverage of electrophilic and nucleophilic aromatic substitution reactions Reactivity and orientation in these reactions Reactivity and orientation in monosubstituted benzenes Benzyne mechanism Structure and uses of DDT Saccharin BHC and Chloramine

Polycyclic aromatic hydrocarbons and reactions with mechanisms of bi and tricyclic fused carbocyclic rings like naphthalene anthracene and phenanthrene Structure and medicinal uses of Naphthalene Phenanthrene Anthracene Diphenylmethane Triphenylmethane and their derivatives Cycloalkanes Stabilities includes Baeyers strain theory limitation of Baeyers strain theory Coulson and Moffitts modification Sachse Mohrs theory Theory of strainless rings reactions of cyclopropane and cyclobutane only Bridged rings Bridged ring systems and their nomenclature

Different aromatic classes of compounds The following classes of compounds should be taught in detail concerning their IUPAC or systematic nomenclature industrial wherever applicable and laboratory methods of preparations physical properties and chemical reactions with emphasis on reaction mechanisms arrow based and stereochemistry wherever applicable Phenolic compounds Aromatic amines Diazonium salts Structure and uses of phenol cresols resorcinol naphthols

Carbohydrates Definition and classification D and L nomenclature in sugars Mutarotation Reactions of glucose Chain extension and chain reduction of a sugar Amino acids and proteins Definition and classification D and L Amino acids Strecker Gabriel phthalamide methods for the preparation of amino acids Peptide bond and its formation Denaturation of proteins Two protective groups each for NH2 and COOH functionalities during protein synthesis Sequencing of a protein by chemical and enzymatic methods Fats and Oils Fatty acids reactions Hydrolysis Hydrogenation Saponification and Rancidity of oils Drying oils Analytical constants Acid value Saponification value Ester value Iodine value Acetyl value Reichert Meissl (RM) value significance and principle involved in their determination

Reference Books

1 Organic Chemistry , Morrison and Boyd, 7th (2010), Pearson Education India.

2 Organic Chemistry, I L Finar Vol 1, 6th (2002), Pearson Education India.

3 Textbook of Organic Chemistry, B S Bahl and Arun Bahl, 22nd (2019), S Chand Publishing.

4 Textbook of Organic Chemistry, P L Soni and H.M. Chawla, 29th (2012), Sultan Chand and Sons.

5 Organic Reaction Mechanisms, VK Ahluwalia and R K Parashar, 3rd (2006), CRC Press (Boca Raton) and Narosa Publishing House (New Delhi).

25PY2114P - PHYSICAL PHARMACEUTICS I (PRACTICAL) (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
25PY2114P	PHYSICAL PHARMACEUTICS I (PRACTICAL)	PP I-P	R	0	0	4	0	2

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Understand the Solubility of drugs and mechanisms of solute solvent interactions, States of Matter and properties of matter and Physicochemical properties of drug molecules	2	PO4
CO2	Apply the Concepts of Surface and interfacial phenomenon, Complexation and protein binding and determination of PH in biological systems	3	PO4

Syllabus

1 Determination of solubility of drug at room temperature, 2 Determination of pKa value by Half Neutralization/ Henderson Hasselbalch equation. 3 Determination of Partition coefficient of benzoic acid in benzene and water. 4 Determination of Partition co- efficient of Iodine in CCl4 and water. 5 Determination of % composition of NaCl in a solution using the phenol - water system by CST method. 6 Determination of surface tension of given liquids by drop count and drop weight method

7 Determination of HLB number of a surfactant by saponification method. 8 Determination of Freundlich and Langmuir constants using activated charcoal. 9 Determination of critical micellar concentration of surfactants. 10 Determination of stability constant and donor acceptor ratio of PABA-Caffeine complex by solubility method. 11 Determination of stability constant and donor acceptor ratio of Cupric-Glycine complex by pH titration method

Reference Books

1 Physical Pharmacy , Alfred Martin , 2016, Lippincot williiams & Vilkins.

2 Experimental Pharmaceutics , Eugene, 1977, Parott..

3 Advances in Pharmaceutical Sciences Vol. 2-5; , H.S. Bean & A.H. Beckett. , 2022, Academic Press Inc..

4 Bentley Textbook of Pharmaceutics , Rawlins. , 2022, Elsevier Books Pvt. Ltd. .

25PY2114T - PHYSICAL PHARMACEUTICS I (THEORY) (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
25PY2114T	PHYSICAL PHARMACEUTICS I (THEORY)	PP I-T	R	3	1	0	0	4

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Understand the principles of colloidal systems and their properties and rheological behaviour of pharmaceutical systems	2	PO1
CO2	Understand the physical parameters in designing of dispersed systems	2	PO4
CO3	Understand the principles of particle surface characteristics in study of powdered materials and application of these concepts in designing of dosageforms	2	PO4
CO4	Understand the principles of chemical kinetics & to use them for stability testing nad determination of expiry date of formulations	2	PO4

Syllabus

Colloidal dispersions: Classification of dispersed systems & their general characteristics, size & shapes of colloidal particles, classification of colloids & comparative account of their general properties. Optical, kinetic & electrical properties. Effect of electrolytes, coacervation, peptization& protectiveaction. Rheology: Newtonian systems, law of flow, kinematic viscosity, effect of temperature, non newtonian systems, pseudoplastic, dilatant, plastic, thixotropy, thixotropy in formulation, determination of viscosity, capillary, falling Sphere, rotational viscometers. Deformation of solids: Plastic and elastic deformation, Heckel equation, Stress, Strain, Elastic Modulus

Coarse dispersion: Suspension, interfacial properties of suspended particles, settling in suspensions, formulation of flocculated and deflocculated suspensions. Emulsions and theories of emulsification, microemulsion and multiple emulsions; Stability of emulsions, preservation of emulsions, rheological properties of emulsions and emulsion formulation by HLB method

Micromeretics: Particle size and distribution, mean particle size, number and weight distribution, particle number, methods for determining particle size by different methods, counting and separation method, particle shape, specific surface, methods for determining surface area, permeability, adsorption, derived properties of powders, porosity, packing arrangement, densities, bulkiness & flow properties.

Drug stability: Reaction kinetics: zero, pseudo-zero, first & second order, units of basic rate constants, determination of reaction order. Physical and chemical factors influencing the chemical degradation of pharmaceutical product: temperature, solvent, ionic strength, dielectric constant, specific & general acid base catalysis, Simple numerical problems. Stabilization of medicinal agents against common reactions like hydrolysis & oxidation. Accelerated stability testing in expiration dating of pharmaceutical dosage forms. Photolytic degradation and its prevention

Reference Books

1 Physical Pharmacy , Alfred Martin , 8th Edition, 2023, Lippincott Williams & Wilkins .

2 Text book of Physical Pharmaceutics , C.V.S. Subramanyam , 3rd Edition,2015, Vallabh Prakashan .

3 Physicochemical Principles of Pharmacy, Alexander T. Florence, David Attwood, 6th Edition, 2015, PP Publications.

4 Ansel's Pharmaceutical Dosage Forms and Drug Delivery Systems, Loyd Allen, 8th Edition, 2006, Wolters.

25PY2115P - PHARMACEUTICAL MICROBIOLOGY (PRACTICAL) (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
25PY2115P	PHARMACEUTICAL MICROBIOLOGY (PRACTICAL)	PMB-P	R	0	0	4	0	2

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Analysis of different equipments used in experimental microbiology, to perform the preparation of culture media and sterilization of glassware. Applying the knowledge of sterilization techniques and isolation of Pure Cultures	3	PO2, PO4
CO2	Analysis and apply the staining techniques of bacteria, demonstration of bacterial motility by hanging drop technique. To perform the microbiological assays of antibiotics, sterility testing of pharmaceuticals, biochemical tests of Microorganisms	3	PO2, PO4

Syllabus

Introduction and study of different equipments and processing, e.g., B.O.D. incubator, laminar flow, aseptic hood, autoclave, hot air sterilizer, deep freezer, refrigerator, microscopes used in experimental microbiology. Sterilization of glassware, preparation and sterilization of media. Sub culturing of bacteria and fungus. Nutrient stabs and slants preparations. Staining methods- Simple, Grams staining and acid fast staining Demonstration with practical. Isolation of pure culture of micro-organisms by multiple streak plate technique and other techniques.

Microbiological assay of antibiotics by cup plate method and other methods. Motility determination by Hanging drop method. Sterility testing of pharmaceuticals. Bacteriological analysis of water. Biochemical tests

Reference Books

1 Pharmaceutical Microbiology, W.B. Hugo and A.D. Russel, 8th (2013), Blackwell Scientific publications, Oxford London..

2 Industrial Microbiology, Prescott and Dunn., 4th (2004), CBS Publishers & Distributors, Delhi..

3 Microbiology, Pelczar, Chan Kreig, 7th (1993), Tata McGraw Hill edn..

4 Text Book of Microbiology, Ananthnarayan, 11th (2021), Orient-Longman, Chennai.

25PY2115T - PHARMACEUTICAL MICROBIOLOGY (THEORY) (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
25PY2115T	PHARMACEUTICAL MICROBIOLOGY (THEORY)	PMB-T	R	3	1	0	0	4

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Understand nutritional requirements, cultivation and preservation of various microorganisms	2	PO1
CO2	understand the importance and implementation of sterilization in pharmaceutical processing and industry	2	PO1, PO2
CO3	Understand the sterility testing of pharmaceutical products.and morphology,cultivation and replication of fungi and virus.	2	PO1, PO2
CO4	Understand microbiological standardization of Pharmaceuticals.	2	PO1, PO2, PO4

Syllabus

Introduction, history of microbiology, its branches, scope and its importance. Introduction to Prokaryotes and Eukaryotes. Study of ultra-structure and morphological classification of bacteria, nutritional requirements, raw materials used for culture media and physical parameters for growth, growth curve, isolation and preservation methods for pure cultures, cultivation of anaerobes, quantitative measurement of bacterial growth (total & viable count). Study of different types of phase contrast microscopy, dark field microscopy and electron microscopy.

Identification of bacteria using staining techniques simple Grams Acid fast staining) and biochemical tests IMViC Study of principle, procedure, merits, demerits and applications of physical chemical gaseous radiation and mechanical method of sterilization Evaluation of the efficiency of sterilization methods. Equipments employed in large scale sterilization Sterility indicators

Study of morphology, classification, reproduction/replication and cultivation of Fungi and Viruses. Classification and mode of action of disinfectants. Factors influencing disinfection, antiseptics and their evaluation. For bacteriostatic and bactericidal actions. Evaluation of bactericidal & Bacteriostatic. Sterility testing of products (solids, liquids, ophthalmic and other sterile products) according to IP, BP and USP.

Principles and methods of different microbiological assay. Methods for standardization of antibiotics, vitamins and amino acids. Assessment of a new antibiotic. Types of spoilage, assessment of microbial contamination and spoilage. Preservation of pharmaceutical products using antimicrobial agents, evaluation of microbial stability of formulations. Growth of animal cells in culture, general procedure for cell culture, Primary, established and transformed cell cultures. Application of cell cultures in pharmaceutical industry and research.

Reference Books

1 Microbiology, Prescot L.M., Jarley G.P Klein D.A, 2004, Mc Graw Hill Company Inc. .

2 Immunology , War Roitt, Jonathan Brostoff, David male , 1993, Mosby- year book Europe Ltd, London.

4 Microbiology: An Introduction , Gerard J. Tortora, Berdell R. Funke, Christine L. Case , 2014, Pearson .

5 Hugo and Russell's Pharmaceutical Microbiology , Sean P. Gorman (Editor), Brendan F. Gilmore (Editor), Norman A. Hodges (Editor), Stephen P. Denyer (Editor) , 2011, Wiley-Blackwell.

25PY2116P - PHARMACEUTICAL ENGINEERING (PRACTICAL) (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
25PY2116P	PHARMACEUTICAL ENGINEERING (PRACTICAL)	PE-P	R	0	0	4	0	2

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Apply various unit operations used in pharmaceutical industries and material handling techniques	3	PO2
CO2	Apply various processes involved in pharmaceutical manufacturing and the operation of pharmaceutical manufacturing equipment	3	PO2

Syllabus

Description of Construction working and application of Pharmaceutical Machinery such as rotary tablet machine, fluidized bed coater, fluid energy mill, de humidifier. Size analysis by sieving - To evaluate size distribution of tablet granulations - Construction of various size frequency curves including, arithmetic and logarithmic probability plots. Size reduction - To verify the laws of size reduction using ball mill and determining Kicks, Rittingers, Bonds coefficients, power requirement and critical speed of Ball Mill. To study the effect of time on the Rate of Crystallization. Determination of radiation constant of brass, and iron Determination of radiation constant of unpainted and painted glass. Steam distillation - To calculate the efficiency of steam distillation To determine the overall heat transfer coefficient by heat exchanger. Factors affecting Rate of Evaporation (Surface area, Concentration and Thickness, viscosity).

Construction of drying curves (for calcium carbonate and starch). Determination of moisture content and loss on drying. Determination of humidity of air - i) from wet and dry bulb temperatures - use of Dew point method. To calculate the uniformity Index for given sample by using Double Cone Blender. Demonstration of colloid mill, planetary mixer, fluidized bed dryer, freeze dryer and such other major equipment. Factors affecting Rate of Filtration (Surface area, Concentration and Thickness, viscosity).

Reference Books

1 Pharmaceutical engineering principles and practices, C.V.S Subrahmanyam, 1, 1998, Vallabh Prakashan.

2 Remington - The Science and practice of pharmacy, Adejaro. A, 21, 2006, Elsevier Exclusive.

3 Theory and practice of industrial pharmacy, Roop K. Khar, 4, 2013, CBS.

4 Essentials of Physical Pharmacy, Derle D. V, 2, 2015, PharmaMed Press.

25PY2116T - PHARMACEUTICAL ENGINEERING (THEORY) (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
25PY2116T	PHARMACEUTICAL ENGINEERING (THEORY)	PE-T	R	3	1	0	0	4

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Understand the concept of flow of fluids and various principles and equipments involved in size separation and size reduction techniques	2	PO2
CO2	Understand the concept of Heat transfer and principles and equipments involved in evaporation and distillation	2	PO2
CO3	Apply the concepts of drying and mixing in operation of pharmaceutical manufacturing dosage forms	3	PO2
CO4	Understand various materials involved in pharmaceutical manufacturing process, principles and equipments involved in filtration and centrifugation	2	PO2

Syllabus

Flow of fluids - Types of manometers, Reynolds number and its significance, Bernoullis theorem and its applications, Energy losses, Orifice meter, Venturi meter, Pitot tube and Rotameter. Size Reduction - Objectives, Mechanisms & Laws governing size reduction, factors affecting size reduction, principles, construction, working, uses, merits and demerits of Hammer mill, ball mill, fluid energy mill, Edge runner mill & end runner mill. Size Separation - Objectives, applications & mechanism of size separation, official standards of powders, sieves, size separation Principles, construction, working, uses, merits and demerits of Sieve shaker, cyclone separator, Air separator, Bag filter & elutriation tank.

Heat Transfer - Objectives, applications & Heat transfer mechanisms. Fouriers law, Heat transfer by conduction, convection & radiation. Heat interchangers & heat exchangers. Evaporation - Objectives, applications and factors influencing evaporation, differences between evaporation and other heat process. principles, construction, working, uses, merits and demerits of Steam jacketed kettle, horizontal tube evaporator, climbing film evaporator, forced circulation evaporator, multiple effect evaporator& Economy of multiple effect evaporator. Distillation - Basic Principles and methodology of simple distillation, flash distillation, fractional distillation, distillation under reduced pressure, steam distillation & molecular distillation

Drying - Objectives, applications & mechanism of drying process, measurements & applications of Equilibrium Moisture content, rate of drying curve. principles, construction, working, uses, merits and demerits of Tray dryer, drum dryer spray dryer, fluidized bed dryer, vacuum dryer, freeze dryer. Mixing - Objectives, applications & factors affecting mixing, Difference between solid and liquid mixing, mechanism of solid mixing, liquids mixing and semisolids mixing. Principles, Construction, Working, uses, Merits and Demerits of Double cone blender, twin shell blender, ribbon blender, Sigma blade mixer, planetary mixers, Propellers, Turbines, Paddles & Silverson Emulsifier.

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

Reference Books

1 Pharmaceutical engineering principles and practices, C.V.S Subrahmanyam, 1, 1998, Vallabh Prakashan.

2 Remington: The Science and Practice of Pharmacy, Adeboye Adejare, 21, 2006, Elsevier Exclusive.

3 Lachman Liebermans The Theory And Practice Of Industrial Pharmacy, Roop K. Khar, 4, 2013, CBS.

4 Essentials of Physical Pharmacy, Derle D, 2, 2015, PharmaMed Press.

25PY2217T - PHARMACEUTICAL ORGANIC CHEMISTRY-III (THEORY) (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
25PY2217T	PHARMACEUTICAL ORGANIC CHEMISTRY-III (THEORY)	POC III-T	R	3	1	0	0	4

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Learn stereoisomerism and racemic modification of compound	1	PO1
CO2	Understand sterereo specific reactions and its nomenclature of given organic compounds	2	PO1
CO3	Understand nomenclature rules, synthesis and its reactions for heterocyclic compounds	2	PO1
CO4	Understand preparative methods, medicinal uses of heterocyclic drugs and Study of Named reactions.	2	PO1

Syllabus

Stereo isomerism, Optical isomerism, Optical activity, enantiomerism, diastereo isomerism, meso compounds Elements of symmetry, chiral and achiral molecules, DL system of nomenclature of optical isomers, sequence rules, RS system of nomenclature of optical isomers. Reactions of chiral molecules. Racemic modification and resolution of racemic mixture. Asymmetric synthesis partial and absolute.

Geometrical isomerism: Nomenclature of geometrical isomers (Cis Trans, EZ, Syn Anti systems) Methods of determination of configuration of geometrical isomers. Conformational isomerism in Ethane, n-Butane and Cyclohexane. Stereo isomerism in biphenyl compounds (Atropisomerism) and conditions for optical activity. Stereospecific and stereoselective reactions.

Heterocyclic compounds: Nomenclature and classification, Synthesis, reactions and medicinal uses of following compounds/derivatives Pyrrole, Furan, and Thiophene. Relative aromaticity and reactivity of Pyrrole, Furan and Thiophene.

Synthesis, reactions and medicinal uses of following compounds/derivatives, Pyrazole, Imidazole, Oxazole and Thiazole. Pyridine, Quinoline, Isoquinoline, Acridine and Indole. Basicity of pyridine Synthesis and medicinal uses of Pyrimidine, Purine, azepines and their derivatives. Reactions of synthetic importance: Metal hydride reduction (NaBH4 and LiAlH4), Clemmensen reduction, Birch reduction, Wolff Kishner reduction. Oppenauer-oxidation and Dakin reaction. Beckmanns rearrangement and Schmidt rearrangement. Claisen-Schmidt condensation.

Reference Books

1 Organic chemistry- Volume I & II, I.L. Finar, 6th edition (2002), Pearson.

2 A text book of organic chemistry, Arun Bahl, B.S. Bahl, 22nd edition (2019), S Chand & Co. Ltd.

3 Heterocyclic Chemistry, Raj K. Bansal, 7th edition (2022), New Age International.

4 Organic Chemistry, Morrison and Boyd, 7th edition (2010), Pearson.

5 Heterocyclic Chemistry, T.L. Gilchrist, 3rd edition (2005), Pearson.

25PY2218P - MEDICINAL CHEMISTRY-I (PRACTICAL) (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
25PY2218P	MEDICINAL CHEMISTRY-I (PRACTICAL)	MC I-P	R	0	0	4	0	2

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Apply the various chemical reactions to perform chemical synthesis of some drugs and their intermediates.	3	PO4
CO2	Apply qualitative technique to perform the assays for few drugs to identify its purity and to determination of a physical property, partition coefficient for few drugs	3	PO4

Syllabus

Preparation of drugs: Benzimidazole, Benztriazole, Benzocaine, Phenytoin, Phenothiazine, Barbiturate. Preparation of intermediates: 1,3-pyrazole, 1,3-oxazole, 2,3- diphenyl quinoxaline,

Assay of drugs: Chlorpromazine, Phenobarbitone, Atropine, Ibuprofen, Aspirin, Furosemide. Determination of Physical properties: Partition coefficient for any two drugs

Reference Books

1 Medicinal Chemistry Practical, Ashutoskar, 4th (2007), New Age International Publishers,.

2 Vogels textbook of Practical Organic Chemistry, Arthur Israel Vogel, BS Furniss , 5th (2011), Longman.

3 Introduction to Organic Laboratory Techniques , Pavia, Lampman, Engel and Kriz, 5th (2012), Thomson Brooks and Cole .

4 Organic Chemistry Decoded: Master Orgo with Step-by-Step Solutions, Sterling Education, Dr. Frank Addivinola , 4th (2022), Sterling Test Prep.

25PY2218T - MEDICINAL CHEMISTRY-I (THEORY) (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
25PY2218T	MEDICINAL CHEMISTRY-I (THEORY)	MC I-T	R	3	1	0	0	4

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Understand the correlation of pharmacology of a disease with physico-chemical properties of drugs	2	PO1
CO2	Understand the chemistry, metabolic pathways, structure activity relationship and therapeutic value of adrenergic drugs	2	PO1
CO3	Understand the chemistry, metabolic pathways, structure activity relationship and therapeutic value of cholinergic drugs	2	PO4
CO4	Understand the chemistry, metabolic pathways, structure activity relationship and therapeutic value of CNS drugs	2	PO4

Syllabus

Introduction to Medicinal Chemistry: History and development of medicinal chemistry Physicochemical properties in relation to biological action Ionization, Solubility, Partition Coefficient, Hydrogen bonding, Protein binding, Chelation, Bio-isosterism, Optical and Geometrical isomerism. Drug metabolism Drug metabolism principles- Phase I and Phase II. Factors affecting drug metabolism including stereo chemical aspects.

Drugs acting on Autonomic Nervous System Adrenergic Neurotransmitters Biosynthesis and catabolism of catecholamine Adrenergic receptors Alpha and Beta and their distribution Sympathomimetic agents SAR of Sympathomimetic agents Direct acting Norepinephrine Epinephrine Phenylephrine Dopamine Methyldopa Clonidine Dobutamine Isoproterenol Terbutaline Salbutamol Bitolterol Naphazoline Oxymetazoline and Xylometazoline Indirect acting agents Hydroxy amphetamine Pseudoephedrine Propylhexedrine Agents with mixed mechanism Ephedrine Metaraminol Adrenergic Antagonists Alpha adrenergic blockers Tolazoline Phentolamine Phenoxybenzamine Prazosin Dihydroergotamine Methysergide Beta adrenergic blockers SAR of beta blockers Propranolol Metibranolol Atenolol Betazolol Bisoprolol Esmolol Metoprolol Labetolol Carvedilol

Cholinergic neurotransmitters Biosynthesis and catabolism of acetylcholine Cholinergic receptors Muscarinic and Nicotinic, and their distribution Parasympathomimetic agents SAR of Parasympathomimetic agents Direct acting agents Acetylcholine Carbachol Bethanechol Methacholine, Pilocarpine Indirect acting or Cholinesterase inhibitors Reversible and Irreversible Physostigmine Neostigmine Pyridostigmine Edrophonium chloride Tacrine hydrochloride Ambenonium chloride Isofluorphate Echothiophate iodide Parathion Malathion Cholinesterase reactivator Pralidoxime chloride Cholinergic Blocking agents SAR of cholinolytic agents Solanaceous alkaloids and analogues Atropine sulphate Hyoscyamine sulphate Scopolamine hydrobromide Homatropine hydrobromide Ipratropium bromide Synthetic cholinergic blocking agents Tropicamide Cyclopentolate hydrochloride Clidinium bromide, Dicyclomine hydrochloride*, Glycopyrrolate, Methantheline bromide, Propantheline bromide Benztropine mesylate Orphenadrine citrate Biperidine hydrochloride Procyclidine hydrochloride Tridihexethyl chloride Isopropamide iodide Ethopropazine hydrochloride

Drugs acting on Central Nervous System Sedatives and Hypnotics: Benzodiazepines SAR of Benzodiazepines Chlordiazepoxide Diazepam Oxazepam Chlorazepate Lorazepam Alprazolam Zolpidem Barbiturates SAR of barbiturates Barbital Phenobarbital Mephobarbital Amobarbital Butabarbital Pentobarbital Secobarbital Miscelleneous Amides and imides Glutethmide Alcohol and their carbamate derivatives Meprobomate Ethchlorvynol Aldehyde and their derivatives Triclofos sodium Paraldehyde Antipsychotics Phenothiazeines SAR of Phenothiazeines Promazine hydrochloride Chlorpromazine hydrochloride Triflupromazine Thioridazine hydrochloride Piperacetazine hydrochloride Prochlorperazine maleate Trifluoperazine hydrochloride Ring Analogues of Phenothiazeines Chlorprothixene Thiothixene Loxapine succinate Clozapine.Fluro buterophenones Haloperidol Droperidol Risperidone Beta amino ketones Molindone hydrochloride Benzamides Sulpieride Anticonvulsants SAR of Anticonvulsants mechanism of anticonvulsant action Barbiturates Phenobarbitone Methabarbital Hydantoins Phenytoin Mephenytoin Ethotoin Oxazolidine diones Trimethadione Paramethadione Succinimides Phensuximide Methsuximide Ethosuximide Urea and monoacylureas Phenacemide Carbamazepine Benzodiazepines Clonazepam Miscellaneous Primidone Valproic acid Gabapentin Felbamate General anesthetics Inhalation anesthetics Halothane Methoxyflurane Enflurane Sevoflurane Isoflurane Desflurane Ultrashort acting barbitutrates Methohexital sodium Thiamylal sodium Thiopental sodium Dissociative anesthetics Ketamine hydrochloride Narcotic and non-narcotic analgesics Morphine and related drugs SAR of Morphine analogues Morphine sulphate Codeine Meperidine hydrochloride Anilerdine hydrochloride Diphenoxylate hydrochloride Loperamide hydrochloride Fentanyl citrate Methadone hydrochloride Propoxyphene hydrochloride Pentazocine Levorphanol tartarate Narcotic antagonists Nalorphine hydrochloride Levallorphan tartarate Naloxone hydrochloride Anti-inflammatory agents Sodium salicylate Aspirin Mefenamic acid Meclofenamate Indomethacin Sulindac Tolmetin Zomepriac Diclofenac Ketorolac Ibuprofen Naproxen Piroxicam Phenacetin Acetaminophen Antipyrine Phenylbutazone

Reference Books

1. Wilson and Giswolds Organic medicinal and Pharmaceutical Chemistry, Charles Owens Wilson, 12th (2010), Lippincott Williams and Wilkins.
2. Organic Chemistry Vol I, IL Finar, 6th (2002), Pearson.
3. Foye Principles of Medicinal Chemistry, Victoria F. Roche and Thomas Lemke, 8th (2019), Wolters Kluwer Health Lippincott Williams and Wilkins.
4. Burgers Medicinal Chemistry Vol 1-8, Donald J Abraham Michael Myers, 8th (2021), Wiley.

25PY2219P - PHYSICAL PHARMACEUTICS II (PRACTICAL) (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
25PY2219P	PHYSICAL PHARMACEUTICS II (PRACTICAL)	PP II-P	R	0	0	4	0	2

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Apply the principles of colloidal systems and their properties and rheological behaviour of pharmaceutical systems and physical parameters in designing of dispersed systems	3	PO1
CO2	Apply the principles of particle surface characteristics in study of powdered materials and application of these concepts in designing of dosage forms and the principles of chemical kinetics & to use them for stability testing and determination of expiry date of formulations	3	PO1

Syllabus

Determination of viscosity of liquid using Ostwalds viscometer Determination of viscosity of semisolid by using Brookfield viscometer Determination sedimentation volume with effect of different concentration of single suspending agent Determination sedimentation volume with effect of different suspending agent

Determination of bulk density, true density and porosity Determination of flow properties of powders Determine influence of lubricant on angle of repose Determination of particle size, particle size distribution using sieving method Determination of particle size, particle size distribution using Microscpy method Determination of reaction rate constant for first order reaction Determination of reaction rate constant forSecond order reaction Accelerated stability studies

Reference Books

1 Physical Pharmacy , Alfred Martin, 8th Edition (2020), Lippincott Williams & Wilkins.

2 Text book of Physical Pharmaceutics, C.V.S. Subramanyam, 4th Edition (2019), Vallabh Prakashan.

3 PHYSICAL PHARMACEUTICS - II Practical Book, Dr. TARUN VIRMANI, 3rd Edition (2022), Nirali Prakashan.

4 PHYSICAL PHARMACEUTICS II, Dr. A. A. Hajare, 4th Edition (2020), Nirali Prakashan.

25PY2219T - PHYSICAL PHARMACEUTICS II (THEORY) (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
25PY2219T	PHYSICAL PHARMACEUTICS II (THEORY)	PP II-T	R	3	1	0	0	4

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Apply the principles of colloidal systems and their properties and rheological behaviour of pharmaceutical systems	3	PO1, PO4
CO2	Application of physical parameters in designing of dispersed systems	3	PO1, PO4
CO3	Apply the principles of particle surface characteristics in study of powdered materials and application of these concepts in designing of dosageforms	3	PO1, PO4
CO4	Apply the principles of chemical kinetics & to use them for stability testing nad determination of expiry date of formulations	3	PO1, PO4

Syllabus

"Colloidal dispersions: Classification of dispersed systems & their general characteristics, size & shapes of colloidal particles, classification of colloids & comparative account of their general properties. Optical, kinetic & electrical properties. Effect of electrolytes, coacervation, peptization& protectiveaction. Rheology: Newtonian systems, law of flow, kinematic viscosity, effect of temperature, non newtonian systems, pseudoplastic, dilatant, plastic, thixotropy, thixotropy in formulation, determination of viscosity, capillary, falling Sphere, rotational viscometers. Deformation of solids: Plastic and elastic deformation, Heckel equation, Stress, Strain, Elastic Modulus.

Coarse dispersion: Suspension, interfacial properties of suspended particles, settling in suspensions, formulation of flocculated and deflocculated suspensions. Emulsions and theories of emulsification, microemulsion and multiple emulsions; Stability of emulsions, preservation of emulsions, rheological properties of emulsions and emulsion formulation by HLB method

Micromeretics: Particle size and distribution, mean particle size, number and weight distribution, particle number, methods for determining particle size by different methods, counting and separation method, particle shape, specific surface, methods for determining surface area, permeability, adsorption, derived properties of powders, porosity, packing arrangement, densities, bulkiness & flow properties.

"Drug stability: Reaction kinetics: zero, pseudo-zero, first & second order, units of basic rate constants, determination of reaction order. Physical and chemical factors influencing the chemical degradation of pharmaceutical product: temperature, solvent, ionic strength, dielectric constant, specific & general acid base catalysis, Simple numerical problems. Stabilization of medicinal agents against common reactions like hydrolysis & oxidation. Accelerated stability testing in expiration dating of pharmaceutical dosage forms. Photolytic degradation and its prevention "

Reference Books

1 Physical Pharmacy , Alfred Martin , 2022, Lippincott Williams & Wilkins .

2 Text book of Physical Pharmaceutics , C.V.S. Subramanyam , 2015, Vallabh Prakashan .

3 Novel Drug Delivery Systems, 5th edition, revised and expanded , ? Y W. Chien , 1991, Marcel Dekker, Inc. .

4 Encyclopedia of Controlled Delivery. Published by Wiley Interscience Publication, , Edith Mathiowitz , 1999, John Wiley and Sons, Inc, New York. Chichester Weinheim .

25PY2220P - PHARMACOLOGY I (PRACTICAL) (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
25PY2220P	PHARMACOLOGY I (PRACTICAL)	P. COL I-P	R	0	0	4	0	2

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Apply basic principles of pharmacology and common laboratory techniques	3	PO2, PO3
CO2	Analyse the effect of drugs using various pharmacological equipments(Insilico)	4	PO2, PO3

Syllabus

Introduction to experimental pharmacology. 2. Commonly used instruments in experimental pharmacology. 3. Study of common laboratory animals. 4. Maintenance of laboratory animals as per CPCSEA guidelines 5. Common laboratory techniques. Blood withdrawal, serum and plasma separation, anesthetics and euthanasia used for animal studies 6. Study of different routes of drugs administration in mice/rats 7. Study of effect of hepatic microsomal enzyme inducers on the phenobarbitone sleeping time in mice

Effect of drugs on ciliary motility of frog oesophagus 2. Effect of drugs on rabbit eye. 3. Effects of skeletal muscle relaxants using rota-rod apparatus 4. Effect of drugs on locomotors activity using actophotometer. 5. Anticonvulsant effect of drugs by MES and PTZ method. 6. Study of stereotype and anti-catatonic activity of drugs on rats/mice. 7. Study of anxiolytic activity of drugs using rats/mice. 8. Study of local anesthetics by different methods

Reference Books

1 Rang and Dales Pharmacology, Churchil Livingstone Elsevier, Rang H. P., Dale M. M. Ritter J. M., Flower R. J., 10 (2020), Elsevier.

2 Basic and clinical pharmacology, Katzung B. G., Masters S. B., Trevor A, 15 (2021), Lea& Febigur.

3 Text book of Medical Pharmacology , KD Tripathy , 9 (2019), Jaypee.

4 The Pharmacological Basis Of therapeutics , Good man Nad Gill Man, 16 (2021), Mc Graw Hill.

5 Text Book of experimental pharmacology, Jithin Mathew, 1 (2022), Pritam Publications.

25PY2220T - PHARMACOLOGY I (THEORY) (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
25PY2220T	PHARMACOLOGY I (THEORY)	P. COL I-T	R	3	1	0	0	4

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Understand the pharmacological actions of different categories of drugs	2	PO1, PO4
CO2	Understand the mechanism of drug action at the organ system/subcellular/macromolecular level	2	PO1, PO4
CO3	Apply the basic knowledge of pharmacology in PNS	3	PO1, PO4
CO4	Apply the principles of pharmacology of drugs on CNS	3	PO1, PO4

Syllabus

General Pharmacology a. Introduction to Pharmacology- Definition, historical landmarks and scope of pharmacology, nature and source of drugs, essential drugs concept and routes of drug administration, Agonists, antagonists(competitive and non-competitive), spare receptors, addiction, tolerance, dependence, tachyphylaxis, idiosyncrasy, allergy. b. Pharmacokinetics- Membrane transport, absorption, distribution, metabolism and excretion of drugs .Enzyme induction, enzyme inhibition, kinetics of elimination

Principles and mechanisms of drug action. Receptor theories and classification of receptors, regulation of receptors. drug receptors interactions signal transduction mechanisms, G-protein coupled receptors, ion channel receptor, transmembrane enzyme linked receptors, transmembrane JAK STAT binding receptor and receptors that regulate transcription factors, dose response relationship, therapeutic index, combined effects of drugs and factors modifying drug action. b. Adverse drug reactions. c. Drug interactions pharmacokinetic and pharmacodynamic d. Drug discovery and clinical evaluation of new drugs Drug discovery phase, preclinical evaluation phase, clinical trial phase, phases of clinical trials and pharmacovigilance

Pharmacology of drugs acting on peripheral nervous system a. Organization and function of ANS. b. Neurohumoral transmission,co transmission and classification of neurotransmitters. c. Parasympathomimetics, Parasympatholytics, Sympathomimetics, sympatholytics. d.Neuromuscular blocking agents and skeletal muscle relaxants peripheral. e. Local anesthetic agents. f. Drugs used in myasthenia gravis and glaucoma

Pharmacology of drugs acting on central nervous system .General anesthetics and preanesthetics.Sedatives, hypnotics and centrally acting muscle relaxants. Anti epileptics . Alcohols and disulfuram .Pharmacology of drugs acting on central nervous system .Psychopharmacological agents: Antipsychotics, antidepressants, anti anxiety agents, anti manics and hallucinogens. Drugs used in Parkinsons disease and Alzheimers disease. CNS stimulants and nootropics. Opioid analgesics and antagonists. Drug addiction, drug abuse, tolerance and dependence.

Reference Books

1. Rang and Dales Pharmacology, Churchil Livingstone Elsevier, Rang H. P. Dale M. M., Ritter J. M.Flower R. J, 10 (2020), Elsevier.
2. Basic and clinical pharmacology, Katzung B. G. Masters S. B.Trevor A. J, 15 (2021), Lea& Febigur.
3. The Pharmacological Basis of Therapeutics, Goodman Gilman, Louis S. Goodman, Alfred Goodman, and Theodore W. Rall. pen_spark, 16 (2021), Mc-Graw Hill.
4. Essentials of Medical Pharmacology, KD Tripathy, 9 (2019), Jaypee.

25PY2221P - PHARMACOGNOSY AND PHYTOCHEMISTRY I (PRACTICAL) (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
25PY2221P	PHARMACOGNOSY AND PHYTOCHEMISTRY I (PRACTICAL)	PH. COG-I-	R	0	0	4	0	2

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Applying the knowledge of chemical evaluation in identifying and physical evaluation of crude drugs	3	PO1, PO4
CO2	Applying the knowledge of microscopical evaluation of crude drugs by linear measurements and leaf constants	3	PO1, PO4

Syllabus

Identification of Tragacanth and Acacia using chemical tests Identification of Agar and Gelatin using chemical Tests Identification of Starch, Honey and castor oil using chemical tests Determination of Ash value and moisture content of Cinnamon Determination of extractive value of Acacia powder Determination of swelling Index of Isapgol and foaming index of liquorice

Determination of number of starch grains by Lycopodium spore method Determination of fiber length and width of cinnamon bark Determination of size of starch grains using microscopic methods Determination of Palisade cell ratio of Datura leaf using microscopic methods Determination of Stomatal number and Stomatal index of Vinca leaf using camera lucida Determination of Vein islet and vein termination number of Datura leaf using camera lucida

Reference Books

1 Trease and Evans Pharmacognosy, W.C.Evans, 16,2009, W.B. Sounders & Co., London.

2 Text book of Pharmacognosy, C.K. Kokate, Purohit, Gokhlae, 57, 2021, Nirali Prakashan.

3 Essentials of Pharmacognosy, Dr.SH.Ansari, 2,2016, Birla publications.

4 Herbal drug industry, R.D. Choudhary, 1, 1996, Eastern Publisher.

25PY2221T - PHARMACOGNOSY AND PHYTOCHEMISTRY I (THEORY) (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
25PY2221T	PHARMACOGNOSY AND PHYTOCHEMISTRY I (THEORY)	PH. COG-I-	R	3	1	0	0	4

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Understand the knowledge of crude drugs and its evaluation	2	PO1, PO4
CO2	Understand the cultivation, collection and processing of crude drugs	2	PO1, PO4
CO3	Understand the traditional systems of medicine and a brief introduction about secondary metabolites	2	PO1, PO4
CO4	Understand primary metabolites and marine source of drugs	2	PO1, PO4

Syllabus

Introduction to Pharmacognosy Definition history scope and development of Pharmacognosy Sources of Drugs Plants Animals Marine &Tissue culture Organized drugs unorganized drugs (dried latex dried juices dried extracts gums and mucilages oleoresins and oleo- gum-resins) Classification of drugs Alphabetical morphological taxonomical chemical pharmacological chemo and serotaxonomical classification of drugs Quality control of Drugs of Natural Origin Adulteration of drugs of natural origin Evaluation by organoleptic microscopic physical chemical and biological methods and properties Quantitative microscopy of crude drugs including lycopodium spore method leaf constants camera lucida and diagrams of microscopic objects to scale with camera lucida

Cultivation Collection Processing and storage of drugs of natural origin Cultivation and Collection of drugs of natural origin Factors influencing cultivation of medicinal plants Plant hormones and their applications Polyploidy mutation and hybridization with reference to medicinal plants Conservation of medicinal plants Plant tissue culture Historical development of plant tissue culture types of cultures Nutritional requirements growth and their maintenance Applications of plant tissue culture in pharmacognosy Edible vaccines Pharmacognosy in various systems of medicine Role of Pharmacognosy in allopathy and traditional systems of medicine namely Ayurveda Unani Siddha Homeopathy and Chinese systems of medicine

Introduction to secondary metabolites Definition classification properties and test for identification of Alkaloids Glycosides Flavonoids Tannins Volatile oil and Resins Study of biological source chemical nature and uses of drugs of natural origin containing following drugs Plant Products Fibers Cotton Jute Hemp Hallucinogens Teratogens Natural allergens

Primary metabolites General introduction detailed study with respect to chemistry sources preparation evaluation preservation storage therapeutic used and commercial utility as Pharmaceutical Aids and or Medicines for the following Primary metabolites Carbohydrates Acacia Agar Tragacanth Honey Proteins and Enzymes Gelatin casein proteolytic enzymes (Papain bromelain serratiopeptidase urokinase streptokinase pepsin Lipids Waxes fats fixed oils Castor oil Chaulmoogra oil Wool Fat Bees Wax Marine Drugs Novel medicinal agents from marine sources

Reference Books

1 Trease and Evans Pharmacognosy, W.C.Evans, 14, 2009, W.B. Sounders & Co., London.

2 Text book of Pharmacognosy, C.K. Kokate, Purohit, Gokhlae, 57, 2021, Nirali Prakashan.

3 Essentials of Pharmacognosy, Dr.SH.Ansari, 2, 2016, Birla publications.

4 Herbal drug industry, R.D. Choudhary, 1, 1996, Eastern Publisher.

25PY3122T - MEDICINAL CHEMISTRY-II (THEORY) (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
25PY3122T	MEDICINAL CHEMISTRY-II (THEORY)	MC II-T	R	3	1	0	0	4

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Understanding the nomenclature, chemistry, metabolism, structure- activity relationship, mechanism of action, synthesis (few drugs) and uses of antihistamine and antineoplastic drugs	2	PO1, PO4
CO2	Understanding the nomenclature, chemistry, metabolism, structure- activity relationship, mechanism of action, synthesis (few drugs) and uses of anti-anginal, antihypertensive and diuretic drugs	2	PO1, PO4
CO3	Applying the knowledge of the nomenclature, chemistry, metabolism, structure-activity relationship, mechanism of action, synthesis (few drugs) and uses of anti-arrhythmic, anticoagulant, antihyperlipidemic and local anaesthetic drugs and drug used in cardiac failure	3	PO1, PO4
CO4	Applying the knowledge of the nomenclature, chemistry, metabolism, structure-activity relationship, mechanism of action, synthesis (few drugs) and uses of antidiabetic drugs, hormones and steroid drugs	3	PO1, PO4

Syllabus

Antihistaminic agents,Gastric Proton pump inhibitors,Anti-neoplastic agents.

Anti-anginal,Diuretics,Anti-hypertensive Agents.

Anti-arrhythmic Drugs,Anti-hyperlipidemic agents,Coagulant & Anticoagulants,Drugs used in Congestive Heart Failure,Local Anesthetics

Antidiabetic agents,Drugs acting on Endocrine system.

Reference Books

1 Text Book of Medicinal Chemistry, S. N. Pandeya & S. K. Pandey, 2, 2024, KG Publisher.

2 Medicinal Chemistry, Ashutoskar, 4 , 2013, New Age International Publishers.

3 Burger s Medicinal Chemistry, Donald J Abraham, 7, 2010, Wiley Publications.

4 Organic Medicinal and Pharmaceutical Chemistry, Wilson & Giswolds, 12, 2010, Williams & Wilkins.

25PY3123P - INDUSTRIAL PHARMACY-I (PRACTICAL) (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
25PY3123P	INDUSTRIAL PHARMACY-I (PRACTICAL)	IP I-P	R	0	0	4	0	2

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Estimate the Physicochemical properties of drug that influences the performance of drug and dosage from and preparation and evaluation of capsules and coated tablets	3	PO2
CO2	examine preparation and evaluation of injections and creams	4	PO3

Syllabus

Preformulation studies on paracetamol/aspirin/or any other drug Preparation and evaluation of Paracetamol tablets Preparation and evaluation of Aspirin tablets Coating of tablets- film coating of tablets/granules Preparation and evaluation of Tetracycline capsules

Preparation of Calcium Gluconate injection Preparation of Ascorbic Acid injection Quality control test of (as per IP) marketed tablets and capsules Preparation of Eye drops/ and Eye ointments Preparation and evaluation of cold cream Preparation and evaluation of vanishing cream

Reference Books

1 Encyclopedia of Pharmaceutical Technology, Jabes swarbrick, 2002, Taylor & Francis.

2 Pharmaceutical dosage forms - Tablets, Lieberman HA, Lachman L, Schwartz JB , 2022, J.B.Schwartz publiser.

3 "Pharmaceutical Preformulation and Formulation: A Practical Guide from Candidate Drug Selection to Commercial Dosage Form", Mark Gibson, 2013, CRC Press.

4 4 "Pharmaceutical Process Scale-Up", Michael Levin, 2011, CRC Press.

25PY3123T - INDUSTRIAL PHARMACY-I (THEORY) (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
25PY3123T	INDUSTRIAL PHARMACY-I (THEORY)	IP I-T	R	3	1	0	0	4

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Know about Physicochemical properties of drug that influences the performance of drug and dosage from.	1	PO1, PO2
CO2	Understand the formulation, manufacturing, evaluation of tablets, liquid orals, capsules and pelletization.	2	PO1, PO2
CO3	understand different considerations related to parenterals and ophthalmic products	2	PO1, PO2
CO4	Understand the formulation, preparation and evaluation of cosmetics and aerosols. A note on packaging materials for pharmaceutical products	2	PO1, PO2

Syllabus

Preformulation Studies: Introduction to preformulation, goals and objectives, study of physicochemical characteristics of drug substances. a. Physical properties: Physical form (crystal & amorphous), particle size, shape, flow properties, solubility profile (pKa, pH, partition coefficient), polymorphism b. Chemical Properties: Hydrolysis, oxidation, reduction, racemisation, polymerization BCS classification of drugs & its significant Application of preformulation considerations in the development of solid, liquid oral and parenteral dosage forms and its impact on stability of dosage forms.

Tablets: a. Introduction, ideal characteristics of tablets, classification of tablets. Excipients, Formulation of tablets, granulation methods, compression and processing problems. Equipments and tablet tooling. b. Tablet coating: Types of coating, coating materials, formulation of coating composition, methods of coating, equipment employed and defects in coating. c. Quality control tests: In process and finished product tests. Liquid orals: Formulation and manufacturing consideration of syrups and elixirs suspensions and emulsions; Filling and packaging; evaluation of liquid orals official in pharmacopoeia . Capsules: a. Hard gelatin capsules: Introduction, Production of hard gelatin capsule shells. size of capsules, Filling, finishing and special techniques of formulation of hard gelatin capsules, manufacturing defects. In process and final product quality control tests for capsules. b. Soft gelatin capsules: Nature of shell and capsule content, size of capsules, importance of base adsorption and minim/gram factors, production, in process and final product quality control tests. Packing, storage and stability testing of soft gelatin capsules and their applications. Pellets: Introduction, formulation requirements, pelletization process, equipments for manufacture of pellets.

Parenteral Products: a. Definition, types, advantages and limitations. Preformulation factors and essential requirements, vehicles, additives, importance of isotonicity b. Production procedure, production facilities and controls, aseptic processing c. Formulation of injections, sterile powders, large volume parenterals and lyophilized products. d. Containers and closures selection, filling and sealing of ampoules, vials and infusion fluids. Quality control tests of parenteral products. Ophthalmic Preparations: Introduction, formulation considerations; formulation of eye drops, eye ointments and eye lotions; methods of preparation; labeling, containers; evaluation of ophthalmic preparations.

Cosmetics: Formulation and preparation of the following cosmetic preparations: lipsticks, shampoos, cold cream and vanishing cream, tooth pastes, hair dyes and sunscreens. Pharmaceutical Aerosols: Definition, propellants, containers, valves, types of aerosol systems; formulation and manufacture of aerosols; Evaluation of aerosols; Quality control and stability studies. Packaging Materials Science: Materials used for packaging of pharmaceutical products, factors influencing choice of containers, legal and official requirements for containers, stability aspects of packaging materials, quality control tests.

Reference Books

1 "Remington: The Science and Practice of Pharmacy", David B. Troy, Paul Beringer, 2021, Lippincott Williams & Wilkins.

2 "Pharmaceutical Dosage Forms: Tablets", Larry L. Augsburger, Stephen W. Hoag, 1991, CRC Press.

3 "Pharmaceutical Extrusion Technology", Isaac Ghebre-Selassie, Charles Martin, 2003, Taylor & Francis.

4 Industrial Pharmacy, Lachman/Libermans, 2020, CBS Publishers.

25PY3124P - PHARMACOLOGY II (PRACTICAL) (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
25PY3124P	PHARMACOLOGY II (PRACTICAL)	P.COL II-P	R	0	0	4	0	2

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Analyse the pharmacological activity of drugs on Cardiac and Renal system and dose responses on isolated tissues (Insilco	4	PO2
CO2	Analyse the potency of drugs by Bioassays and the effect of drugs on analgesic and inflammation	4	PO3

Syllabus

1. Introduction to in-vitro pharmacology and physiological salt solutions. 2. Effect of drugs on isolated frog heart. 3. Effect of drugs on blood pressure and heart rate of dog. 4. Study of diuretic activity of drugs using rats/mice. 5. DRC of acetylcholine using frog rectus abdominis muscle. 6. Effect of physostigmine and atropine on DRC of acetylcholine using frog rectus abdominis muscle and rat ileum respectively

1. Bioassay of histamine using guinea pig ileum by matching method. 2. Bioassay of oxytocin using rat uterine horn by interpolation method. 3. Bioassay of serotonin using rat fundus strip by three-point bioassay. 4. Bioassay of acetylcholine using rat ileum/colon by four-point bioassay. 5. Determination of PA2 value of prazosin using rat anococcygeal muscle (by Schilds plot method). 6. Determination of PD2 value using guinea pig ileum. 7. Effect of spasmogens and spasmolytics using rabbit jejunum

Reference Books

1 Rang and Dales Pharmacology, Churchil Livingstone Elsevier, Rang and Dale, 10 (2020), Elsevier.

2 Basic and clinical pharmacology, Katzung B. G. Masters S. B., Trevor A. J., 15 (2021), Lea& Febigur.

3 The Pharmacological Basis of Therapeutics, Goodman Gilman, Louis S. Goodman, Alfred Goodman, and Theodore W. Rall. pen_spark, 16 (2021, Mc-Graw Hill.

4 Text Book of Medical Pharmacology, K D Tripathy, 9(2019), Jaypee.

25PY3124T - PHARMACOLOGY II (THEORY) (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
25PY3124T	PHARMACOLOGY II (THEORY)	P.COL II-T	R	3	1	0	0	4

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Understand the pharmacology of cardio vascular system drugs: congestive heart failure drugs, Anti hypertensive drugs, Anti anginal drugs, Anti arrhythmic drugs, Anti hyperlipidemic drugs	2	PO1, PO4
CO2	Understand the pharmacology of shock, Hematinics, coagulants and anticoagulants, Fibrinolytics and anti - platelet drugs, diuretics and autocoids	2	PO1, PO4
CO3	Understand the Pharmacology of drugs acting on endocrine system. Anterior Pituitary hormones, Thyroid hormones, Insulin, Oral Hypoglycemic agents and glucagon, ACTH and corticosteroids.	2	PO1, PO4
CO4	Apply the principles of Bio -Assays	3	PO1, PO4

Syllabus

Pharmacology of drugs acting on cardiovascular system: Introduction to hemodynamic and electrophysiology ofheart. Drugs used in congestive heart failure Anti-hypertensivedrugs.Anti-anginaldrugs. Anti-arrhythmicdrugs. Anti-hyperlipidemic drugs. Pharmacology of drugs acting on cardiovascular system: Drug used in the therapy of shock. Hematinics, coagulants and anticoagulants. Fibrinolytics and antiplatelet drugs. Plasma volume expanders

Pharmacology of drugs acting on urinary system: Diuretics, Anti-diuretics. Autocoids and related drugs: Introduction to autacoids and classification, Histamine, 5-HT and their antagonists. Prostaglandins, Thromboxanes and Leukotrienes. Angiotensin, Bradykinin and Substance P. Non- steroidal anti-inflammatoryagents, Anti-gout drugs, Antirheumatic drugs

Pharmacology of drugs acting on endocrine system: Basic concepts in endocrine pharmacology., Anterior Pituitary hormones- analogues and their inhibitors. Thyroid hormones- analogues and their inhibitors. Hormones regulating plasma calcium levelParathormone, Calcitonin and Vitamin-D. Insulin, Oral Hypoglycemic agents and glucagon. ACTH and corticosteroids

Pharmacology of drugs acting on endocrine system: Androgens and Anabolic steroids. Estrogens, progesterone and oral contraceptives. Drugs acting on the uterus. Bioassay: Principles and applicationsof bioassay. b. Types of bioassay Bioassay of insulin, oxytocin, vasopressin, ACTH, d-tubocurarine, digitalis, histamine and 5-HT

Reference Books

1. Rang and Dales Pharmacology, Churchil Livingstone Elsevier, Rang H. P. Dale M. M. Ritter J. M. Flower R. J, 10 (2020), Elsevier.
2. Basic and clinical pharmacology, Katzung B. G., Masters S. B., Trevor A. J., 15 (2021), Lea& Febigur.
3. The Pharmacological Basis of Therapeutics, Goodman Gilman, Louis S. Goodman, Alfred Goodman, and Theodore W. Rall. pen_spark, 16 (2021), Mc-Graw Hill.
4. Essentials of Medical Pharmacology, KD Tripathy, 9 (2019), Jay Pee.

25PY3125P - PHARMACOGNOSY AND PHYTOCHEMISTRY -II (PRACTICAL) (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
25PY3125P	PHARMACOGNOSY AND PHYTOCHEMISTRY -II (PRACTICAL)	P. COG II-P	R	0	0	4	0	2

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Apply various chemical tests to Identification of phytoconstituents in the crude drugs	3	PO3
CO2	Examine the Isolation and detection of Phytoconstituents from crude drugs	4	PO3

Syllabus

Morphology, histology and powder characteristics & extraction & detection of Cinchona, Cinnamon, Senna, Clove, Ephedra, Fennel and Coriander 2. Exercise involving isolation & detection of active principles a. Caffeine - from tea dust. b. Diosgenin from Dioscorea c. Atropine from Belladonna d. Sennosides from Senna 3. Separation of sugars by Paper chromatography 4. TLC of herbal extract

Distillation of volatile oils and detection of phytoconstitutents by TLC 2. Analysis of crude drugs by chemical tests (i) Asafoetida (ii) Benzoin (iii) Colophony (iv) Aloes (v) Myrrh 3. Morphology, histology and powder characteristics & extraction & detection of Cinchona, Cinnamon, Senna, Clove, Ephedra, Fennel and Coriander 4. Exercise involving isolation & detection of active principles

Reference Books

1 Herbal drug industry, D. R. Chaudhuri, 1996, Eastern Publisher, New Delhi..

2 Herbal Cosmetics , HK.Panda. , 2015, Asia Pacific Business press, Inc, New Delhi.

3 Plant cell Biotechnology , R Endress, 2020, Springer-Verlag, Berlin.

4 Textbook of Biotechnology , Vyas and Dixit. , 2018, CBS PUBLISHERS.

5 Textbook of Biotechnology , RC. Dubay, 1993, S.Chand publications.

25PY3125T - PHARMACOGNOSY AND PHYTOCHEMISTRY -II (THEORY) (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
25PY3125T	PHARMACOGNOSY AND PHYTOCHEMISTRY -II (THEORY)	P. COG II-T	R	3	1	0	0	4

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Understand the importance of the basic metabolic pathways occurring in higher	2	PO1
CO2	Understand the importance of biological sources of various crude drugs	2	PO1
CO3	Understand the extraction procedures of crude drugs	2	PO2
CO4	Application of various techniques involved in production of the phytoconstituents and identification of it.	3	PO2

Syllabus

Metabolic pathways in higher plants and their determination - Brief study of basic metabolic pathways and formation of different secondary metabolites through these pathways- Shikimic acid pathway, Acetate pathways and Amino acid pathway. Study of utilization of radioactive isotopes in the investigation of Biogenetic studies.

General introduction, composition, chemistry & chemical classes, biosources, therapeutic uses and commercial applications of following secondary metabolites. Alkaloids - Vinca, Rauwolfia, Belladonna, Opium, Phenylpropanoids and Flavonoids - Lignans, Tea, Ruta Steroids, Cardiac Glycosides & Triterpenoids - Liquorice, Dioscorea, Digitalis. Volatile oils: Mentha, Clove, Cinnamon, Fennel, Coriander, Tannins: Catechu, Pterocarpus. Resins - Benzoin, Guggul, Ginger, Asafoetida, Myrrh, Colophony. Glycosides - Senna, Aloes, Bitter Almond. Iridoids, Other terpenoids & Naphthaquinones - Gentian, Artemisia, taxus, carotenoids

Basics of Phytochemistry - Modern methods of extraction, application of latest techniques like Spectroscopy, chromatography and electrophoresis in the isolation, purification and identification of crude drugs. Terpenoids - Menthol, Citral, Artemisin. Glycosides - Glycyrhetinic acid & Rutin. Alkaloids - Atropine, Quinine, Reserpine, Caffeine. Resins - Podophyllotoxin, Curcumin.

Industrial production, estimation, and utilization of the following phytoconstituents - Forskolin, Sennoside, Artemisinin, Diosgenin, Digoxin, Atropine, Podophyllotoxin, Caffeine, Taxol, Vincristine and Vinblastine.

Reference Books

1 Herbal drug industry, R.D Chowdary, 1996, Eastern Publisher, New Delhi.

2 Herbal Cosmetics, HK.Pande,., 2015, Asia Pacific Business press, Inc, New Delhi.

3 Plant cell Biotechnology, R Endress, 2020, Springer-Verlag, Berlin.

4 Textbook of Biotechnology, Vyas and Dixit., 2018, CBS PUBLISHERS.

5 Textbook of Biotechnology, RC. Dubay, 1993, S.Chand publications.

25PY3126T - PHARMACEUTICAL JURISPRUDENCE (THEORY) (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
25PY3126T	PHARMACEUTICAL JURISPRUDENCE (THEORY)	PJ-T	R	3	1	0	0	4

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Understand Pharmaceutical legislations and their implications in the development and marketing of pharmaceuticals.	2	PO9
CO2	Understand Various Indian Pharmaceutical Acts and Laws such as Drugs and Cosmetics Act and its rules	2	PO9
CO3	Understand The regulatory authorities and agencies governing the manufacture and sale of pharmaceuticals	2	PO9
CO4	Understand The code of ethics, laws and regulations during the pharmaceutical practice	2	PO9

Syllabus

Pharmaceutical Legislations A brief review, Introduction, Study of drugs enquiry committee, Health survey and development committee, Hathi committee and Mudaliar committee. Code of Pharmaceutical ethics Definition, Pharmacist in relation to his job, trade, medical profession and his profession, Pharmacist oath. Drugs and Cosmetics Act, 1940 and its rules 1945: Objectives, Definitions, Legal definitions of schedules to the Act and Rules Import of drugs Classes of drugs and cosmetics prohibited from import, Import under license or permit. Offences and penalties. Manufacture of drugs Prohibition of manufacture and sale of certain drugs, Conditions for grant of license and conditions of license for manufacture of drugs, Manufacture of drugs for test, examination and analysis, manufacture of new drug, loan license and repacking license

Drugs and Cosmetics Act, 1940 and its rules 1945: Detailed study of Schedule G, H, M, N, P,T,U, V, X, Y, Part XII B, Sch F & DMR Sale of Drugs Wholesale, Retail sale and Restricted license. Offences and penalties. Labelling & packing of drugs General labelling requirements and specimen labels for drugs and cosmetics, List of permitted colours. Offences and penalties. Administration of the Act and Rules Drugs Technical Advisory Board, Central drugs Laboratory, Drugs Consultative Committee, Government drug analysts, licensing authorities, controlling authorities, Drugs Inspectors

Pharmacy Act 1948: Objectives, Definitions, Pharmacy Council of India; its constitution and functions, Education Regulations, State and Joint state pharmacy councils; constitution and functions, Registration of Pharmacists, Offences and penalties. Medicinal and Toilet Preparation Act 1955: Objectives, Definitions, Licensing, Manufacture In bond and Outside bond, Export of alcoholic preparations, Manufacture of Ayurvedic, Homeopathic, Patent & Proprietary Preparations. Offences and Penalties. Narcotic Drugs and Psychotropic substances Act 1985 and Rules: Objectives, Definitions, Authorities and Officers, Constitution and Functions of narcotic & Psychotropic Consultative Committee, National Fund for Controlling the Drug Abuse, Prohibition, Control and Regulation, Opium poppy cultivation and production of poppy straw, manufacture, sale and export of Opium, Offences and Penalties.

Study of Salient Features of Drugs and Magic Remedies Act and its rules: Objectives, Definitions, Prohibition of certain advertisements, Classes of Exempted advertisements, Offences and Penalties. Prevention of Cruelty to animals Act 1960: Objectives, Definitions, Institutional Animal Ethics Committee, CPCSEA guidelines for Breeding and Stocking of Animals, Performance of Experiments, Transfer and acquisition of animals for experiment, Records, Power to suspend or revoke registration, Offences and Penalties. National Pharmaceutical Pricing Authority: Drugs Price Control Order 2013. Objectives, Definitions, Sale prices of bulk drugs, Retail price of formulations, Retail price and ceiling price of scheduled formulations, National List of Essential Medicines. Medical Termination of Pregnancy Act. Right to Information Act. Introduction to Intellectual Property

Reference Books

1 Forensic Pharmacy, B.Suresh , First Edition (2010), CBS Publishers & Distributors .

2 Text book of Forensic Pharmacy , R.M.Mithal , First Edition (2011), Vikas Publishing House .

3 Hand book of drug law , M.L.Mehra , 9th Edition (1997), Jain publishers .

4 A text book of Forensic Pharmacy , N.K.Jain , 4th Edition (2017), Vallabh Prakashan .

5 Text book of Forensic Pharmacy , C.K.Kokate , 2nd Edition (2012), Pharmamed Press .

25PY3227P - MEDICINAL CHEMISTRY III (PRACTICAL) (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
25PY3227P	MEDICINAL CHEMISTRY III (PRACTICAL)	MC II-P	R	0	0	4	0	2

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Analysing the Preparation of drugs and intermediates like 1. Sulphanilamide,2. 7 Hydroxy, 4 methyl coumarin 3. Chlorobutanol 4. Triphenyl imidazole 5. Tolbutamide 6. Hexamine. Assay of drugs like 1. Isonicotinic acid hydrazide 2. Chloroquine 3. Metronidazole 4. Dapsone 5. Chlorpheniramine maleate 6. Benzyl penicillin	3	PO2, PO4
CO2	Analysing the Preparation of medicinally important compounds or intermediateslike aspirin, paracetamol by Microwave irradiation technique.Drawing structures and reactions using chem draw Determination of physicochemical properties such as logP, clogP, MR, Molecular weight, Hydrogen bond donors and acceptors for class of drugs course content using drug design software Drug likeliness screening Lipinskies RO5	3	PO2, PO4

Syllabus

Preparation of drugs and intermediates 1. Sulphanilamide 2. 7 Hydroxy, 4 methyl coumarin 3. Chlorobutanol 4. Triphenyl imidazole 5. Tolbutamide 6. Hexamine .II Assay of drugs 1. Isonicotinic acid hydrazide 2. Chloroquine 3. Metronidazole 4. Dapsone 5. Chlorpheniramine maleate 6. Benzyl penicillin

III Preparation of medicinally important compounds or intermediates by Microwave irradiation technique.IV. Drawing structures and reactions using chem draw V Determination of physicochemical properties such as logP, clogP, MR, Molecular weight, Hydrogen bond donors and acceptors for class of drugs course content using drug design software Drug likeliness screening Lipinskies RO5

Reference Books

1 Organic medicinal and Pharmaceutical Chemistry, Wilson and Giswold , 12,2010, Wolters Kluwer India Pvt. Ltd..

2 Introduction to principles of drug design, Smith and Williams. , 4, 2005, CRC Press.

3 Indian Pharmacopoeia. , Indian Pharmacopoeia Commission, 7,2022, Indian Pharmacopoeia Commission.

4 Indian Pharmacopeia Commission, Indian Pharmacopeia Commission,, 3, 2022, Indian Pharmacopeia Commission,.

25PY3227T - MEDICINAL CHEMISTRY III (THEORY) (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
25PY3227T	MEDICINAL CHEMISTRY III (THEORY)	MC II-T	R	3	1	0	0	4

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Understand the chemistry, SAR, classification of different Beta lactam, Aminoglycoside, Tetracyclines, Macrolides antibiotics, the concept of prodrug.	2	PO1, PO3, PO9
CO2	Understand the chemistry, SAR, classification of different Antimalarials, Anti tubercular agents, Anti protozoal, Anthelmintics antibiotics.	2	PO1, PO3, PO9
CO3	Understand the chemistry, SAR, classification of different Urinary tract Anti-Infective agents, Anti- viral, Anti-fungal antibiotics.	2	PO1, PO3, PO9
CO4	Understand the chemistry, SAR, classification of different Sulfonamides and sulfones. Know the importance of QSAR of drugs rug design and combinatorial chemistry	2	PO1, PO3, PO9

Syllabus

Beta Lactam antibiotics,Aminoglycosides,Tetracyclines,Macrolide,Miscellaneous,Prodrugs.

Antimalarials,Quinolines ,Biguanides and dihydro triazines,Miscellaneous,Anti- tubercular Agents,Anti-protozoal Agents: Quinolines ,Anthelmintics.

Urinary tract anti-infective agents ,Quinolones,Miscellaneous,Antiviral agents,Antifungal agents,Antifungal agents.

Sulphonamides and Sulfones ,Folate reductase inhibitors,Sulfones,Introduction to Drug Design ,Combinatorial Chemistry

Reference Books

1 Organic medicinal and Pharmaceutical Chemistry, Wilson and Griswolds, 12, 2010, Wolters Kluwer India Pvt. Ltd..

2 Foye s Principles of Medicinal Chemistry, Foye, 7, 2012, Lippincott Williams and Wilkins.

3 Burger s Medicinal Chemistry and Drug Discovery, DJ Abrah, 6, 2003, Wiley Blackwell.

4 Text Book of Medicinal Chemistry, S N Pandeya & S K Pandey, 4,2008, KG Publications.

25PY3228P - PHARMACOLOGY III (PRACTICAL) (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
25PY3228P	PHARMACOLOGY III (PRACTICAL)	P.COL III-P	R	0	0	4	0	2

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Obtain the knowledge on introduction to experimental Pharmacology, common laboratory animals, agonist and antagonist activities of drugs on isolated tissues Get trained on screening of anti allergic drugs , anti ulcer drugs and gastro intestinal activity.	3	PO1, PO2, PO4
CO2	Estimation of different biochemical parameters using semi auto analyzer and obtain a Knowledge on screening of hypo glyceamic drugs, Pyrogen testing. Trained in performing of toxicity studies, and get knowledge in application of Biostatistics in Pharmacological research.	3	PO1, PO2, PO4

Syllabus

Dose calculation in pharmacological experiments Effect of agonist and antagonists on guinea pig ileum Antiallergic activity by mast cell stabilizationassay Study of anti-ulcer activity of a drug using pylorus ligand (SHAY) rat modeland NSAIDS induced ulcer model. Study of effect of drugs on gastrointestinal motility Effect of saline purgative on frog intestine Estimation of serum biochemical parameters by using semi-auto analyser

Insulin hypoglycemic effect in rabbit Test for pyrogens rabbit method Determination of acute oral toxicity LD50 of a drug from a givendata Determination of acute skin irritation corrosion of a test substance Determination of acute eye irritation corrosion of a test substance Calculation of pharmacokinetic parameters from a given data Biostatistics methods in experimental pharmacology students t testANOVA Biostatistics methods in experimental pharmacology Chi square testWilcoxon Signed Rank test

Reference Books

1 Fundamentals of Experimental Pharmacology , M. N. Ghosh , 2008, Hilton and Company .

2 Hand book of Experimental Pharmacology , S. K. Kulakarni , 2014, Vallabh Prakashan .

3 CPCSEA guidelines for laboratory animal facility. , ccsea, 2018, Ministry of Environment, forest,climate change government of India .

4 Essentials of medical pharmacology , Tripathi, K. D , 2018, Jaypee, Delhi .

25PY3228T - PHARMACOLOGY III (THEORY) (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
25PY3228T	PHARMACOLOGY III (THEORY)	P.COL III-T	R	3	1	0	0	4

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	understand the pharmacology of drugs acting on Respiratory and digestive system	2	PO1, PO4
CO2	understand the pharmacology of chemotherapy	2	PO1, PO4
CO3	understand the immuno pharmacology and principles of animal toxicology	2	PO1, PO4
CO4	Comprehend the principles of toxicology and treatment of various poisonings	2	PO1, PO4

Syllabus

1 Pharmacology of drugs acting on Respiratory system a Anti asthmatic drugs b Drugs used in the management of COPD c Expectorants and antitussives d Nasal decongestants e Respiratory stimulants 2 Pharmacology of drugs acting on the Gastrointestinal Tract a Antiulcer agents b Drugs for constipation and diarrhoea c Appetite stimulants and suppressants d Digestants and carminatives e Emetics and antiemetics

Chemotherapy a General principles of chemotherapy b Sulfonamides and cotrimoxazole c Antibiotics Penicillins cephalosporins chloramphenicol macrolides quinolones and fluoroquinolins tetracycline andaminoglycosides d Antitubercular agents e Antileprotic agents f Antifungal agents g Antiviral drugs hAnthelmintics i Antimalarial drugs j Antiamoebic agents

Principles of toxicology a Definition and basic knowledge of acute subacute and chronic toxicity b Definition and basic knowledge of genotoxicity carcinogenicity teratogenicity and mutagenicity c General principles of treatment of poisoning d Clinical symptoms and management of barbiturates morphine Organophosphosphorus compound and lead mercury and arsenic poisoning 6 Chrono pharmacology a Definition of rhythm and cycles b Biological clock and their significance leading to chronotherapy

Principles of toxicology a Definition and basic knowledge of acute subacute and chronic toxicity b Definition and basic knowledge of genotoxicity carcinogenicity teratogenicity and mutagenicity c General principles of treatment of poisoning d Clinical symptoms and management of barbiturates morphine Organophosphosphorus compound and lead mercury and arsenic poisoning 6 Chrono pharmacology a Definition of rhythm and cycles b Biological clock and their significance leading to chronotherapy

Reference Books

1 P Goodman and Gilmans The pharmacological Basis of therapeutics , Goodman Gilman, A., Rall, T.W., Nies, A.I.S. and Taylor , 2023, Mc Graw Hill, Pergamon press. .

2 Essential Medical Pharmacology , KD Thripathi, 2023, Jaypee.

3 Illustrative pharmacology , lippincott , 2018, wolters kluwer .

4 Pharmacology , Rang, H.P. and Dale, M.M. , 2018, Churchill Living stone .

25PY3229P - HERBAL DRUG TECHNOLOGY (PRACTICAL) (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
25PY3229P	HERBAL DRUG TECHNOLOGY (PRACTICAL)	HDT-P	R	0	0	4	0	2

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Analyze the preliminary screening and determination of phytochemical constituents	3	PO3
CO2	Analyze and Evaluation of natural origins and application of herbal products in cosmetics	3	PO2

Syllabus

1. To perform preliminary phytochemical screening of crude drugs. 2. Determination of the alcohol content of Asava and Arista 3. Evaluation of excipients of natural origin 4. Incorporation of prepared and standardized extract in cosmetic formulations like creams, lotions and shampoos and their evaluation. 5. Incorporation of prepared and standardized extract in formulations like syrups, mixtures and tablets and their evaluation as per Pharmacopeial requirements. 6. Monograph analysis of herbal drugs from recent Pharmacopoeias

1. Determination of Aldehyde content 2. Determination of Phenol content 3. Determination of total alkaloids 4. To perform preliminary phytochemical screening of crude drugs. 5. Determination of the alcohol content of Asava and Arista 6. Evaluation of excipients of natural origin Incorporation of prepared and standardized extract in cosmetic formulations like creams, lotions and shampoos and their evaluation

Reference Books

1 Textbook of Pharmacognosy , Trease &Evans, 2009, Saunders.

2 Textbook of Pharmacognosy, Tyler, Brady & Robber., 2018, Lea& Febigur.

3 Pharmacognosy , Kokate, Purohit and Gokhale, 2008, Nirali Prakashan.

4 Essential of Pharmacognosy , Dr.S.H.Ansari, 2016, Birla PUBLICATIONS.

5 Pharmacognosy & Phytochemistry, V.D.Rangari , 2009, Career publications.

25PY3229T - HERBAL DRUG TECHNOLOGY (THEORY) (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
25PY3229T	HERBAL DRUG TECHNOLOGY (THEORY)	HDT-T	R	3	1	0	0	4

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Apply the knowledge on formulation of Ayurvedic dosage form understand raw material as source of herbal drugs from cultivation to herbal drug product.	3	PO3
CO2	Understand the concept of Nutraceuticals and their role in ailments like Diabetes, CVS diseases, Cancer, Irritable bowel syndrome and various Gastrointestinal diseases	2	PO2
CO3	Apply the knowledge on formulation of Herbal Cosmetics using Herbal excipients	3	PO3
CO4	Understand the WHO and ICH guidelines for evaluation of herbal drugs. Understand Regulatory Issues -Regulations in India and Schedule T	2	PO2

Syllabus

Herbs as raw materials Definition of herb, herbal medicine, herbal medicinal product, herbal drug preparation Source of Herbs Selection, identification and authentication of herbal materials Processing of herbal raw material Biodynamic Agriculture Good agricultural practices in cultivation of medicinal plants including Organic farming. Pest and Pest management in medicinal plants - Bio pesticides/Bio insecticides. Indian Systems of Medicine a) Basic principles involved in Ayurveda, Siddha, Unani and Homeopathy b) Preparation and standardization of Ayurvedic formulations viz Aristas and Asawas, Ghutika,Churna, Lehya and Bhasma.

Nutraceuticals General aspects, Market, growth, scope and types of products available in the market. Health benefits and role of Nutraceuticals in ailments like Diabetes, CVS diseases, Cancer, Irritable bowel syndrome and various Gastro intestinal diseases. Study of following herbs as health food - Alfaalfa, Chicory, Ginger, Fenugreek, Garlic, Honey, Amla, Ginseng, Ashwagandha, Spirulina Herbal-Drug and Herb-Food Interactions, General introduction to interaction and classification. Study of following drugs and their possible side effects and interactions, Hypercium, kava-kava, Ginkobiloba, Ginseng, Garlic, Pepper

Herbal Cosmetics Sources and description of raw materials of herbal origin used via, fixed oils, waxes, gums colours, perfumes, protective agents, bleaching agents, antioxidants in products such as skin care, hair care and oral hygiene products. Herbal excipients, Herbal Excipients - Significance of substances of natural origin as excipients - colorants, sweeteners, binders, diluents, viscosity builders, disintegrants, flavors & perfumes. Herbal formulations, Conventional herbal formulations like syrups, mixtures and tablets and Novel dosage forms like phytosomes Evaluation of Drugs WHO & ICH guidelines for the assessment of herbal drugs Stability testing of herbal drugs.

Patenting and Regulatory requirements of natural products. b) Definition of the terms. Patent, IPR, Farmers right, Breeders right, Bioprospecting and Biopiracy c) Patenting aspects of Traditional Knowledge and Natural Products. Case study of Curcuma & Neem. Regulatory Issues - Regulations in India (ASU DTAB, ASU DCC), Regulation of manufacture of ASU drugs - Schedule Z of Drugs & Cosmetics Act for ASU drugs. General Introduction to Herbal Industry Herbal drugs industry - Present scope and future prospects. A brief account of plant based industries and institutions involved in work on medicinal and aromatic plants in India. Schedule T, Good Manufacturing Practice of Indian systems of medicine Components of GMP (Schedule - T) and its objectives Infrastructural requirements, working space, storage area, machinery and equipments, standard operating procedures, health and hygiene, documentation and records.

Reference Books

1 Textbook of Pharmacognosy , Trease &Evans., 2009, Saunders.

2 Textbook of Pharmacognosy, Tyler, Brady & Robber., 2018, Lea& Febigur .

3 Pharmacognosy, Kokate, Purohit and Gokhale, 2008, Nirali Prakashan.

4 Essential of Pharmacognosy , Dr.S.H.Ansari, 2016, Birla PUBLICATIONS.

5 Pharmacognosy & Phytochemistry , V.D.Rangari , 2009, Career publications.

25PY3230T - BIOPHARMACEUTICS AND PHARMACOKINETICS (THEORY) (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
25PY3230T	BIOPHARMACEUTICS AND PHARMACOKINETICS (THEORY)	BPPK	R	3	1	0	0	4

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Understand the basic concepts in biopharmaceutics and pharmacokinetics and their significance.	2	PO1
CO2	understand the concepts of bioavailability and bioequivalence of drug products and their significance.	2	PO1
CO3	understand the Use of plasma drug concentration-time data to calculate the pharmacokinetic parameters to describe the kinetics of drug absorption, distribution, metabolism, excretion, elimination	2	PO1
CO4	Understand various pharmacokinetic parameters, their significance & applications.	2	PO1

Syllabus

Introduction to Biopharmaceutics. Absorption: Mechanisms of drug absorption through GIT, factors influencing drug absorption though GIT, absorption of drug from non-per oral extra vascular routes. Distribution: Tissue permeability of drugs, binding of drugs, apparent volume of drug distribution, plasma and tissue protein binding of drugs, factors affecting protein-drug binding.

Elimination: Drug metabolism and basic understanding of metabolic pathways, renal excretion of drugs, factors affecting renal excretion of drugs, renal clearance, non-renal routes of drug excretion. Bioavailability and Bioequivalence: Definition and objectives of bioavailability, Bioavailability protocol, absolute and relative bioavailability, measurement of bioavailability, in-vitro drug dissolution models, in-vitro in-vivo correlations, bioequivalence studies, methods to enhance the dissolution rate and bioavailability of poorly soluble drugs.

Pharmacokinetics: Definition and introduction to pharmacokinetics, compartment models, non-compartment models, physiological models. One compartment open model (a) Intravenous injection (Bolus), (b) Intravenous infusion and (c) Extra vascular administrations. Pharmacokinetics parameters: KE, t1/2, Vd, AUC, Ka, ClT and CLR: definitions, methods of eliminations, understanding of their significance and application, Urinary excretion methods. Dose adjustment in renal impaired patients.

Multicompartment models: Two compartment open model - IV bolus. Kinetics of multiple dosing, steady state drug levels, calculation of loading and maintenance doses and their significance in clinical setting. Non-linear pharmacokinetics: Introduction, factors causing non-linearity. Michaelis-menton method of estimating parameters, explanation with example of drugs.

Reference Books

1 Dissolution, Bioavailability and Bioequivalence , Abdou H.M, Mack, , 1990, Pennsylvania.

2 Biopharmaceutics and Clinical Pharmacokinetic, Robert F. Notari, Marcel Dekker Inn, New York and Basel, 1980, New York and Basel .

3 Biopharmaceutics and Pharmacokinetics , V. Venkateswarlu, 2004, Pharma Book Syndicate .

4 Applied Biopharmaceutics and Pharmacokinetics , Leon Shargel and Andrew B.C. YU , 1980, Prentice-Hall International edition, USA.

25PY3231T - PHARMACEUTICAL BIOTECHNOLOGY (THEORY) (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
25PY3231T	PHARMACEUTICAL BIOTECHNOLOGY (THEORY)	PBT	R	3	1	0	0	4

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Understand the importance of Immobilized enzymes and fermentation technology in Pharmaceutical Industries	2	PO1, PO4
CO2	Understand Genetic engineering applications in relation to production of pharmaceuticals	2	PO1, PO4
CO3	Understand the importance of immunity and Importance of preparation of immunological preparation and Monoclonal antibodies in Industries	2	PO1, PO4
CO4	Understand the use of microorganisms in biotransformation with fermentation technology	2	PO1, PO4

Syllabus

a)Brief introduction to Biotechnology with reference to Pharmaceutical Sciences. b) Enzyme Biotechnology- Methods of enzyme immobilization and applications.c)Biosensors- Workingandapplications of biosensors in Pharmaceutical Industries.d)Brief introduction to Protein Engineering.e) Fermentation methods and general requirements, study of media, equipments, sterilization methods, aeration process, stirring.f)Large scale production fermenter design and its various controls. g) Study of the production of - penicillins, citric acid, Vitamin B12, Glutamic acid, Griseofulvin. h)Use of microbes in industry. Production ofEnzymes- General consideration - Amylase, Catalase, Peroxidase, Lipase, Protease, Penicillinase. i)Basic principles of genetic engineering.

a)Study of cloning vectors, restriction endonucleases and DNA ligase.b) Recombinant DNA technology. Application of genetic engineering in medicine.c)Application of r DNA technology and genetic engineering in the production of:i) Interferon ii) Vaccines- hepatitis- B iii) Hormones-Insulin. d) Brief introduction to PCR

Types of immunity- humoral immunity, cellular immunity: a)Structure of Immunoglobulins, b) Structure and Function of MHC, c)Hypersensitivity reactions, Immune stimulation and Immune suppressions. d) General method of the preparation of bacterial vaccines, toxoids, viral vaccine, antitoxins, serum-immune blood derivatives and other products relative to immunity.e)Storage conditions and stability of official vaccines, f)Hybridoma technology- Production, Purification and Applications

a)Immuno blotting techniques- ELISA, Western blotting, Southern blotting.b) Genetic organization of Eukaryotes and Prokaryotes. c) Microbial genetics including transformation, transduction, conjugation, plasmids and transposons. d)Introduction to Microbial biotransformation and applications. e)Mutation: Types of mutation/mutants f) Blood Products: Collection, Processing and Storage of whole human blood, dried human plasma, plasma Substituties.

Reference Books

1. Molecular Biotechnology: Principles and Applications of Recombinant DNA, B.R. Glick and J.J. Pasternak, 4th Edition (2010), ASM Press Washington D.C.
2. Kuby Immunology, RA Goldshy, 3rd Edition (2002), W.H. Freeman.
3. Monoclonal Antibodies, J.W. Goding, 3rd Edition (1996), Academic Press.
4. Molecular Biology and Biotechnology, J.M. Walker and E.B. Gingold, 4th Edition (2000), Royal Society of Chemistry.
5. Molecular Biotechnology , S.B. Primrose, 2 nd Edition (1999), Blackwell Scientific Publication.
6. Principles of fermentation technology, Stanbury F., P., Whitakar A., and Hall J., S, 2nd Edition (2020), Aditya books Ltd., New Delhi..

25PY3232T - QUALITY ASSURANCE (THEORY) (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
25PY3232T	QUALITY ASSURANCE (THEORY)	QA	R	3	1	0	0	4

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Understand the cGMP aspects in a pharmaceutical industry	2	PO1, PO9
CO2	Understand the importance of organization and personnel	2	PO1, PO9
CO3	Understand the scope of quality certifications applicable to pharmaceutical industries	2	PO1, PO9
CO4	Understand the responsibilities of QA & QC departments	2	PO1, PO9

Syllabus

Quality Assurance and Quality Management concepts - Definition and concept of Quality control, Quality assurance and GMP. Total Quality Management - TQM - Definition, elements, philosophies. ICH Guidelines - purpose, participants, process of harmonization, Brief overview of QSEM, with special emphasis on Q-series guidelines, ICH stability testing guidelines. Quality by design - QbD - Definition, overview, elements of QbD program, tools ISO 9000 & ISO14000 - Overview, Benefits, Elements, steps for registration NABL accreditation - Principles and procedures

Organization and personnel - Personnel responsibilities, training, hygiene and personal records. Premises - Design, construction and plant layout, maintenance, sanitation, environmental control, utilities and maintenance of sterile areas, control of contamination. Equipments and raw materials - Equipment selection, purchase specifications, maintenance, purchase specifications and maintenance of stores for raw materials

Quality Control - Quality control test for containers, rubber closures and secondary packing materials. Good Laboratory Practices - General Provisions, Organization and Personnel, Facilities, Equipment, Testing Facilities Operation, Test and Control Articles, Protocol for Conduct of a Nonclinical Laboratory Study, Records and Reports, Disqualification of Testing Facilities Complaints - Complaints and evaluation of complaints, Handling of return good, recalling and waste

Document maintenance in pharmaceutical industry - Batch Formula Record, Master Formula Record, SOP, Quality audit, Quality Review and Quality documentation, Reports and documents, distribution records. Calibration and Validation - Introduction, definition and general principles of calibration, qualification and validation, importance and scope of validation, types of validation, validation master plan. Calibration of pH meter, Qualification of UV-Visible spectrophotometer, General principles of Analytical method Validation. Warehousing - Good warehousing practice, materials management.

Reference Books

1 How To Practice GMPs, P P Sharma, 7, 2015, Vandana Publications.

2 A guide to Total Quality Management, Kushik Maitra and Sedhan K Ghosh, 4, 2005, Vandana Publications.

3 Total Quality Management, Besterfield, 4, 2018, Pearson Education.

4 Good Laboratory Practice Regulations, Sandy Weinberg, 4, 2007, CRC Press.

25PY4133P - INSTRUMENTAL METHODS OF ANALYSIS (PRACTICAL) (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
25PY4133P	INSTRUMENTAL METHODS OF ANALYSIS (PRACTICAL)	IMA-P	R	0	0	4	0	2

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Application through estimation of samples by spectroscopic methods	3	PO1, PO4
CO2	Application through determination of samples by Chromatographic and Spectroscopic methods	3	PO1, PO4

Syllabus

Determination of absorption maxima and effect of solvents on absorption maxima of organic compounds Estimation of dextrose by colorimetry Estimation of sulfanilamide by colorimetry Simultaneous estimation of ibuprofen and paracetamol by UV spectroscopy Assay of paracetamol by UV- Spectrophotometry Estimation of quinine sulfate by fluorimetry Study of quenching of fluorescence Determination of sodium by flame photometry

Determination of potassium by flame photometry Determination of chlorides and sulphates by nephelo turbidometry Separation of amino acids by paper chromatography Separation of sugars by thin layer chromatography Separation of plant pigments by column chromatography Demonstration experiment on HPLC Demonstration experiment on Gas Chromatography

Reference Books

1 Instrumental Methods of Chemical Analysis , B.K Sharma , 2011, Krishna Prakashan Media p Ltd.

2 Organic spectroscopy , Y.R Sharma, 2013, S Chand.

3 Text book of Pharmaceutical Analysis, Kenneth A. Connors , 2016, Wiley.

4 Spectrometric identification of organic compounds, Silverstein, 2022, wiley.

25PY4133T - INSTRUMENTAL METHODS OF ANALYSIS (THEORY) (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
25PY4133T	INSTRUMENTAL METHODS OF ANALYSIS (THEORY)	IMA-T	R	3	1	0	0	4

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Understand the intensity and wavelength distribution of absorption and emission spectrum after excitation by a certain spectrum of light	2	PO2, PO4
CO2	Understand and Interpret chemical compounds by molecular vibrations and identify chemical elements by measuring emitted light intensity, on absorption of optical radiation by free atoms and measuring intensities of scattered and emitted light through samples	2	PO2, PO4
CO3	Understand the concepts of Chromatography and techniques used in resolving complex mixtures into individual compounds.	2	PO2, PO4
CO4	Understand and acquire knowledge on various instrumental procedure involving Chromatographic principles.	2	PO2, PO4

Syllabus

UV VISIBLE SPECTROSCOPY Electronic transitions chromophores auxochromes spectral shifts solvent effect on absorption spectra Beer and Lamberts law Derivation and deviations Instrumentation Sources of radiation wavelength selectors sample cells detectors Photo tube Photomultiplier tube Photo voltaic cell Silicon Photodiode Applications Spectrophotometric titrations Single component and multi component analysis Fluorimetry

IR spectroscopy Introduction fundamental modes of vibrations in poly atomic molecules sample handling factors affecting vibrations Instrumentation Sources of radiation wavelength selectors detectors Golay cell Bolometer Thermocouple Thermister Pyroelectric detector and applications Flame Photometry Principle interferences instrumentation and applications 144 Atomic absorption spectroscopy Principle interferences instrumentation and applications Nepheloturbidometry Principle instrumentation and applications

Introduction to chromatography Adsorption and partition column chromatography Methodology advantages disadvantages and applications Thin layer chromatography Introduction Principle Methodology Rf values advantages disadvantages and applications Paper chromatography Introduction methodology development techniques advantages disadvantages and applications Electrophoresis Introduction factors affecting electrophoretic mobility Techniques of paper gel capillary electrophoresis applications

Gas chromatography Introduction theory instrumentation derivatization temperature programming advantages disadvantages and applications High performance liquid chromatography (HPLC) Introduction theory instrumentation advantages and applications

Reference Books

1 Instrumental methods of chemical analysis, BK Sharma, 2022, Krishna Prakashan Media p Ltd.

2 Instrumental methods of chemical analysis, YR Sharma, 2013, S. Chand Publishing.

3 Spectrophotometric identification, silverstein, 2018, WILEY.

4 Introduction to spectroscopy, Pavia, 2016, Cengage India Private Limited.

25PY4134T - INDUSTRIAL PHARMACY II (THEORY) (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
25PY4134T	INDUSTRIAL PHARMACY II (THEORY)	IP II	R	3	1	0	0	4

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Understand the process of pilot plant and scale up of pharmaceutical dosage forms	2	PO1, PO4
CO2	Understand the process of technology transfer from lab scale to commercial batch	2	PO1, PO4
CO3	Understand different Laws and Acts that regulate pharmaceutical industry	2	PO1, PO4
CO4	Application of the approval process and regulatory requirements for drug products	3	PO1, PO4

Syllabus

Pilot plant scale up techniques: General considerations - including significance of personnel requirements, space requirements, raw materials, Pilot plant scale up considerations for solids, liquid orals, semi solids and relevant documentation, SUPAC guidelines, Introduction to platform technology.

Technology development and transfer: WHO guidelines for Technology Transfer (TT): Terminology, Technology transfer protocol, Quality risk management, Transfer from R & D to production (Process, packaging and cleaning), Granularity of TT Process (API, excipients, finished products, packaging materials) Documentation, Premises and equipments, qualification and validation, quality control, analytical method transfer, Approved regulatory bodies and agencies, Commercialization - practical aspects and problems (case studies), TT agencies in India - APCTD, NRDC, TIFAC, BCIL, TBSE / SIDBI; TT related documentation - confidentiality agreement, licensing, MoUs, legal issues

Regulatory affairs-Introduction, Historical overview of Regulatory Affairs, Regulatory authorities, Role of Regulatory affairs department, Responsibility of Regulatory Affairs Professionals. Regulatory requirements for drug approval- Drug Development Teams, Non-Clinical Drug Development, Pharmacology, Drug Metabolism and Toxicology, General considerations of Investigational New Drug IND Application, Investigator Brochure IB and New Drug Application NDA, Clinical research or BE studies, Clinical Research Protocols, Biostatistics in Pharmaceutical Product Development, Data Presentation for FDA Submissions, Management of Clinical Studies.

Quality management systems- Quality management and Certifications- Concept of Quality, Total Quality Management, Quality by Design QbD, Six Sigma concept, Out of Specifications OOS, Change control, Introduction to ISO 9000 series of quality systems standards, ISO 14000, NABL, GLP. Indian Regulatory Requirements- Central Drug Standard Control Organization CDSCO and State Licensing Authority- Organization, Responsibilities, Certificate of Pharmaceutical Product COPP, Regulatory requirements and approval procedures for New Drugs. Quality management systems- Quality management and Certifications- Concept of Quality, Total Quality Management, Quality by Design QbD, Six Sigma concept, Out of Specifications OOS, Change control, Introduction to ISO 9000 series of quality systems standards, ISO 14000, NABL, GLP Indian Regulatory Requirements- Central Drug Standard Control Organization CDSCO and State Licensing Authority- Organization, Responsibilities, Certificate of Pharmaceutical Product COPP, Regulatory requirements and approval procedures for New Drugs.

Reference Books

1. Pharmaceutical Science: The Science and Practice of Pharmacy, JP Remington, AR Gennaro, 23 (2021), Lippincott Williams and Wilkins.
2. New drug approval process- Accelerating Global registrations, RA Guarino, 4 (2004), Taylor and francis.
3. Total Quality Management, Besterfield, 4 (2022), Pearson Education .
4. Lachman/Lieberman theory and practice of industrial pharmacy, RK Khar, SP Vyas, FJ Ahmad, GK Jain, 4 (2013), CBS Publishers .

25PY4135T - PHARMACY PRACTICE (THEORY) (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
25PY4135T	PHARMACY PRACTICE (THEORY)	PP	R	3	1	0	0	4

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Understand hospital organization and its functions along with application of ADRs.	3	PO1, PO3, PO8
CO2	Understand various drug distribution methods, TDM and medication adherence of patients	2	PO1, PO8
CO3	Understand in detail about PTC, Drug information services and patient counselling	2	PO1, PO3, PO8
CO4	Understand and apply the activities of clinical pharmacists along with investigation of laboratory data	3	PO1, PO3

Syllabus

A. Hospital and its organization Definition, Classification of hospital- Primary, Secondary and Tertiary hospitals, Classification based on clinical and non clinical basis, Organization Structure of a Hospital, and Medical staffs involved in the hospital and their functions. B. Hospital pharmacy and its organization Definition, functions of hospital pharmacy, Organization structure, Location, Layout and staff requirements, and Responsibilities and functions of hospital pharmacists. C. Adverse drug reaction Classifications - Excessive pharmacological effects, secondary pharmacological effects, idiosyncrasy, allergic drug reactions, genetically determined toxicity, toxicity following sudden withdrawal of drugs, Drug interaction beneficial interactions, adverse interactions, and pharmacokinetic drug interactions, Methods for detecting drug interactions, spontaneous case reports and record linkage studies, and Adverse drug reaction reporting and management. D. Community Pharmacy Organization and structure of retail and wholesale drug store, types and design, Legal requirements for establishment and maintenance of a drug store, Dispensing of proprietary products, maintenance of records of retail and wholesale drug store.

) Drug distribution system in a hospital Dispensing of drugs to inpatients, types of drug distribution systems, charging policy and labelling, Dispensing of drugs to ambulatory patients, and Dispensing of controlled drugs. b) Hospital formulary Definition, contents of hospital formulary, Differentiation of hospital formulary and Drug list, preparation and revision, and addition and deletion of drug from hospital formulary. c) Therapeutic drug monitoring Need for Therapeutic Drug Monitoring, Factors to be considered during the Therapeutic Drug Monitoring, and Indian scenario for Therapeutic Drug Monitoring. d) Medication adherence Causes of medication non-adherence, pharmacist role in the medication adherence, and monitoring of patient medication adherence. e) Patient medication history interview Need for the patient medication history interview, medication interview forms. f) Community pharmacy management Financial, materials, staff, and infrastructure requirements.

a) Pharmacy and therapeutic committee Organization, functions, Policies of the pharmacy and therapeutic committee in including drugs into formulary, inpatient and outpatient prescription, automatic stop order, and emergency drug list preparation. b) Drug information services Drug and Poison information centre, Sources of drug information, Computerised services, and storage and retrieval of information. c) Patient counseling Definition of patient counseling; steps involved in patient counseling, and Special cases that require the pharmacist d) Education and training program in the hospital Role of pharmacist in the education and training program, Internal and external training program, Services to the nursing homes/clinics, Code of ethics for community pharmacy, and Role of pharmacist in the interdepartmental communication and community health education. e) Prescribed medication order and communication skills Prescribed medication orderinterpretation and legal requirements, and Communication skills-communication with prescribers and patients.

a) Budget preparation and implementation Budget preparation and implementation b) Clinical Pharmacy Introduction to Clinical Pharmacy, Concept of clinical pharmacy, functions and responsibilities of clinical pharmacist, Drug therapy monitoring - medication chart review, clinical review, pharmacist intervention, Ward round participation, Medication history and Pharmaceutical care. Dosing pattern and drug therapy based on Pharmacokinetic & disease pattern. c) Over the counter (OTC) sales Introduction and sale of over the counter, and rational use of common over the counter medications. a) Drug store management and inventory control Organisation of drug store, types of materials stocked and storage conditions, Purchase and inventory control: principles, purchase procedure, purchase order, procurement and stocking, Economic order quantity, Reorder quantity level, and Methods used for the analysis of the drug expenditure b) Investigational use of drugs Description, principles involved classification, control, identification, role of hospital pharmacist, advisory committee. c) Interpretation of Clinical Laboratory Tests Blood chemistry, hematology, and urinalysis.

Reference Books

1 Basic skills in interpreting laboratory , Lee, Mary (Mary Wun-Len, 6, 2017, American Society of Health-System.

2 A textbook of Clinical Pharmacy Practice- essential concepts and skills, Parthasarathi G, Karin NyfortHans, 4, 2004, Orient Longman Private Limited.

3 A textbook of hospital pharmacy, merchant S.H. and Dr. J.S.Quadry, 2018, B.S. Shah Prakakshan.

4 Hospital pharmacy , William E. Hassan , 12,1986, Philadelphia Lea & Febiger.

25PY4136T - NOVEL DRUG DELIVERY SYSTEM (THEORY) (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
25PY4136T	NOVEL DRUG DELIVERY SYSTEM (THEORY)	NDDS	R	3	1	0	0	4

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Understand the Various approaches of controlled drug delivery system and Microspheres	2	PO1, PO4
CO2	Understand the various approaches for development of Mucosal and implantable drug delivery system.	2	PO1, PO4
CO3	Understand the approaches and Evaluation of Transdermal, Gastro retentive and Naso pulmonary drug delivery system.	2	PO1, PO4
CO4	Apply the concept and approaches ocular and targeting methods such as liposomes, niosomes, and nanoparticles.	3	PO1, PO4

Syllabus

Controlled drug delivery systems: Introduction, terminology/definitions and rationale, advantages, disadvantages, selection of drug candidates. Approaches to design controlled release formulations based on diffusion, dissolution and ion exchange principles. Physicochemical and biological properties of drugs relevant to controlled release formulations Polymers: Introduction, classification, properties, advantages, and application of polymers in formulation of controlled release drug delivery systems.

Microencapsulation: Definition, advantages and disadvantages, microspheres /microcapsules, microparticles, methods of microencapsulation, applications. Mucosal Drug Delivery system: Introduction, Principles of bioadhesion / mucoadhesion, concepts, advantages and disadvantages, transmucosal permeability and formulation considerations of buccal delivery systems. Implantable Drug Delivery Systems: Introduction, advantages and disadvantages, concept of implants and osmotic pump.

Transdermal Drug Delivery Systems Introduction, Permeation through skin factors affecting permeation permeation enhancers basic components of TDDS formulation approaches Gastroprotective drug delivery systems Introduction advantages disadvantages approaches for GRDDS Floatinghigh density systemsinflatable and gastroadhesive systems and their applications Naso pulmonary drug delivery system

Targeted drug Delivery: Concepts and approaches advantages and disadvantages introduction to liposomes niosomes nanoparticles, monoclonal antibodies and their applicationsOcular Drug Delivery Systems Introduction intra ocular barriers and methods to overcome Preliminary study

Reference Books

1 Novel Drug Delivery Systems, Chien, 1992, Marcel.

2 Fundamentals and Applications of Controlled Release Drug Delivery, uergen Siepmann, Ronald A. Siegel, Michael J. Rathbone, 2005, Springer.

3 Nanoparticulate Drug Delivery Systems: Strategies, Technologies, and Applications, Deepak Thassu, Michel Deleers, Yashwant Pathak, 2010, CRC Press.

4 Drug Delivery Systems: An Overview, Xinguo Jiang, Huixiao Hong, 2002, Springer.

5 Advances in Controlled Drug Delivery, Yie W. Chien, 2005, CRC Press.

25PY4238T - BIOSTATISTICS AND RESEARCH METHODOLOGY (THEORY) (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
25PY4238T	BIOSTATISTICS AND RESEARCH METHODOLOGY (THEORY)	BSRM	R	3	1	0	0	4

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Apply Graphical representation of a given numerical data through its frequency distribution and also calculation of various measures of location and dispersion.	3	PO1, PO3
CO2	Apply the chances of occurrences of an event through various probability distributions and fit a curve by using principle of least squares	3	PO1, PO3
CO3	Apply ANOVA technique to construct Completely randomized design, randomized block design, Latin square design	3	PO1, PO3
CO4	Apply statistical tests for large and small samples to test the hypothesis. and Analyze the variance by using completely randomized, randomized, Latin square designs and also apply queuing models to the real world problems	3	PO1

Syllabus

Measures of central tendency and Measures of dispersion-Mean,Median,Mode,Range,mean Deviation,Varience-Both Group and Ungrouped data

Regression and testing of Hypothesis-Z test,T-Test,Chi square Test,Anova-One way clasidfication

Non Parametric tests-ANOVA-Two way clasification, wilcoxon rank test, Rank sum test

Blocking and confounding system for Two-level factorials Regression modelling-RBD, 2 k Factorial Design

Reference Books

1 Biostatistics and Research methodology , N. K. Nag,, 3rd-2004, Kalyani Publishers.

2 Pharmaceutical statistics-Practical and clinical applications, Sanford Bolton, 2002, publisher Marcel Dekker Inc. NewYork.

3 Fundamental of Statistics, S.C.Guptha , 2003, Himalaya Publishing House.

4 Design and Analysis of Experiments, Pannerselvam, 2012, PHILearning Private Limited,R..

25PY4239T - SOCIAL AND PREVENTIVE PHARMACY (THEORY) (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
25PY4239T	SOCIAL AND PREVENTIVE PHARMACY (THEORY)	SPP	R	3	1	0	0	4

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Understand current issues related to health and pharmaceutical problems within the country and worldwide.	2	PO1, PO6, PO9
CO2	Applying current healthcare development for a critical way of thinking.	3	PO6, PO9
CO3	Understanding alternative ways of solving problems related to health issues through various healthcare programs.	2	PO6, PO9
CO4	Understanding alternative ways of solving problems related to sanitation and hygiene	2	PO6, PO9

Syllabus

Concept of health and disease: Definition, concepts and evaluation of public health. Understanding the concept of prevention and control of disease, social causes of diseases and social problems of the sick. Social and health education: Food in relation to nutrition and health, Balanced diet, Nutritional deficiencies, Vitamin deficiencies, Malnutrition and its prevention. Sociology and health: Socio cultural factors related to health and disease, Impact of urbanization on health and disease, Poverty and health Hygiene and health: personal hygiene and health care; avoidable habits.

Preventive medicine: General principles of prevention and control of diseases such as cholera, SARS, Ebola virus, influenza, acute respiratory infections, malaria, chicken guinea, dengue, lymphatic filariasis, pneumonia, hypertension, diabetes mellitus, cancer, drug addiction-drug substance abuse

National health programs, its objectives, functioning and Outcomes of the following: HIV AND AIDS control programme, TB, Integrated disease surveillance program (IDSP), National leprosy control programme, National mental health program, National programme for prevention and control of deafness, Universal immunization programme, National programme for control of blindness, Pulse polio programme

National health intervention programme for mother and child, National family welfare programme, National tobacco control programme, National Malaria Prevention Program, National programme for the health care for the elderly, Social health programme; role of WHO in Indian national program Community services in rural, urban and school health: Functions of PHC, Improvement in rural sanitation, national urban health mission, Health promotion and education in school.

Reference Books

1 Park Textbook of Preventive and Social Medicine, K PARK, 27, 2023, BANARSIDAS BHANOT PUBLISHERS.

2 Community pharmacy practice, RAMESH A, 2017, BSP publishers .

3 Social and Preventive Pharmacy, S.P. Agarwal, 1,2021, Thakur Publications Pvt. Ltd.

4 OXFORD HANDBOOK OF PUBLIC HEALTH PRACTICE, Ichiro Kawachi, Iain Lang & Walter Ricciardi, 4, 2020, OUP Oxford.

Y25: B.Pharmacy

Category: Skill Development Courses (SDC)

25PY3122S - AI AND PYTHON PROGRAMMING FOR PHARMACY (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
25PY3122S	AI AND PYTHON PROGRAMMING FOR PHARMACY	AIPP	R	0	0	0	4	1

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Apply AI concepts and knowledge-representation methods to choose suitable machine learning paradigms and implement basic algorithms for solving specific problems	3	PO3
CO2	Apply core python programming concepts and integrate AI/ML algorithms to create and evaluate solutions for real-world pharmacy problems	3	PO3

Syllabus

Foundations of Artificial Intelligence: History of AI, Major approaches to AI (symbolic, statistical, connectionist, evolutionary, hybrid, etc.), AI problem-solving paradigms, Knowledge representation techniques, Reasoning under uncertainty, Decision-making strategies. Machine-Learning Essentials: Learning paradigms: Supervised learning, Unsupervised learning, Reinforcement learning. Core algorithms and where they fit: Naive Bayes, k-Nearest Neighbours (KNN), Linear & logistic regression, Clustering algorithms (e.g., k-means, hierarchical), Neural networks (basic feed-forward concepts). AI/ML in Pharmaceutical Sciences: Industrial applications of AI/ML in the pharmaceutical sector (formulation, process optimisation, quality control, supply-chain analytics, pharmacovigilance, etc.), Research avenues of AI/ML in pharmacy (drug discovery, QSAR/QSPR, clinical trial design, personalised medicine, regulatory science, real-world evidence, etc.).

Python Setup and Language Basics: Why Python for AI or ML and scientific computing, Installing Python and choosing an IDE-IDLE, VS Code, PyCharm, Jupyter, etc. Writing and running your first Python script, Core syntax rules indentation, comments, Declaring and using variables. Python Programming Constructs and Data Handling Operators and expressions Arithmetic and assignment operators and Comparison and logical operators. Conditional statements if, elif, else, Nested conditions and typical use cases. Looping constructs for loops with range, while loops, Loop controls break, continue, pass and Iterating through strings and lists. Core collections Creating, accessing, and modifying lists, List methods and slicing, Tuples and immutability and Iterating over collections, Functions defining, calling, returning values, File handling basics open, read, write, close and Exception handling try except finally

Reference Books

1. 1. For depth on core concepts, start with Artificial Intelligence: A Modern Approach, Russell & Norvig , 4th , Pearson Education.

2. Introduction to Machine Learning , Ethem Alpaydin, 4th , The MIT Press.

25PY3123S - PRODUCTION PROCESS FOR API/BULK DRUG/INTERMEDIATES (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
25PY3123S	PRODUCTION PROCESS FOR API/BULK DRUG/INTERMEDIATES	PP	R	0	0	0	4	1

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Apply the principles of Active Pharmaceutical Ingredient productions in pharmaceutical manufacturing.	4	PO1
CO2	Analyze the application of unit operations for API (Active Pharmaceutical Ingredient) manufacturing and plant components	4	PO1

Syllabus

Apply the fundamental science in API production including size separation, mixing and homogenization process, mass transfer, fluid flow, heat transfer and size reduction. Explain role of API in typical pharmaceutical manufacturing and role of API particle size in formulations. Determine the particle size of powders by sieve analysis and by optical microscope. Perform unit process of oxidation, reduction, hydrogenation. Perform unit process of sulfonation, nitration, and halogenation

Produce bulk organic chemicals as building blocks for manufacture of drugs and drug intermediates. Perform catalysis and bio- catalysis in industrial production. Perform downstream process of filtration, centrifugation, extraction, evaporation, crystallization, drying and size reduction. Perform cleaning of reactor, receiver, condenser, and other API manufacturing plant components. Operation of centrifuge and its application in pharmacy.

Reference Books

1 Unit operation of chemical engineering, Warren McCabe and Julian Smith, 2017, McGraw-Hill .

2 Pharmaceutical engineering principles and practices, C.V.S Subrahmanyam, 2002, Vallabh Prakashan .

3 Remington practice of pharmacy, Joseph Price Remington, 2006, Lippincott Williams & Wilkin.

4 Theory and practice of industrial pharmacy, Roop K Khar, Vyas S.P, 2015, CBS Publishers & Distributors.

5 Physical pharmaceutics, K Sambamurthy, 2007, New Age International.

6 Pharmaceutics- The science of dosage form design, Michael E. Aulton, 1988, Churchill Livingstone.

25PY4133S - OPERATION OF ANALYTICAL INSTRUMENTS (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
25PY4133S	OPERATION OF ANALYTICAL INSTRUMENTS	OAI	R	0	0	0	4	1

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Analysing the basic principles of analytical instruments.	3	PO2, PO4
CO2	Analysing the operation of analytical instruments.	3	PO2, PO4

Syllabus

Explaination of basic principles of analytical instruments used in life sciences sector Summarize application of each analyticalinstrument Operate pH meter, conductivity meter,hardness tester as per SOP,Operate gas chromatography instrument Perform calibration and validation ofanalytical instrument as per SOP andmanual Perform maintenance procedure foranalytical instruments as per SOP.

Operate analytical weighing balance as perSOP Operate, moisture analyser, disintegration tester, loss on drying machine,dissolution apparatus, Karl Fisher apparatus, viscometer, density tester,refractometer, polarimeter, autotitrator,torque tester, leak test apparatus, pycnometer, tensile strength tester

Reference Books

1 SPECTROMETRICAL IDENTIFICATION OF ORGANIC COMPOUNDS, ROBERT M. SILVERSTEIN, 7,2011, Wiley.

2 BIOANALYSIS OF PHARMACEUTICALS, STEEN HONORE HANSEN, 1, 2015, ohn Wiley Sons.

3 TEXTBOOK OF QUANTITATIVE CHEMICAL ANALYSIS, VOGELS, 5, 2021, Pearson.

4 HANDBOOK OF MODERN PHARMACEUTICAL ANALYSIS , SATINDER AHUJA, 8, 2018, AHUJA PUBLICATIONS.

Y25: B.Pharmacy

Category: Professional Elective Courses (PEC)

25PY4240ET - PHARMA MARKETING MANAGEMENT (THEORY) (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
25PY4240ET	PHARMA MARKETING MANAGEMENT (THEORY)	PMM	R	3	1	0	0	4

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Understand the concepts of sales and marketing of pharmaceutical products	2	PO1
CO2	Understand about various policies for drug inventory management	2	PO1
CO3	Understand about retail and wholesale marketing	2	PO1
CO4	Understand business potential and development in product sales and manufacturing	2	PO1

Syllabus

Marketing, Definition, general concepts and scope of marketing. Distinction between marketing & selling, Marketing environment, Industry and competitive analysis. Analyzing consumer buying behavior, industrial buying behavior. Pharmaceutical market - Quantitative and qualitative aspects, size and composition of the market, demographic descriptions andsocio-psychological characteristics of the consumer, market segmentation& targeting. Consumer profile, Motivation and prescribing habits of the physician, patients choice of physician and retail pharmacist

Analysing the Market - Role of market research. Product decision, Classification, product line and product mix decisions, product life cycle, product portfolio analysis. product positioning, New product decisions, Product branding, packaging and labeling decisions, Product management in pharmaceutical industry. Promotion - Methods, determinants of promotional mix, promotional budget. An overview of personal selling, advertising, direct mail, journals, sampling, retailing, medical exhibition, public relations, online promotional techniques for OTC Products

Pharmaceutical marketing channels - Designing channel, channel members, selecting the appropriate channel, conflict in channels, physical distribution management. Strategic importance, tasks in physicaldistribution management. Professional sales representative (PSR) - Duties of PSR, purpose of detailing, selection and training, supervising, normsfor customer calls, motivating, evaluating, compensation andfuture prospects of the PSR. Pricing, Meaning, importance, objectives, and determinants of price, pricing methods and strategies, issues in price management in pharmaceutical industry.

An overview of DPCO (Drug Price Control Order) and NPPA (National Pharmaceutical Pricing Authority). Emerging concepts in marketing. Vertical & Horizontal Marketing, Rural Marketing, Consumerism, Industrial Marketing, Global Marketing

Reference Books

1 Marketing Management , Philip Kotler and Kevin Lane Keller, 2021, Prentice Hall of India.

2 Marketing Management , Arun Kumar and N Menakshi, 2016, Vikas Publishing.

3 Pharmaceutical Marketing in India, Subba Rao Changanti, 2006, Excel Publications.

4 Pharma Marketing Management, Dr. Rupesh N Gautam, 2020, Nirali Prakashan.

25PY4241ET - PHARMACEUTICAL REGULATORY SCIENCE (THEORY) (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
25PY4241ET	PHARMACEUTICAL REGULATORY SCIENCE (THEORY)	PRS	R	3	1	0	0	4

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	To understand about the process, legal aspects, quality policies of drug discovery and development and manufacturing in India	2	PO1
CO2	To understand the regulatory authorities and agencies governing the manufacture and sale of pharmaceuticals	2	PO1
CO3	To understand the regulatory approval process in India	2	PO1
CO4	To understand about the registration of drug product in Indian and international markets	2	PO1

Syllabus

New Drug Discovery and development- Stages of drug discovery, Drug development process, pre-clinical studies, non-clinical activities, clinical studies, Innovator and generics, Concept of generics, Generic drug product development. Clinical trials- Developing clinical trial protocols, Institutional Review Board or Independent Ethics committee - formation and working procedures, Informed consent process and procedures, GCP obligations of Investigators, sponsors and Monitors, Managing and Monitoring clinical trials, Pharmacovigilance - safety monitoring in clinical trials.

Regulatory Concepts- Basic terminology, guidance, guidelines, regulations, Laws and Acts, Orange book, Federal Register, Code of Federal Regulatory, Purple book Regulatory authorities and agencies- Overview of regulatory authorities of India, United States, European Union, Australia, Japan, Canada (Organization structure and types of applications)

Regulatory Approval Process: Approval processes and timelines involved in Investigational New Drug (IND), New Drug Application (NDA), Abbreviated New Drug Application (ANDA). Changes to an approved NDA or ANDA.

Registration of Indian drug product in overseas market- Procedure for export of pharmaceutical products, Technical documentation, Drug Master Files (DMF), Common Technical Document (CTD), electronic Common Technical Document (eCTD), ASEAN Common Technical Document (ACTD) research.

Reference Books

1 Drug Regulatory Affairs, Sachin Itkar, Dr. N.S. Vyawahare, 1 (2019), Nirali Prakashan.

2 The Pharmaceutical Regulatory Process, Drugs and the Pharmaceutical Sciences , Ira R. Berry and Robert P. Martin, 2 (2019), Informa Health care Publishers.

3 Generic Drug Product Development, Solid Oral Dosage forms, Leon Shargel and IsaderKaufer, 2 (2013), CRC Press.

4 New Drug Approval Process: Accelerating Global Registrations, Richard A Guarino, 4 (2004), CRC Press.

25PY4242ET - PHARMACOVIGILANCE (THEORY) (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
25PY4242ET	PHARMACOVIGILANCE (THEORY)	PV	R	3	1	0	0	4

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Understand the monitoring aspects of Pharmacovigilance	2	PO1, PO6
CO2	Understand the monitoring aspects of Pharmacovigilance	2	PO1, PO6
CO3	Understand the monitoring aspects of Pharmacovigilance	2	PO1, PO6
CO4	Understand the medical codes used in the pharmacovigilance industry	2	PO1, PO6

Syllabus

Introduction to Pharmacovigilance History and development of Pharmacovigilance Importance of safety monitoring of Medicine WHO international drug monitoring program Pharmacovigilance Program of India Introduction to adverse drug reactions Definitions and classification of ADRs Detection and reporting Methods in Causality assessment Severity and seriousness assessment Predictability and preventability assessment and Management of adverse drug reactions. Basic terminologies used in pharmacovigilance Terminologies of adverse medication related events Regulatory terminologies

Drug and disease classification Anatomical therapeutic and chemical classification of drugs. International classification of diseases Daily defined doses International Nonproprietary Names for drugs Drug dictionaries and coding in pharmacovigilance WHO adverse reaction terminologies MedDRA and Standardised Med DR Queries WHO drug dictionary Eudravigilance medicinal product dictionary Information resources in pharmacovigilance Basic drug information resources Specialised resources for ADRs Establishing pharmacovigilance program Establishing in a hospital Establishment operation of drug safety department in the industry Contract Research Organisations Establishing a national program

Vaccine safety surveillance Vaccine Pharmacovigilance Vaccination failure Adverse events following immunization Pharmacovigilance methods Passive surveillance Spontaneous reports and case series Stimulated reporting Active surveillance Sentinel sites drug event monitoring and registries Comparative observational studies Cross sectional study case-control study and cohort study Targeted clinical investigations Communication in pharmacovigilance Effective communication in Pharmacovigilance Communication in Drug Safety Crisis management Communicating with Regulatory Agencies Business Partners Healthcare facilities Media

Safety data generation preclinical phase Clinical phase Post approval phase ICH Guidelines for Pharmacovigilance Organization and objectives of ICH expedited reporting Individual case safety reports Periodic safety update reports Post approval expedited reporting Pharmacovigilance planning Good clinical practice in pharmacovigilance studies Pharmacogenomics of adverse drug reactions Genetics related ADR with example focusing PK parameters. Drug safety evaluation in special populations Paediatrics Pregnancy and lactation Geriatrics CIOMS CIOMS Working Groups CIOMS Form CDSCO (India) and Pharmacovigilance D&C Act and Schedule Y Differences in Indian and global pharmacovigilance requirements

Reference Books

1 Mann's Pharmacovigilance, Elizabeth B. Andrews, Nicholas, , 1, 2015, Wiley Publishers .

2 Textbook of Pharmacovigilance, S K Gupta, 1, 2011, Jaypee Brothers Medical Publishers .

3 Textbook of pharmacovigilance, Ashish Garg and Sweta Garg, 1,2020, S. Vikas and company Medical publishers.

4 Concise course in pharmacovigilance, Pramod V Burakale, , 1,2020, S. Vikas and company Medical publishers.

25PY4243ET - QUALITY CONTROL AND STANDARDIZATION OF HERBALS (THEORY) (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
25PY4243ET	QUALITY CONTROL AND STANDARDIZATION OF HERBALS (THEORY)	QCSH	R	3	1	0	0	4

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Understand and kow WHO guidelines for quality control of herbal drugs	2	PO1, PO4
CO2	Understand and know Quality assurance in herbal drug industry	2	PO1, PO4
CO3	Understand and know the regulatory approval process and their registration in Indian and international markets	2	PO1, PO4
CO4	Understand and appreciate EU and ICH guidelines for quality control of herbal drugs	2	PO1, PO4

Syllabus

Basic tests for drugs Pharmaceutical substances, Medicinal plants materials and dosage forms WHO guidelines for quality control of herbal drugs. Evaluation of commercial crude drugs intended for use. Quality assurance in herbal drug industry of cGMP, GAP, GMP and GLP in traditional system of medicine.

WHO Guidelines on current good manufacturing Practices cGMP for Herbal Medicines WHO Guidelines on GACP for Medicinal Plants. EU and ICH guidelines for quality control of herbal drugs. Research Guidelines for Evaluating the Safety and Efficacy of Herbal Medicines. Stability testing of herbal medicines.

Application of various chromatographic techniques in standardization of herbal products. Preparation of documents for new drug application and export registration GMP requirements and Drugs & Cosmetics Act provisions. Regulatory requirements for herbal medicines.

WHO guidelines on safety monitoring of herbal medicines in pharmacovigilance systems Comparison of various Herbal Pharmacopoeias. Role of chemical and biological markers in standardization of herbal products.

Reference Books

1 Textbook of Pharmacognosy, Trease &Evans., 17th (2009), Saunders.

2 Herbal drug technology, Aggrawal, S.S, 3rd (2010), Universities Press.

3 Quality Control of Herbal Drugs: An Approach to Evaluation of Botanicals., Mukherjee, P.W., 1st (2002), Business Horizons Publishers, New Delhi, India..

4 Pharmacognosy & Phytochemistry, V.D.Rangari, 4th (2018), Career publications.

25PY4244ET - COMPUTER AIDED DRUG DESIGN (THEORY) (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
25PY4244ET	COMPUTER AIDED DRUG DESIGN (THEORY)	CADD	R	3	1	0	0	4

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Apply the principles to discover and optimize lead molecules	3	PO1, PO4
CO2	Understand the role of drug design in drug discovery process	3	PO1, PO4
CO3	Apply the principles of QSAR and docking to predict the activity of potential drug candidates	3	PO1, PO4
CO4	Understand various strategies to develop new drug-like molecules	2	PO1, PO4

Syllabus

Introduction to Drug Discovery and Development Stages of drug discovery and development, Lead discovery and Analog Based Drug Design Rational approaches to lead discovery based on traditional medicine, Random screening, Non random screening, serendipitous drug discovery, lead discovery based on drug metabolism, lead discovery based on clinical observation

Analog Based Drug Design, Bioisosterism, Classification, Bioisosteric replacement. Any three casestudies. Quantitative Structure Activity Relationship (QSAR) SAR versus QSAR, History and development of QSAR, Types of physicochemical parameters, experimental and theoretical approaches for the determination of physicochemical parameters such as Partition coefficient, Hammets substituent constant and Tafts steric constant. Hansch analysis, Free Wilson analysis, 3DQSAR approaches like COMFA and COMSIA.

Molecular Modeling and virtual screening techniques, Virtual Screening techniques, Drug likeness screening, Concept of pharmacophore mapping and pharmacophore based Screening, Molecular docking Rigid docking, flexible docking, manual docking, Docking based screening. De novo drug design

Informatics & Methods in drug design Introduction to Bioinformatics, chemoinformatics. ADME databases, chemical, biochemical and pharmaceutical databases. Molecular Modeling Introduction to molecular mechanics and quantum mechanics. Energy Minimization methods and Conformational Analysis, global conformational minima determination

Reference Books

1 Drug Action at the Molecular Level, Robert GCK , 2009, University Prak Press Baltimore.

2 Quantitative Drug Design, Martin YC, 2005, Dekke.

3 Principles of Medicinal Chemistry , William.O.Foye, 2000, B.I. Waverly Pvt. Ltd., New Delhi.

4 Quantitative Drug Design, Y.C. Martin, 2010, CRC Press.

5 Computational and structural approaches to drug design, Robert M Stroud and Janet. F Moore, 2007, RSC Publication.

25PY4245ET - CELL AND MOLECULAR BIOLOGY (THEORY) (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
25PY4245ET	CELL AND MOLECULAR BIOLOGY (THEORY)	CMB	R	3	1	0	0	4

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Understand basics and applications of cell and molecular biology	2	PO1, PO4
CO2	Understanding chemical foundations and cellular process	2	PO1, PO4
CO3	Understand of science of genetics.	2	PO1, PO4
CO4	Understand the principle of cell signalling	2	PO1, PO4

Syllabus

Definitions theory and basics and Applications. Cell and Molecular Biology: History and Summation. Properties of cells and cell membrane. Prokaryotic versus Eukaryotic. Cellular Reproduction

Chemical Foundations an Introduction and Reactions Types. DNA and the Flow of Molecular Information. DNA Functioning, DNA and RNA, Types of RNA, Transcription and Translation. Proteins: Defined and Amino Acids, Protein Structure, Regularities in Protein Pathways, Cellular Processes, Positive Control and significance of Protein Synthesis

. Science ofGenetics: Transgenics andGenomic Analysis, Cell Cycle analysis, Mitosis and Meiosis, Cellular Activities and Checkpoints

CellSignals: Introduction, Receptors for Cell Signals, Signaling Pathways: Overview, Misregulation of Signaling Pathways, Protein-Kinases: Functioning.

Reference Books

1 Pharmaceutical Microbiology, W.B. Hugo and A.D. Russe, 8 (2013), Blackwell Scientific publications.

2 Basic and clinical pharmacology, Katzung B. G., Masters S. B., Trevor A. J, 15 (2021), Lea& Febigur .

3 The Pharmacological Basis of Therapeutics, Good Man and Gill Man , 16 (2021), Mc-Graw Hill.

4 Applied Therapeutics, The Clinical use of Drugs, The Point, Marry Anne K. K., Lloyd Yee Y., Brian K. A., Robbin L.C., Joseph G. B., Wayne A. K., Bradley R.W., 12 (2023), Wolters Kluwer.

5 Tutorial Pharmacy, Cooper and Gun, 12 (2008), CBS Publishers & Distributors.

25PY4246ET - COSMETIC SCIENCE (THEORY) (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
25PY4246ET	COSMETIC SCIENCE (THEORY)	CS	R	3	1	0	0	4

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	understand the Principles of formulation and building blocks of skin careproducts	2	PO1
CO2	understand the Principles of formulation and building blocks of Hair care Products	2	PO1
CO3	understand the Principle of formulation of oral care products and Role of herbs in cosmetics	2	PO1
CO4	understand the Principles of Cosmetic Evaluation	2	PO1

Syllabus

Classification of cosmetic and cosmeceutical products. Definition of cosmetics as per Indian and EU regulations, Evolution of cosmeceuticals from cosmetics, cosmetics as quasi and OTC drugs. Cosmetic excipients: Surfactants, rheology modifiers, humectants, emollients, preservatives. Classification and application. Skin: Basic structure and function of skin, Principles of formulation and building blocks of skin care products: Face wash, Moisturizing cream, Cold Cream, Vanishing cream and their advantages and disadvantages. Application of these products in formulation of Cosmecuticals. Antiperspirants & deodorants- Actives & mechanism of action.

Principles of formulation and building blocks of Hair care products: Conditioning shampoo, Hair conditioner, anti-dandruff shampoo. Hair oils. Chemistry and formulation of Para- phylene diamine-based hair dye.

Principles of formulation and building blocks of oral care products: Toothpaste for bleeding gums, sensitive teeth. Teeth whitening, Mouthwash. Sun protection, Classification of Sunscreens and SPF. Role of herbs in cosmetics: Skin Care: Aloe and turmeric Hair care: Henna and amla. Oral care: Neem and clove.

Analytical cosmetics: BIS specification and analytical methods for shampoo, skincream and toothpaste. Principles of Cosmetic Evaluation: Principles of sebumeter, corneometer. Measurement of TEWL, Skin Color, Hair tensile strength, Hair combing properties. Soaps, and syndet bars. Evolution and skin benefits. Oily and dry skin, causes leading to dry skin, skin moisturisation. Basic under-standing of the terms Comedogenic, dermatitis. Cosmetic problems associated with Hair and scalp: Dandruff, Hair fall causes Cosmetic problems associated with skin: blemishes, wrinkles, acne, prickly heat and body odor. Antiperspirants and Deodorants- Actives and mechanism of action.

Reference Books

1 Cosmetic Formulation of Skin Care Products, Zoe Diana Draelos Lauren A. Thaman, 2005, Taylor & Francis group.

2 Poucher's Perfumes, Cosmetics and Soaps, William Arthur Poucher, 1923, Springer Nature.

3 "The Chemistry and Manufacture of Cosmetics", Maison G. DeNavarre, 2024, Allured Publishing Corporation.

4 "Introduction to Cosmetic Formulation and Technology", Gabriella Baki, Kenneth S. Alexander, 2023, Wiley.

25PY4247ET - EXPERIMENTAL PHARMACOLOGY (THEORY) (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
25PY4247ET	EXPERIMENTAL PHARMACOLOGY (THEORY)	EP	R	3	1	0	0	4

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	understand the uses of various commonly used laboratory animals in preclinical research	2	PO1, PO4
CO2	Understand the animal screening models for various indications	2	PO1, PO4
CO3	Understand the animal screening models for nervous system related indications	2	PO1, PO4
CO4	Understand the importance of biostatistics and research methodology in clinical and preclinical research	2	PO1, PO4

Syllabus

Study of CPCSEA and OECD guidelines for maintenance, breeding and conduct of experiments on laboratory animals. Common lab animals: Description and applications of different species and strains of animals. Popular transgenic and mutant animals. Techniques for collection of blood and euthanasia. Common routes of drug administration in laboratory animals. Dose selection, calculation and conversions, preparation of drug solution. Grouping of animals and importance of sham negative and positive control groups

Study of screening animal models for various indications Rationale for selection of animal species and sex for the study. Diuretics Antiasthmatics Analgesic Antipyretic Anti-inflammatory Drugs acting on eye Antihypertensives Antiarrhythmics Anti-dyslepidemics Anti-aggregatory Coagulants Anticoagulants Antiulcer Antidiabetic Anticancer

Study of screening animal models for nervous system related indications Nootropics Alzheimers disease AntiParkinsons General anesthetics Sedative and hypnotics Antipsychotic Antidepressant Antiepileptic Sympathomimetics Sympatholytics Parasympathomimetics Parasympatholytics Skeletal muscle relaxants Local anesthetics

Research methodology and Biostatistics Selection of research topic Review of literature Research hypothesis Study design Preclinical data analysis Interpretation using Students t test and Oneway ANOVA Graphical representation of data

Reference Books

1 Fundamentals of Experimental Pharmacology , M. N. Ghosh , 2008, Hilton and Company .

2 Hand book of Experimental Pharmacology, S. K. Kulakarni , 2014, VALLABH PRAKASHAN .

3 CPCSEA guidelines for laboratory animal facility. , CCSEA, 2018, Ministry of Environment, forest,climate change government of India .

4 Introduction to biostatistics and research methods , PSS Sundar Rao and J Richard , 2012, PHI Learning Pvt. Ltd. .

25PY4248ET - ADVANCED INSTRUMENTATION TECHNIQUES (THEORY) (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
25PY4248ET	ADVANCED INSTRUMENTATION TECHNIQUES (THEORY)	AIT	R	3	1	0	0	4

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Apply and understands the ability to investigate and determine the structure of typical organic chemical compounds using suitable Nuclear magnetic resonance experiments	3	PO2, PO7
CO2	Apply and understand the concepts in Thermo gravimetric analysis, Differential Thermal Analysis, Differential Scanning Calorimetry. X-Ray Diffraction methods	3	PO2, PO7
CO3	Apply and understanding the calibration of various analytical instruments.	3	PO2, PO7
CO4	Apply and gain knowledge on analysis of drugs using various analytical instruments .	3	PO2, PO7

Syllabus

Nuclear Magnetic Resonance spectroscopy Principles of H NMR and C NMR chemical shift factors affecting chemical shift coupling constant Spin spin coupling relaxation instrumentation and applications Mass Spectrometry Principles Fragmentation Ionization techniques Electron impact chemical ionization MALDI FAB AnalyzersTime of flight and Quadrupole instrumentation applications

Thermal Methods of Analysis Principles instrumentation and applications of ThermogravimetricAnalysis (TGA) Differential Thermal Analysis (DTA) Differential Scanning Calorimetry (DSC) XRay Diffraction Methods Origin of Xrays basic aspects of crystals Xray Crystallography rotating crystal technique single crystal diffraction powder diffraction structural elucidation and applications

Calibration and validation as per ICH and USFDA guideliness Calibration of instruments electronic balance UV Visible spectrophotometer IR Fluorieter Flame photometer HPLC GC

RIA Importance various components Principle different methods Limitation and Applications of Radio immuno assay Extraction techniques General principle and procedure involved in the solid phase extraction and liquid-liquid extraction Extraction methods Hyphenated techniques LCMSMS GCMSMS

Reference Books

1 Instrumental Methods of Chemical Analysis, B.K Sharma, 2022, Krishna Prakashan Media.

2 Organic spectroscopy , Y.R Sharma, 2013, S. Chand & Company Ltd.

3 Textbook of Pharmaceutical Analysis, Kenneth A. Connors, 2011, Wiley-Interscience.

4 Spectrometric identification of organic compounds, Robert Silverstein, 2016, wiley.

25PY4249ET - DIETARY SUPPLEMENTS AND NUTRACEUTICALS (THEORY) (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
25PY4249ET	DIETARY SUPPLEMENTS AND NUTRACEUTICALS (THEORY)	DSN	R	3	1	0	0	4

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Understand the need of supplements by the different group of people to maintain healthy life	2	PO2
CO2	Understand the outcome of deficiencies in dietary supplements.	2	PO2
CO3	Understand the components in dietary supplements and their application	3	PO2
CO4	Understand the regulatory and commercial aspects of dietary supplements including health claims	2	PO2

Syllabus

Definitions of Functional foods, Nutraceuticals and Dietary supplements. Classification of Nutraceuticals, Health problems and diseases that can be prevented or cured by Nutraceuticals i.e. weight control, diabetes, cancer, heart disease, stress, osteoarthritis, hypertension etc. Public health nutrition, maternal and child nutrition, nutrition and ageing, nutrition education in community. Source,Name of marker compounds and their chemical nature, Medicinal uses and health benefits of followingused as nutraceuticals/functional foods: Spirulina, Soyabean, Ginseng, Garlic, Broccoli, Gingko,Flaxseeds

Phytochemicals as nutraceuticals- Occurrence and characteristic features, chemical nature medicinal benefits of following: Carotenoids- alpha and beta-Carotene, Lycopene, Xanthophylls, leutin, Sulfides- Diallyl sulfides, Allyl trisulfide; Polyphenolics- Reservetrol, Flavonoids- Rutin , Naringin, Quercitin, Anthocyanidins, catechins, Flavones, Prebiotics Probiotics.: Fructo oligosaccharides, Lactobacillum. Phyto estrogens - Isoflavones, daidzein, Geebustin, lignans; Tocopherols, Proteins, vitamins, minerals,cereal, vegetables and beverages as functional foods- oats, wheat bran, rice bran, sea foods, coffee, tea and the like

Introduction to free radicals: Free radicals, reactive oxygen species, production of free radicals in cells, damaging reactions of free radicals on lipids, proteins, Carbohydrates, nucleic acids. Dietary fibres andcomplex carbohydrates as functional food ingredients.. Free radicals in Diabetes mellitus, Inflammation, Ischemic reperfusion injury, Cancer, Atherosclerosis, Free radicals in brain metabolism and pathology, kidney damage, muscle damage. Free radicals involvement in other disorders. Free radicals theory of ageing.

Antioxidants: Endogenous antioxidants enzymatic and nonenzymatic antioxidant defence, Superoxide dismutase, catalase, Glutathione peroxidase, Glutathione Vitamin C, Vitamin E, alpha- Lipoic acid, melatonin. Synthetic antioxidants: Butylated hydroxy Toluene, Butylated hydroxy Anisole. Functional foods for chronic disease prevention. Effect of processing, storage and interactions of various environmental factors on the potential of nutraceuticals. Regulatory Aspects; FSSAI, FDA, FPO, MPO, AGMARK. HACCP and GMPs on Food Safety. Adulteration of foods. Pharmacopoeial Specifications for dietary supplements and nutraceuticals.

Reference Books

1 Dietetics , Sri Lakshmi , 2023, NEW AGE INTERNATIONAL PUBLISHERS .

2 Role of dietary fibres and neutraceuticals in preventing diseases , K.T Agusti and P. Faizal , 2019, BSP Books Private Limited .

3 Advanced Nutritional Therapies , Cooper. K.A., , 1997, Trust Media Distribution .

4 Remington: The Science and Practice of Pharmacy, 20th edition Pharmaceutical Science (RPS) , Adeboye Adejare , 2020, Elsevier Academic Press .

Y25: B.Pharmacy

Category: Project Research And Internship (PRI)

25PY4137PS - PRACTICE SCHOOL (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
25PY4137PS	PRACTICE SCHOOL	PS	R	0	0	12	0	6

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Educational initiatives seeking to introduce industry perspective in education.	1	PO1
CO2	Acquire learning by applying the knowledge and the skills they possess	2	PO2
CO3	Simulation of the Industry environment into the process of education	2	PO2
CO4	Industrial training through experimental and cooperative learning	5	PO3, PO4
CO5	Promotes Partnership and intellectual exchange between academia and industry	2	PO7

Syllabus

Educational programs aim to incorporate business perspectives into the classroom by integrating real-world scenarios, promoting entrepreneurial thinking, offering industry partnerships, and enhancing students\' practical skills for future careers

Students leverage their existing skills and expertise to gain information by engaging in experiential learning, participating in projects, conducting research, collaborating with peers, and applying theoretical knowledge to practical situations

Incorporating industry simulation into education bridges theory and practice, enhances problem-solving skills, provides hands-on experience, and prepares students for real-world professional challenges

Industrial training employing cooperative and experimental methods fosters teamwork, enhances problem-solving skills, provides hands-on experience, and bridges the gap between theoretical knowledge and practical application in real-world settings

Encourages collaboration and intellectual sharing between higher education and business by fostering partnerships, facilitating knowledge exchange, aligning curricula with industry needs, and providing opportunities for joint research and innovation

Reference Books

1 Aulton's Pharmaceutics: The Design and Manufacture of Medicines, Michael E. Aulton and Kevin Taylor, 6, 2021, Michel.

2 Pharmacy Management: Essentials for All Practice Settings, David P. Zgarrick, Greg L. Alston, Leticia R. Moczygemba, Shane P. Desselle, 4 2019, McGraw-Hill Education Medical.

3 Pharmacotherapy: A Pathophysiologic Approach, Joseph DiPiro, Robert L. Talbert, Gary Yee, Gary Matzke, Barbara Wells, and L. Michael Posey, 8,2016, McGraw-Hill Education Medical;.

4 Remington: The Science and Practice of Pharmacy, by David B. Troy and Paul Beringer, 6,2016, Lippincott Williams & Wilkins.

25PY4250PW - PROJECT WORK (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
25PY4250PW	PROJECT WORK	PW	R	0	0	12	0	6

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Application of Pharmacy in clinical settings	3	PO7
CO2	Application of modern tools usage	3	PO3
CO3	Application of pharmacy knowledge in communication skills and ethics	3	PO9, PO11
CO4	Application of Pharmacy knowledge in research development	3	PO4

Syllabus

The student should select a project from the following areas and work in respective industries/departments to complete a project. 1. Formulation Development 2. Analytical Development 3. Chemical synthesis/Natural products 4. Pharmacological/toxicological screening 5. Pharmacovigilance 6. Herbal drugs, formulations and Analysis 7. Regulatory Affairs 8. Bioavailability, Bioequivalence, clinical students 9. Intellectual property management 10. Hospital Pharmacy 11. Community Pharmacy 12. Any project work related to the Pharmacy profession. The student should study the background of the literature and develop the project\'s aims and objectives.

The student should design a plan of work, list of Materials and Methods for excuting project work in selected area. Conduct research experiments to meet the aim and objectives of proposed research work.

Evaluate the findings and plan alterations or new methodologies or procedures for further improvement

Document the findings of conducted experiments & interpretation of results, report writing. The reporting on the investigation shall be presented in one or more chapters with appropriate chapter titles. The project work done has to be presented as a report. The student should present the findings of the project work in the college for final evaluation.

Reference Books

1 REMINGTON THE SCIENCE AND PRACTICE OF PHARMACY, ADEJARE A., 23rd edition (2021), ELSEVIER EXCLUSIVE SPECIAL PRICE.

2 RANG & DALE'S PHARMACOLOGY, Ritter, 9th edition (2019), ELSEVIER EXCLUSIVE SPECIAL PRICE.

3 Trease and Evans Pharmacognosy, WC Evans, 16th edition (2009), Sanders.

4 Wilson andGisvolds Textbook of Organic Medicinal and Pharmaceutical Chemistry, Beale and Block, 12th edition (2010), Wolters Kluwer India Pvt Ltd.

Y25: B.Pharmacy

Category: Open Elective Courses (OEC)

OEAD3011 - MEDICAL DATA ANALYTICS (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
OEAD3011	MEDICAL DATA ANALYTICS	MDA	R	3	0	0	0	3

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Understand Healthcare Management and Analytics	2	PO1, PO3
CO2	Demonstrate Python program techniques for Healthcare Analytics	3	PO1, PO3
CO3	Apply Artificial Intelligence in Healthcare data analysis	3	PO1, PO3
CO4	Analyse Management in Healthcare data	4	PO1, PO3

Syllabus

General Management in Healthcare: Introduction to Healthcare Management and Analytics, Public Health Management Challenges, Healthcare Policy, Health Management Information Systems, Healthcare Economics, Human Resource Management in Healthcare, Healthcare Financial Reporting

Healthcare Analytics: statistics and EDA with python , and Data Visualisation, Exploring Healthcare Analytics and Correlation Analysis, Predictive Analytics in Healthcare, Healthcare Optimisation Practice, Six Sigma in Healthcare, Demand Forecasting in Healthcare

AI and Digital Transformation in Healthcare: Introduction to Artificial Intelligence in Healthcare, Digital Patient Experience, Digital Transformation Strategy, Implementing Artificial Intelligence in Healthcare

Management in Healthcare: Supply Chain Management in Healthcare, Capacity Management in Healthcare, Lean Management, Process improvement, Service Excellence and Business Process Re-Engineering, Quality Measurement & Benchmarking in Healthcare, Project Management in Healthcare

Reference Books

1 Statistics for Healthcare Professionals: An Introduction, Ian Scott, 1st, Edition,2005, WILEY.

2 Data Science for Effective Healthcare Systems, HariSingh, 1st, Edition,2023, ebook.

3 Healthcare Analytics: From Data to Knowledge to Healthcare Improvement, Laura A. Kirkwood and Eugene Kolker, 1st, Edition,2016, ebook.

OEBT1001 - IPR AND PATENT LAWS (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
OEBT1001	IPR AND PATENT LAWS	IPRPL	R	3	0	0	0	3

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Apply the concepts of intellectual property rights to protect innovations and creative works in biotechnology and allied fields.	3	PO11
CO2	Demonstrate the procedure for filing patents, trademarks, and copyrights through appropriate legal and administrative channels.	3	PO11
CO3	Apply patent search and analysis tools to evaluate the novelty and patentability of research ideas or inventions.	3	PO11
CO4	Utilize knowledge of national and international IPR laws to develop strategies for technology transfer and commercialization.	3	PO11

Syllabus

Intellectual Property Rights Patents and intellectual property rights (IPR): Definition, History of intellectual property; Types of intellectual property rights, copy rights, trade marks, geographical indication, Industrial design rights, patents. Sources of patent information, patent application procedures. Principles, Scope and Functions Of GATT&WTO GATT

Historical perspective, objectives and fundamental principles, impact on developing countries. WTO- Objectives, scope, functions, structure, status, membership and withdrawal, dispute settlement, impact on globalization, India-tasks and challenges. Regulatory Affairs Indian contest-requirements and guidelines of GMP, understanding of Drugs and cosmetic act 1940 and rules 1945 with reference schedule M,U & Y.

Related quality systems-objectives and guidelines of USFDA,WHO & ICH; Introduction to ISO series. Documentation and Protocols Documentation: Types related to pharmaceuticals industry, protocols, harmonizing formulation development for global fillings, NDA, ANDA, CTD

Dealing with post approval changes-SUPAC, handling and maintenance including electronic documentation. Case Studies on Patents. Case Studies on - Patents (Basumati rice, turmeric, Neem, and related medicinal plants and byproducts)

Reference Books

1 Good manufacturing practices for Pharmaceuticals, , S. H. Willig, 2000, Informa Healthcare.

2 Industrial Property Rights: Vol. III-4, , Kogan Pate, 1998, Kogan Page.

OEGN1001 - NATIONAL CADET CORPS - 1 (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
OEGN1001	NATIONAL CADET CORPS - 1	NCC-1	R	2	0	4	0	4

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Define the aims, organization, and functioning of the NCC and its role in nation building.	1	PO7, PO9
CO2	Describe the basic military subjects such as drill, map reading, and field signals.	2	PO7, PO9
CO3	Apply the principles of discipline and leadership in NCC activities and campus life.	3	PO7, PO9
CO4	Demonstrate basic weapon training and social service participation through practical sessions.	4	PO7, PO9
CO5	Display teamwork, physical fitness, and civic responsibility through NCC drills and camps.	5	PO7, PO9

Syllabus

Introduction to NCC and National Integration: Aims, organization, and motto of NCC. Structure and functioning of NCC. National Integration and Awareness: importance and challenges. History and achievements of NCC.

Drill and Discipline: Types of drill and their importance. Word of command and formation. Saluting and reporting procedures. Importance of discipline and punctuality.

Weapon Training: Introduction to weapons and safety measures. Stripping and assembling of a rifle (demonstration). Firing positions (theoretical component).

Social Service and Community Development: Role of NCC in community service. Swachh Bharat Abhiyan, Tree plantation, Blood donation. Disaster management awareness.

Foot drill practice, saluting, and parade. Map reading and field signals. Participation in local social service activities. Physical training and obstacle course basics.

Reference Books

1 Directorate General NCC, Cadets Hand Book (Common for Army, Navy & Air Wing), Ministry of Defence, Govt. of India., ., ., ..

2 NCC Training Syllabus - Part I (First Year), DG NCC, Ministry of Defence, New Delhi., ., ., ..

3 Lt. Col. A.K. Singh, National Cadet Corps - Handbook for Cadets, Kalyani Publishers., ., ., ..

4 Dr. V. Raghavan, Youth and National Integration, Deep & Deep Publications., ., ., ..

OEGN1002 - NATIONAL SERVICE SCHEME - 1 (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
OEGN1002	NATIONAL SERVICE SCHEME - 1	NSS-1	R	2	0	4	0	4

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Understand the fundamental principles, objectives, and organizational structure of NSS, including the significance of its emblem, flag, motto, song, and badge.	2	PO6, PO8
CO2	Identify Planning and executing regular activities, special camps, and day camps, and will be skilled in adopting villages or slums for long-term development projects.	2	PO6, PO8
CO3	Report effective community surveys, analyze data, and use findings to develop impactful community service initiatives	2	PO6, PO10
CO4	Contribute meaningfully to NSS programs, fostering leadership, teamwork, and social responsibility.	2	PO6, PO10
CO5	Analyze various house hold surveys and conduction of social activities	4	PO8, PO10

Syllabus

Introduction and Basic Concepts of NSS. Emblem, flag, motto, song, badge, etc. Organizational structure, roles and responsibilities of various NSS functionaries.

Concept of regular activities, special camping, Day Camps. Basis of adoption of village/slums, Methodology of conducting Survey.

Maintenance of the Diary. Issues, challenges and opportunities for youth. Indian Tradition of volunteerism.

Needs & importance of volunteerism Motivation and Constraints of Volunteerism. Shramdan as a part of volunteerism.

Implementation of various programs in adopted villages

Reference Books

1 National Service Scheme in India: A Case Study of Karnataka, Dr. V. S. Babu , 1 st ,2001, Ashish Publishing House.

2 National Service Scheme: A Youth Volunteer Programme, B.L. Gupta, 1st,2009, ABD Publishers.

3 NSS Manual , Ministry of Youth Affairs and Sports, , 1st,2006 Government of India, Government of India.

OEGN2006 - NATIONAL CADET CORPS - 2 (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
OEGN2006	NATIONAL CADET CORPS - 2	NCC-2	R	2	0	4	0	4

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Explain the structure and role of Indian Armed Forces and their relation with NCC.	2	PO7
CO2	Apply map reading, fieldcraft, and first-aid techniques in practical contexts.	3	PO7
CO3	Demonstrate leadership, discipline, and decision-making in group activities and camps.	4	PO7
CO4	Analyze disaster management and social welfare strategies implemented by NCC.	4	PO7
CO5	Exhibit commitment to environmental protection and community service through NCC programs.	5	PO7

Syllabus

Armed Forces and Leadership: Organization of Indian Army, Navy, and Air Force. Leadership traits and types. Command responsibilities and group dynamics.

Map Reading and Fieldcraft: Conventional signs and symbols. Setting a map and finding directions. Field signals, judging distance, and ground formations.

Health, Hygiene, and First Aid: Personal hygiene and sanitation. Basic first aid and life-saving techniques. Stress management and mental well-being

Environment and Social Awareness: Waste management, renewable energy, conservation activities. Role of youth in environmental protection. Participation in community development projects.

Rifle drill and aiming exercises. Fieldcraft practice and map reading. Leadership and team-building exercises. Social awareness campaign participation

Reference Books

1 Directorate General NCC, Training Syllabus - Part II (Second Year), Ministry of Defence., ., ., ..

2 Col. M.P. Bhagat, Leadership and Personality Development for Cadets, Himalaya Publishing House., ., ., ..

3 DG NCC, Map Reading and Fieldcraft Manual (Army Wing), Ministry of Defence., ., ., ..

OEGN2007 - NATIONAL SERVICE SCHEME - 2 (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
OEGN2007	NATIONAL SERVICE SCHEME - 2	NSS-2	R	2	0	4	0	4

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Understand about environmental issues and plantation programs	2	PO8
CO2	Identify Planning and executing regular activities, special camps, and day camps, and will be skilled in adopting villages or slums for long-term development projects.	2	PO8
CO3	Contribute meaningfully to NSS programs, fostering leadership, teamwork, and social responsibility.	2	PO8
CO4	Contribute in environmental issues and disaster management as NSS Volunteer	2	PO8
CO5	Analyze various house hold surveys and conduction of social activities	4	PO8

Syllabus

Plantation Awareness, Waste management awareness, Awareness for self-Employment in adapted village.

Helping local schools to achieve good results and enhance their enrolment in Higher/ technical/ vocational education.

Definition and importance of life competencies; communication and soft skills; Using the Internet; Youth leadership

Introduction; Classification of disasters; Role of NSS in disaster management with more emphasis on disasters specific to NE India; Civil defence

Reference Books

1 National Service Scheme in India: A Case Study of Karnataka, Dr. V. S. Babu, 1st, 2001, Ashish Publishing House.

2 Environmental Studies, PK Pandey, 1st, 2020, MAHAVEER Publications.

3 NSS Manual, Ministry of Youth Affairs and Sports, Government of India, 1st,2006, ..

OEGN3011 - NATIONAL CADET CORPS - 3 (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
OEGN3011	NATIONAL CADET CORPS - 3	NCC-3	R	2	0	4	0	4

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Explain the roles of defense organizations and security forces in national security.	2	PO7
CO2	Apply advanced fieldcraft and weapon training principles during camps and drills.	3	PO7
CO3	Demonstrate leadership and planning skills in organizing NCC and social activities.	4	PO7
CO4	Evaluate disaster management strategies and participate in relief activities.	5	PO7
CO5	Design and execute civic projects contributing to national development and discipline.	6	PO7

Syllabus

National Defense and Security: Defense services: organization and operations. Border management and internal security. Role of NCC in national defense awareness

Advanced Drill and Weapon Training: Weapon handling (simulator/demonstration). Range firing. Ceremonial drill and guard of honor.

Disaster Management and Civil Defense: Types of disasters and preparedness plans. Role of NCC in disaster relief and rehabilitation. First response and resource mobilization

Leadership and Personality Development: Time management, communication, and problem-solving. Career guidance in armed and civil services. NCC values and lifelong discipline.

Advanced drill, weapon simulation, and range practice Leadership and management exercises Disaster mock drills Organization of social, environmental, and national events.

Reference Books

1 Directorate General NCC, Training Syllabus - Part III (Third Year), Ministry of Defence, New Delhi., ., ., ..

2 Brig. K. K. Khanna, National Defence and Security: An Overview, Pointer Publishers., ., ., ..

3 DG NCC, Disaster Management and Civil Defence Manual, Ministry of Defence., ., ., ..

OEGN3012 - NATIONAL SERVICE SCHEME - 3 (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
OEGN3012	NATIONAL SERVICE SCHEME - 3	NSS-3	R	2	0	4	0	4

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Understand community and society, Human Values , Gender Justice	2	PO6, PO9
CO2	Identify Planning and executing regular activities, special camps, and day camps on Food and Nutrition National health programme Healthy Lifestyles	2	PO6, PO9
CO3	Contribute meaningfully to NSS programs, Drugs and Substance abuse Blood donation camp importance , Fire safety Program, Need of Blood grouping	2	PO6, PO9
CO4	Contribute to community by promoting yoga, Yoga as a tool for healthy lifestyle.	2	PO6, PO9
CO5	Analyze various house hold surveys and conduction of social activities	4	PO6, PO9

Syllabus

Concept of community and society, Human Values, Gender Justice.

Food and Nutritio National health programme Healthy Lifestyles.

Drugs and Substance abuse Blood donation camp importance, Fire safety Program, Need of Blood grouping.

Concept of yoga, Yoga as a tool for healthy lifestyle.

Reference Books

1 National Service Scheme in India: A Case Study of Karnataka, Dr. V. S. Babu, 1st, 2001, Ashish Publishing House.

2 Yoga Mind, Body & Spirit, Donna Farhi, 1st, 2000, Henry Holt and Company.

3 Community Health Nursing, C. V. Jacob, 1st, 2017, Jaypee Brothers Medical Publishers.

OEME2007 - TOTAL QULAITY MANAGEMENT (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
OEME2007	TOTAL QULAITY MANAGEMENT	TQM	R	3	0	0	0	3

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Understand the principles and practices of TQM.	2	PO3, PO5
CO2	Know the evolution and challenges made in industries by TQM.	2	PO3, PO5
CO3	Understand the models to solve the problems and improving the circumstances.	2	PO3, PO5
CO4	Learn the quality tools implemented in industries and its performances.	2	PO3, PO5

Syllabus

Principles and Practice: Definition of TQM, basic approach, Obstacles to TQM, TQM Framework, benefits of TQM. Business Evolution: Customer Satisfaction, four fitness of Customer Satisfaction, Evolution of Customer Satisfaction Methodology, Leadership vs Empowerment, Four Practical Revolutions in Management thinking, Four Levels of Practice.

Customer Focus: Change in the Work Concept: Market-in, Philosophy-in and Philosophy-out, Evolution of Customer Focus and Its Challenges, Three Stages of Customer Focus, Customer Concerns, Integration of Concerns, Individualizing Customers.

Continuous Improvement: Management by process, WV Model of Continuous Improvement, Three types of improvements, Continuous Improvement of Processes for All Types of Work, Continuous Improvement verses breakthrough, Continuous Improvement and the Scientific Method. Managing Existing Processes: Process Discovery and Management: Thinking In Terms of Process, Process Discovery, steps of Process Discovery, benefits of Process Discovery.

Proactive Improvement: Proactive Improvement concept, Kawakitas Five Principles, Language Data and Use of Semantics, Comparison of Affective and Report language, Five principles of Customer Visitation, The purpose of Proactive Improvement to Develop New Products. Total Participation: Employee Involvement Motivation, employee surveys, empowerment, teams, suggestion system, recognition and reward, gain sharing, performance appraisal, unions and employee involvement, three sets of skills of leader ship. QC Circles.

Reference Books

1 Total Quality Management, Besterfield, 2011, Pearson Education.

2 Management for Total Quality, N Logothetis, 3, Prentice Hall of India.

3 Total Quality Management, H D Ramachandra and K R Phanesh, 2006, Princeton Publishers.

Y25: B.Pharmacy

Category: Value Added Courses (VAC)

25CC3016 - BASE SAS (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
25CC3016	BASE SAS	BSAS	R	0	0	0	8	0

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Apply the role of SAS Programming for Biotechnology	3	PO2, PO8
CO2	Apply the concepts of SAS Programming for Biotechnology Applications	3	PO2, PO8
CO3	Apply the role of SAS Programming for Biotechnology and product purification	3	PO2, PO8
CO4	Apply the role of SAS Programming for Biotechnology and product Quantification	3	PO2, PO8

Syllabus

Introduction to SAS, Data Import and Export, Data Step Processing, Data Manipulation and Cleaning, Introduction to PROC Steps, Basic Data Visualization

Advanced Data Step Techniques, Advanced PROC Procedures, Macro Programming, Data Analysis and Interpretation, Clinical Trials and Biostatistics, Case Studies and Project

Reference Books

1 The Little SAS Book: A Primer, Lora D. Delwiche, Susan J. Slaughter, 2019, SAS Institute.

2 Learning SAS by Example: A Programmer's Guide, Ron Cody, 2018, SAS Institute.

3 SAS Certification Prep Guide: Base Programming for SAS 9, SAS Institute, 2011, SAS Institute.

4 SAS Programming for Researchers and Social Scientists, Paul D. Allison, 2010, SAS Institute.

25CC3069 - PHARMACOVIGILANCE (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
25CC3069	PHARMACOVIGILANCE	PCV	R	0	0	0	8	0

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Apply pharmacovigilance principles and methodologies to monitor and assess the safety of pharmaceutical products throughout their lifecycle, implementing the foundational principles of pharmacovigilance	3	PO1, PO3
CO2	Apply the concept of adverse drug reactions (ADRs) and assess their potential impact on public health, regulatory decisions, and patient care, nature, classification, and evaluation of adverse drug reactions (ADRs).	3	PO1, PO3

Syllabus

Introduction to Pharmacovigilance Overview of Pharmacovigilance Principles: Introduction to the field of pharmacovigilance, including the definition, objectives, and importance of monitoring drug safety throughout the lifecycle of medications. Regulations in Pharmacovigilance: Examination of global and regional regulations governing pharmacovigilance practices, including guidelines from agencies such as the FDA, EMA, and ICH.

Adverse Drug Reaction Monitoring and Analysi: In-depth study of adverse drug reactions (ADRs), including their identification, assessment, and reporting procedures. Detailed examination of methods for identifying ADRs, including patient interviews, clinical observations, and the use of safety reporting systems.Techniques for assessing the causality, severity, and outcome of ADRs, including the use of assessment scales, causality algorithms, and severity grading systems.

Reference Books

1 "Pharmacovigilance: Principles and Practice", Patrick Waller , 2011, John Wiley & Sons.

2 "Practical Aspects of Signal Detection in Pharmacovigilance", Harald Herkner, Klemens Wallner, 2018, Springer.

3 "Introduction to Pharmacovigilance", Patrick Waller , 2012, Pharmaceutical Press.

4 Textbook of Pharmacovigilance: Ensuring the Safe Use of Medicines, SK Gupta, 2022, Jaypee Brothers Medical Publishers.

25CC3077 - REGULATORY AFFAIRS (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
25CC3077	REGULATORY AFFAIRS	RGA	R	0	0	0	8	0

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Apply the roles and functions of major regulatory agencies	3	PO1, PO4
CO2	Apply the regulatory environment and key legislation that governs pharmaceuticals, biologics, and medical devices	3	PO1, PO4
CO3	Apply the concepts of quality control and assurance processes to ensure trial integrity and compliance	3	PO1, PO4

Syllabus

Fundamentals of Regulatory Affairs: Introduction to Regulatory Affairs, Regulatory Bodies and Legislation, Drug Development and Approval Process, Clinical Trials and Good Clinical Practice (GCP), Regulatory Submissions and Documentation, Quality Assurance and Compliance, Post-Market Surveillance and Pharmacovigilance

Advanced Topics in Regulatory Affairs: International Regulatory Affairs, Medical Devices and Combination Products, Biologics and Biosimilars, Regulatory Affairs in Emerging Markets, Orphan Drugs and Rare Diseases, Over-the-Counter (OTC) Products and Dietary Supplements, Advanced Regulatory Strategies and Project Management

Reference Books

1 Fundamentals of US Regulatory Affairs, Regulatory Affairs Professionals Society (RAPS), 2019, Regulatory Affairs Professionals Society (RAPS).

2 FDA Regulatory Affairs: A Guide for Prescription Drugs, Medical Devices, and Biologics, Douglas J. Pisano, David S. Mantus, 2014, CRC Press.

3 European Regulatory Affairs: Guide for Successful Registration of Medicinal Products in Europe, Regulatory Affairs Professionals Society (RAPS), 2010, Regulatory Affairs Professionals Society (RAPS).

4 Essentials of Pharmaceutical Regulatory Affair, Douglas Pisano, David Mantus, 2003, CRC Press.

Y25: B.Pharmacy

Category: Audit Courses (AUC)

CADCOML1V1 - CAREER ADVANCEMENT:COMPETITIVE EXAM TRAINING (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
CADCOML1V1	CAREER ADVANCEMENT:COMPETITIVE EXAM TRAINING	CAD: COM	R	0	0	0	8	0

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Enhance critical thinking and problem-solving skills to analyze and solve complex problems effectively.	3	PO4
CO2	Apply strategic test-taking techniques to improve performance and manage exam-related stress.	3	PO4

Syllabus

Introduction to Critical Thinking: covering the definition, importance, and key components; Logical Reasoning: focusing on types of reasoning (deductive and inductive) and common logical fallacies; Data Interpretation: analyzing graphs, charts, and statistical information; and Problem-Solving Techniques: emphasizing creative problem-solving methods and structured frameworks.

Practice Sessions through case studies and group discussions. It also explores Understanding Exam Formats, providing an overview of common competitive exams such as GRE, GMAT, and UPSC, along with types of questions encountered. Students will learn Time Management Techniques for prioritizing questions and allocating time efficiently, alongside Effective Study Habits to create study schedules and utilize resources. The syllabus includes Stress Management Strategies, focusing on mindfulness and relaxation techniques, and concludes with Mock Exams and Feedback to assess performance and identify areas for improvement.

Reference Books

1 Critical Thinking: A Beginner's Guide, Gail McDonald, Springer, 2018.

2 The 7 Habits of Highly Effective People, Stephen R. Covey, Free Press, 2020.

CADCORL1V1 - CAREER ADVANCEMENT: TRAINING IN CORE DOMAIN (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
CADCORL1V1	CAREER ADVANCEMENT: TRAINING IN CORE DOMAIN	CAD: TICD	R	0	0	0	8	0

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Apply advanced domain-specific concepts and emerging trends to address industry challenges and innovations.	3	PO1, PO3
CO2	Apply advanced problem-solving and strategic decision-making techniques to manage complex projects within the core domain.	3	PO1, PO3

Syllabus

Core Concepts, theories, and frameworks of the specific domain (e.g., finance, IT, healthcare, engineering), Advanced Domain-Specific Tools, innovations and their impact on the core domain, Real-world examples of how new trends are being applied within the domain

Domain specific challenges, Practical exercises to resolve complex issues in the domain, best practices for managing projects within the domain, Case Studies and Simulations.

CADENTL1V1 - CAREER ADVANCEMENT:ENTREPRENEURIAL CAREER PATHWAY TRAINING (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
CADENTL1V1	CAREER ADVANCEMENT:ENTREPRENEURIAL CAREER PATHWAY TRAINING	CAD: ECPT	R	0	0	0	8	0

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	apply essential entrepreneurial qualities such as resilience, innovation, and risk-taking, enabling them to pursue entrepreneurial career paths in various contexts, including startups, corporate roles, and freelancing.	3	PO11
CO2	Develop the skills to recognize potential business opportunities, conduct thorough market research, and validate ideas by addressing customer needs and evaluating feasibility, preparing them to create sustainable business solutions.	3	PO11

Syllabus

Defining entrepreneurship: What it means to be an entrepreneur; The distinction between entrepreneurial and traditional career paths; The entrepreneurial mindset: resilience, risk-taking, innovation, and adaptability; Exploring entrepreneurial career pathways in startups, corporate environments, freelancing, and social ventures.

Spotting opportunities: How to find unmet needs and gaps in the market; Market research: Tools and techniques for understanding trends and customer needs; Idea validation: Testing the feasibility of your business idea; Problem-solving for innovation: Leveraging customer pain points and inefficiencies.

Reference Books

1 The Lean Startup: How Today's Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses, Eric Ries, 1st (2011), Crown Business.

2 The Startup Owner's Manual: The Step-by-Step Guide for Building a Great Company, Steve Blank, Bob Dorf, 2nd (2020), K&S Ranch Press.

3 Business Model Generation: A Handbook for Visionaries, Game Changers, and Challengers, Alexander Osterwalder, Yves Pigneur, 1st (2010), Wiley.

4 The Innovator's Dilemma: When New Technologies Cause Great Firms to Fail, Clayton M. Christensen, 1st (1997), Harvard Business Review.

CADUPSL1V1 - CAREER ADVANCEMENT: UPSC-CIVIL SERVICES EXAM TRAINING (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
CADUPSL1V1	CAREER ADVANCEMENT: UPSC-CIVIL SERVICES EXAM TRAINING	CAD: UPSC	R	0	0	0	8	0

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Understanding the basics of Indian History and it\'s evolution	2	PO3
CO2	Understanding the basics of Indian Geography	2	PO3
CO3	Understanding the Evolution of Indian Constitution.	2	PO3
CO4	Understanding the evolution of Indian Economy	2	PO3

Syllabus

Ancient Indian History- IVC,Rig Vedic, Later Vedic, Buddhism, Jainism, Mahajanapadas, Mouryan Empire, Guptan Empire, Harshavardhana empire, Sangam Age.

Exploring The Physical and Social Geography of India: The Universe, Big Bang Theory, Solar system, Geological Time Scale, Earth\'s Interior, Earth\'s Magnetic Feild.

Indian Polity and Constitution: Sailent featuresof Indian constitution, Preamble, Fundamental RIghts, Directrive Principles of State Policy, Fundamental Duties , Indian Parliament.

Understanding India\'s Economy - Indian Economic Development, National Income, Public Finance, Indian Budget.

Reference Books

1 Indian Polity, M. Laxmikanth, 7, Tata Mc Graw Hill.

2 Indian Economy, Nitin Singhania, 5, Mc Graw Hill.

3 Ancient and Medieval India, Poonam Dalal Dahiya, 3, Mc Graw Hill.

4 Fundamentals of Physical Geography, Husain Majid, 5, Mc Graw Hill.

CRTCODL1V1 - CAMPUS RECRUITMENT: LOGIC BUILDING SKILLS TRAINING (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
CRTCODL1V1	CAMPUS RECRUITMENT: LOGIC BUILDING SKILLS TRAINING	CRT: LBST	R	0	0	0	8	0

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Apply logical principles and critical thinking skills to analyze and evaluate arguments, solve problems, and make informed decisions.	3	PO1, PO3
CO2	Identify various logical reasoning techniques to solve complex problems, identify patterns, and draw valid conclusions	3	PO1, PO3

Syllabus

Introduction to Logic and Critical Thinking: fundamentals of logic, including the concepts of statements, propositions, truth values, logical connectives (AND, OR, NOT, IF-THEN, IF-AND-ONLY-IF), truth tables, and logical equivalence. Students will learn to identify and analyze different types of arguments, including deductive and inductive reasoning. They will also develop critical thinking skills, such as evaluating evidence, identifying assumptions, and recognizing fallacies

Logical Reasoning and Problem-Solving: applying logical reasoning techniques to solve various types of problems. Students will learn about different problem-solving strategies, including problem decomposition, pattern recognition, working backward, and using analogies. They will practice solving logic puzzles, brain teasers, and real-world problems that require logical thinking. Additionally, students will explore the concepts of syllogisms, Venn diagrams, and conditional reasoning to enhance their problem-solving abilities

Reference Books

1 Introduction to Logic, Irving M. Copi, Carl Cohen, Victor Rodych, 2014, Routledge.

2 Critical Thinking, Richard Paul, Linda Elder, 2019, Pearson.

3 The Art of Logical Thinking; Or, The Laws of Reasoning, William Walker Atkinson, 2013, Public domain in the

4 Symbolic logic and The game of logic, Carroll, Lewis, 1958, Dover Publications.

CRTCSSL1V1 - CAMPUS RECRUITMENT: COMMUNICATION SKILLS TRAINING (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
CRTCSSL1V1	CAMPUS RECRUITMENT: COMMUNICATION SKILLS TRAINING	CRT: CST	R	0	0	0	8	0

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	apply knowledge of communication of different types and techniques while analyzing body language and tone to enhance overall communication effectiveness.	3	PO3, PO10
CO2	apply active listening and feedback techniques, and analyzing effective participation in group discussions, while exploring roles in teamwork and strategies for managing conflicts, alongside professional communication practices such as writing emails and conducting meetings.	3	PO3, PO10

Syllabus

Communication: Basics, significance, types, verbal & non-verbal communication techniques, effective speaking and presentation skills tone and pacing in verbal interactions

Interpersonal skills, listening skills, feedback techniques, group communication and dynamics, group discussion, conflict management in professional communication, E-mail writing, report writing, presentations, interview skills.

Reference Books

1. Business Communication: A Problem-Solving Approach, Louis E. Boone & David L. Kurtz, 3rd Edition, McGraw Hill Education.
2. The Complete Guide to Business School Presentations", Jennifer D. D. McDonald, 2nd Edition, Pearson.
3. Listening: The Forgotten Skill", Geoffrey M. Cohen, 1st Edition, University Press of America.
4. Business Communication: Process and Product", Mary Ellen Guffey & Dana Loewy, 8th Edition, Cengage Learning.
5. Effective Communication Skills" Author, John Adair, 2nd Edition, Pan Macmillan.

CRTCSSL2V2 - CAMPUS RECRUITMENT: SOFT SKILLS TRAINING (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
CRTCSSL2V2	CAMPUS RECRUITMENT: SOFT SKILLS TRAINING	CRT: SST	R	0	0	0	8	0

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	applyi and practice empathy, critical thinking, problem-solving, decision-making, effective communication, and interpersonal skills through real-life scenarios and interactive activities.	3	PO4
CO2	apply group discussion techniques, interview skills, and mock interviews through practical exercises, encouraging learners to practice and refine these skills in realistic settings.	3	PO4

Syllabus

Critical thinking, problem soving, decision making, communication skills, interpersonal skills

Grooming, group discussions, story narrations, interview skills, mock interviews

Reference Books

1 Personality Development and Soft Skills", Barun K. Mitra, 2nd Edition, Oxford University Press.

2 Communication Skills for Engineers", C. Muralikrishna & Sunita Mishra, 1st Edition, Pearson Education.

3 Developing Soft Skills", Robert L. Katz, 1st Edition, McGraw Hill Education.

CRTVQRL1V1 - CAMPUS RECRUITMENT: VERBAL APTITUDE TRAINING (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
CRTVQRL1V1	CAMPUS RECRUITMENT: VERBAL APTITUDE TRAINING	CRT: VAT	R	0	0	0	8	0

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	apply and practice grammatical concepts like sentence formation, identifying odd words, using one-word substitutions, while enhancing understanding of idioms, phrases, spellings, and structures.	3	PO10
CO2	apply concepts like paragraph formation, sentence completion, reading comprehension, sentence correction, and correcting jumbled sentences, while enhancing word selection and sentence structure accuracy.	3	PO10

Syllabus

Synonyms, Antonyms, odd words, parts of speech, idioms and phrases, one word substitutions, odd words, formation of sentences

sentence completion, sentence correction, jumbled sentences, paragraph formation, reading comprehension, and sentence selection

Reference Books

1 The Pearson Guide to Verbal Ability and Logical Reasoning for the CAT", Nishit K. Sinha, 2nd Edition, Pearson.

2 Objective General English", S.P. Bakshi, 3rd Edition, Arihant Publications.

3 English Grammar in Use", Raymond Murphy, 5th Edition, Cambridge University Press.

CRTVQRL2V2 - CAMPUS RECRUITMENT: QUANTITATIVE APTITUDE TRAINING (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
CRTVQRL2V2	CAMPUS RECRUITMENT: QUANTITATIVE APTITUDE TRAINING	CRT: QAT	R	0	0	0	8	0

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Apply principles of quantitative techniques to solve problems on Simple Equations, Simple & Compound Interest etc	3	PO4
CO2	Apply principles of quantitative techniques to solve problems on Divisibility, Functions, Surds & Indices etc	3	PO4

Syllabus

Simple Equations, Problem on Ages, Ratio & Proportion, Variation& Partnership, Percentages, Profit, Loss& Discounts, Simple & Compound Interest, Averages & Allegations or Mixtures

Numbers, Divisibility, Decimal Fractions, LCM & HCF, Simplification, Sequence, Series & Progressions, Linear Algebra, Quadratic Equations & Inequalities, Theory of Equations. Sets, Relations & Functions, Surds & Indices, Logarithms

Reference Books

1 Quantitative Aptitude by R.S. Agarwal, SCHAND Publications, R.S. Agarwal, 2021, SCHAND Publications.

2 A Modern Approach to Verbal Reasoning by R.S. Agarwal, SCHAND Publications, R.S. Agarwal, 2021, SCHAND Publications.

CRTVQRL3V3 - CAMPUS RECRUITMENT: REASONING APTITUDE TRAINING (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
CRTVQRL3V3	CAMPUS RECRUITMENT: REASONING APTITUDE TRAINING	CRT: RAT	R	0	0	0	8	0

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Apply principles of deductive logic to solve problems on syllogisms, Venn diagrams, etc	3	PO10
CO2	Apply principles of inductive logic to solve problems on assumptions and conclusions	3	PO10

Syllabus

Syllogism, Number& letter series, Number, letter & word Analogy, Odd man out, coding & decoding, Cubes & Dice, Logical Venn Diagrams

Statements & conclusions, statements & Arguments (Critical Reasoning), statements & Assumptions, logical connectives, Binary logic

Reference Books

1 A Modern Approach to Verbal Reasoning, R.S. Agarwal, 2022, SCHAND Publications.

2 Logical Reasoning for CAT, Arun Sharma, 2021, McGraw Hills.

Our Campuses

Green Fields, Vaddeswaram.
Guntur District, A.P., India, Pincode : 522 302.

Aziznagar, Moinabad Road,
Near TS Police Academy, Hyderabad, Telangana,
India, Pincode : 500 075

Bowrampet, ALEAP Industrial Area,
Gajularamaram, Hyderabad, Telangana,
India, Pincode : 500 043

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Kothaguda, Kondapur, Hyderabad Telangana,
India, Pincode : 500 084

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