Sri Padmavathi School of Pharmacy (Autonomous)

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(Conferred Autonomous status from the academic year 2024-25)
Accorded under Sections 2 (f) and 12 (B) of UGC act 1956 and Accredited by National Board of Accreditation (NBA) for UG and National Assessment & Accreditation Council (NAAC),Approved by PCI and AICTE, New Delhi

Academic Regulations-MR24
Program Structure
&
Syllabus

Effective from AY 2024-25 onwards

Master of Pharmacy
Pharmacology

Awarding University
Jawaharlal Nehru Technological University Anantapur
JNTUA

Introduction to the Document

The regulations published in this document are official guidelines by the Board of studies (BoS) and Academic council of Sri Padmavathi School of Pharmacy (SPSP) - Autonomous, Andhra Pradesh. The document is a fusion product based on recommendations and guidelines stipulated for syllabus structure by UGC, AICTE, PCI, New Delhi.

- Academic regulations stipulated by Jawaharlal Nehru Technological University Anantapur (JNTUA), Ananthapuramu, Andhra Pradesh.
- Experts' opinion from the Board of Studies, Academic Council constituting approved Advisory boards members includes both academicians and researchers from reputed organizations at national and international levels.
- Suggestions and inputs from members of academic council and Board of studies.
- Recommendations based on feedback from alumni, employers, faculty, students, parents and other experts from allied area.
- This academic regulations, Program structure & Syllabus document has been prepared to ensure quality system in teaching and learning process, examination, assessment, and functioning of other academic related matters to the satisfaction of stakeholders, such as students, parents, alumni, employers, faculty, etc. This document provides core principles of academic regulations duly approved by academic council and board of studies of this institution. The Implementation of these academic regulations shall lead to be considered in the institute and thereby enrich the quality of education and research in the field of pharmaceutical sciences. The guidelines shall aid the transparency and accountability in the administration set up. The list of objectives for implementing academic regulations and course structure through these guidelines are listed below,
    - To improve the academic regulations and course structure.
    - To strengthen the Industry-Institute interaction.
    - To comply with rules and regulations of regulatory bodies like U G C , JNTUA, PCI, AICTE etc.,
    - To meet the requirements of accreditation council and board.
    - To enhance the quality of teaching-learning process and assessments.
    - To provide career support programs, training for enhancing quality in placements and higher education.
    - To place improved systems for feedback, self-appraisal of faculty and staff.
    - To create bench marking with other institutes of repute.

Preamble

The regulations stated herein below shall be called as a document of "Academic regulations, Program structure & Syllabus for M. Pharm – Pharmaceutical Analysis " Sri Padmavathi School of Pharmacy (SPSP) - Autonomous, Andhra Pradesh.

These regulations shall be in force from the batch admitted from 2024 -2025 by the date of ratification by the Academic council and Board of studies (BoS) of the institute.

In the event of any doubt about the interpretation of these regulations, the matter shall be referred to Board of studies (BoS) and Academic council and their decision shall be final.

The Board of studies (BoS) and Academic council shall have the authority to modify, amend and repeal any of the provisions of these regulations from time to time.

Definitions

i. "College" means "Sri Padmavathi School of Pharmacy (SPSP) - Autonomous, Andhra Pradesh".

ii. "Student" means a candidate who has taken admission into B. Pharm course of this college as per the guidelines stipulated from time to time by the regulations of State Government of Andhra Pradesh and the Government of India for admissions into various courses of study and the affiliating university, i.e., Jawaharlal Nehru Technological University, Anantapur (JNTUA), Ananthapuramu, Andhra Pradesh.

iii. "Academic Council" means the Academic council constituted as per the guidelines of UGC.

iv. "Board of Studies" means Board of Studies constituted in each department as per the guidelines of UGC.

v. "Principal" means the Head of the institution

vi. "Head of the Department" means the Head of an Academic Department of the College.

vii. "Faculty member" means the teacher (Assistant/Associate/Professor) working on regular or ad-hoc basis in any of the Academic Departments of the College.

viii. "Program" means a candidate who has chosen to avail degree of B. Pharm of this college as per the marks/ rank awarded by the National/ University/ State common entrance tests, India.

ix. "Course" individual subjects described with content for instructions to the students.

x. "Assessment" means evaluation process for the outcome and grading in term of the marks.

xi. "Credit" means a weight to the time requirements of the academic course in the institute.

VISION OF THE INSTITUTE

To promote holistic learning, nurture ethically strong and highly competent Pharmacy graduates to serve the global healthcare system.

MISSION OF THE INSTITUTE

- ✓ **M1**. To provide innovative and contemporary educational experiences of the highest quality.
- ✓ **M2**. To instil ethics, sense of professionalism, communication and leadership skills.
- ✓ **M3**. To promote and nurture the research and scholarly activities.
- ✓ **M4**. To foster entrepreneurship and life-long learning.

Program Outcomes (POs)

1. PO1: Knowledge in Domain
   Possess adequate knowledge and comprehension of basic and core areas of human anatomy and physiology and pharmacology.
2. PO2: Planning Abilities:
   Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.
3. PO3: Problem Analysis
   Develop ability for in-depth analytical and critical thinking in order to identify and solve the issues related to pharmacokinetics and pharmacodynamics in drug discovery process.
4. PO4: Modern Tool Usage

Learn, select and apply appropriate methods & procedures, resources and computing tools with an understanding of the limitations in pharmacological experiments, drug discovery and screening.

5. PO5: Leadership Skills
   Demonstrate the ability to function effectively as an individual and as a member or leader in diverse teams in various areas like drug testing in animals, drug screening etc.
6. PO6: Professional Identity
   Understand, analyze and communicate the value of their professional roles (e.g. clinical and non-clinical laboratory as required by regulatory bodies etc.)
7. PO7: Ethics
   Apply ethical principles and professional ethics and norms in drug discovery and screening process.
8. PO8: Communication
   Able to develop written and oral communication skills that contribute effectively within the pharmaceutical industry and in the community.
9. PO9: Pharmacist and Society
   Develop an understanding for the need of delivery of pharmaceutical care and assure in regard to drug usage and their adverse effects to people in society.
10. PO10: Environment and Sustainability
    Understand the impact of the use of animal models and animal studies in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
11. PO11: Life-long Learning
    Recognize the need for, and have the preparation and ability to engage in independent and lifelong learning in the broadest context of technological change.

Academic Regulations of M.Pharmacy (Full Time) Pharmacology Program – MR-24

(Effective for the students admitted into I year from the Academic Year 2024-25 and onwards)

Sri Padmavathi School of Pharmacy (SPSP)-Autonomous, offers **Two** Years (**Four** Semesters) full-time Master of Pharmacy (M.Pharm.) Post Graduate Degree program, under Choice Based Credit System (CBCS) with three different specializations.

The Jawaharlal Nehru Technological University Anantapur shall confer M.Pharm. degree on candidates who are admitted to the program and fulfill all the requirements for the award of the degree.

1. Award of the M.Pharm. Degree

A student will be declared eligible for the award of the M.Pharm. degree if he/she fulfils the following:

1.1 Pursues a course of study for not less than two academic years and not more than four academic years.

1.2 Registers for 95 credits and secures all 95 credits.

2. Students, who fail to fulfil all the academic requirements for the award of the degree within four academic years from the year of their admission, shall forfeit their seat in M.Pharm. course and their admission stands cancelled.

3. **Program of Study:**

The following M.Pharm. specializations are offered by the college:

S.No.	Discipline	Name of the Specialization	Code
1	Master of Pharmacy	Pharmacology	MPL
2		Pharmaceutics	MPH
3		Pharmaceutical Analysis	MPA

4. **Eligibility for Admissions**:

4.1 Admission to the M.Pharm. program shall be made subject to the eligibility, qualifications and specialization prescribed by the A.P. State Government/University for each program, from time to time.

4.2 Admissions shall be made on the basis of either the merit rank or Percentile obtained by the qualified student in the relevant qualifying GPAT Examination / the merit rank obtained by the qualified student in an entrance test conducted by A.P. State Government (APPGECET) for M.Pharm. programs/an entrance test conducted by university/ on the basis of any other exams approved by the University, subject to reservations as laid down by the Govt. from time to time.

5. **Program related terms:**

5.1 ***Credit:*** A unit by which the course work is measured. It determines the number of hours of instructions required per week. One credit is equivalent to one hour of teaching (Lecture/Tutorial) or two hours of practical work/field work per week.

Credit definition:

1 Hr. Lecture (L) per week	1 credit
1 Hr. Tutorial (T) per week	1 credit
1 Hr. Practical (P) per week	0.5 credit

5.2 ***Academic Year:*** Two consecutive (one odd + one even) semesters constitute one academic year.

5.3 ***Choice Based Credit System (CBCS):*** The CBCS provides choice for students to select from the prescribed courses.

6. **Program Pattern:**

6.1 Total duration of the of M.Pharm. program is two academic years

6.2 Each academic year of study is divided into two semesters.

6.3 Each Semester shall be of 22 weeks duration (inclusive of Examinations), with a minimum of 90 instructional days per semester.

6.4 The student shall not take more than four academic years to fulfill all the academic requirements for the award of M.Pharm. degree from the date of commencement of first year first semester, failing which the student shall forfeit the seat in M.Pharm. program.

6.5 The medium of instruction of the program (including examinations and project reports) will be in English only.

6.6 All subjects/courses offered for the M.Pharm. program are broadly classified as follows:

S.No.	Broad Course Classification	Course Category	Description
1.	Core Courses	Foundational & Professional Core Courses (PC)	Includes subjects related to the parent discipline
2.	Elective Courses	Electives	Includes elective subjects related to the parent discipline/inter-disciplinary subjects or subjects in an area outside the parent discipline which are of importance in the context of special skill development
3.	Research	Research methodology & IPR	To understand importance and process of creation of patents through research
		Seminar	Ensures preparedness of students to undertake major projects/Dissertation, based on core contents related to specialization
		Cocurricular Activities/Journal Club	Attending conferences, scientific presentations and other scholarly activities
		Dissertation	Major Project
4.	Audit Courses	Mandatory noncredit courses	Covering subjects of developing desired attitude among the learners is on the line of initiatives such as Unnat Bharat Abhiyan, Yoga, Value education etc.

6.7 The college shall take measures to implement Virtual Labs (https://www.vlab.co.in) which provide remote access to labs in various disciplines of science and will help student in learning basic and advanced concept through remote experimentation. Student shall be made to work on virtual lab experiments during the regular labs.

6.8 A faculty advisor/mentor shall be assigned to each specialization to advise students on the program, its Course Structure and Curriculum, Choice of Courses, based on his competence, progress, pre-requisites and interest.

6.9 Preferably 25% course work for the theory courses in every semester shall be conducted in the blended mode of learning.

7. Attendance Requirements:

7.1 A student shall be eligible to appear for the external examinations if he/she acquires i) a minimum of 50% attendance in each course and ii) 75% of attendance in aggregate of all the courses.

7.2 Condonation of shortage of attendance in aggregate up to 10% (65% and above and below 75%) in each semester may be granted by the College Academic Committee.

7.3 Condonation of shortage of attendance shall be granted only on genuine and valid reasons on representation by the candidate with supporting evidence

7.4 Students whose shortage of attendance is not condoned in any semester are not eligible to take their end examination of that class.

7.5 A stipulated fee shall be payable towards condonation of shortage of attendance.

7.6 A student will not be promoted to the next semester unless he satisfies the attendance requirements of the present semester. They may seek re-admission into that semester when offered next.

7.7 If any candidate fulfils the attendance requirement in the present semester, he shall not be eligible for readmission into the same class.

7.8 If the learning is carried out in blended mode (both offline & online), then the total attendance of the student shall be calculated considering the offline and online attendance of the student.

8. Evaluation – Distribution and Weightage of Marks:

The performance of a student in each semester shall be evaluated subject - wise (irrespective of credits assigned), for a maximum of 100 marks for theory and 100 marks for practical, based on Internal Evaluation and End Semester Examination.

8.1 There shall be five units in each of the theory subjects. For the theory subjects 60 marks will be for the End Examination and 40 marks will be for Internal Evaluation.

8.2 Two Internal Examinations shall be conducted for 30 marks each, one in the middle of the Semester and the other immediately after the completion of instruction. First mid examination shall be conducted for I & II units of the syllabus and second mid examination for III, IV & V units. Each mid exam shall be conducted for a total duration of 120 minutes with 3 questions (without choice) each question for 10 marks. Final Internal marks for a total of 30

marks shall be arrived at by considering the marks secured by the student in both the internal examinations with 80% weightage to the better internal exam and 20% to the other. There shall be an online examination (TWO) conducted during the respective mid examinations by the college for the remaining 10 marks with 20 objective questions.

8.3 The following pattern shall be followed in the End Examination:

i. Five questions shall be set from each of the five units with either/or type for 12 marks each.

ii. All the questions have to be answered compulsorily. iii. Each question may consist of one, two or more bits.

8.4 For practical subjects, 60 marks shall be for the End Semester Examinations and 40 marks will be for internal evaluation based on the day-to-day performance.

The internal evaluation based on the day-to-day work-10 marks, record- 10 marks and the remaining 20 marks to be awarded by conducting an internal laboratory test. The end examination shall be conducted by the examiners, with a breakup mark of Procedure-10, Experimentation-25, Results-10, Viva- voce-15.

8.5 There shall be a **Seminar/Assignment** for internal evaluation of 100 marks. A student under the supervision of a faculty member, shall collect the literature on a topic and critically review the literature and submit it to the department in a report form and shall make an oral presentation before the Project Review Committee consisting of Head of the Department, supervisor/mentor and two other faculty members of the department. The student has to secure a minimum of 50% of marks, to be declared successful. If he fails to obtain the minimum marks, he has to reappear for the same as and when supplementary examinations are conducted. The seminar shall be conducted anytime during the semester as per the convenience of the Project Review Committee and students. There shall be no external examination for Technical Seminar.

8.6 For Teaching Practice/Assignments there will be an internal evaluation of 100 marks. A candidate has to secure a minimum of 50% to be declared successful. Student has to teach 10 Hours in his/her interesting subject/subjects in the entire III Semester instruction period for his juniors at PG level or Undergraduate students who are available on the campus. For each teaching hour maximum of 10 marks are allotted. The assessment will be made by the faculty allotted by the HoD.

8.7 There shall be Mandatory Audit courses for zero credits. There is no external examination for audit courses. However, attendance shall be considered while calculating aggregate attendance and student shall be declared to have passed the mandatory course only when he/she secures 50% or more in the internal examinations. In case, the student fails, a re-examination shall be conducted for failed candidates for 40 marks every six months/semester satisfying the conditions mentioned in item 1 & 2 of the regulations.

8.8 There shall be Comprehensive Viva–Voce in III semester. This will test the student's learning and understanding during the course of their specialization. The Comprehensive viva-voce will be conducted by the committee consisting of Head of the Department and two faculty members related to the specialization. The Comprehensive Viva-Voce shall be evaluated for 100 marks by the committee. There are no internal marks for the Comprehensive Viva-Voce. A student shall acquire 2 credits assigned to the Comprehensive Viva–voce when he/she secures 50% or more marks for the total of 100 marks. In case, if a student fails in Comprehensive Viva–voce he/she shall reappear as and when III semester supplementary examinations are conducted.

8.9 A candidate shall be deemed to have secured the minimum academic requirement in a subject if he secures a minimum of 40% of marks in the End Examination and a minimum

aggregate of 50% of the total marks in the End Semester Examination and Internal Evaluation taken together.

8.10 In case the candidate does not secure the minimum academic requirement in any of the subjects he/she has to reappear for the Semester Examination either supplementary or regular in that subject or repeat the course when next offered or do any other specified subject as may be required.

8.11 The laboratory records and mid semester test papers shall be preserved for a minimum of 3 years in the respective institutions as per the University norms and shall be produced to the Committees of the University as and when the same are asked for.

9. **Credit Transfer Policy**

As per University Grants Commission (Credit Framework for Online Learning Courses through SWAYAM) Regulation, 2016, the college shall allow up to a maximum of 40% of the total courses being offered in a particular Program in a semester through the Online Learning courses through SWAYAM.

9.1 The college shall offer credit mobility for MOOCs and give the equivalent credit weightage to the students for the credits earned through online learning courses through SWAYAM platform.

9.2 The online learning courses available on the SWAYAM platform will be considered for credit transfer. SWAYAM course credits are as specified in the platform

9.3 Student registration for the MOOCs shall be only through the institution, it is mandatory for the student to share necessary information with the institution

9.4 The institution shall select the courses to be permitted for credit transfer through SWAYAM. However, while selecting courses in the online platform institution would essentially avoid the courses offered through the curriculum in the offline mode.

9.5 The institution shall notify at the beginning of semester the list of the online learning courses eligible for credit transfer in the forthcoming Semester.

9.6 The institution shall also ensure that the student has to complete the course and produce the course completion certificate as per the academic schedule given for the regular courses in that semester

9.7 The institution shall designate a faculty member as a Mentor for each course to guide the students from registration till completion of the credit course.

9.8 The college shall ensure no overlap of SWAYAM MOOC exams with that of the examination schedule. In case of delay in SWAYAM results, the college will re-issue the marks sheet for such students.

9.9 Student pursuing courses under MOOCs shall acquire the required credits only after successful completion of the course and submitting a certificate issued by the competent authority along with the percentage of marks and grades.

9.10 The institution shall submit the following to the examination section of the college:

a) List of students who have passed MOOC courses in the current semester along with the certificates of completion.

b) Undertaking form filled by the students for credit transfer.

9.11 The college shall resolve any issues that may arise in the implementation of this policy from time to time and shall review its credit transfer policy in the light of periodic changes brought by UGC, SWAYAM, NPTEL and state govt. **Note:** Students shall also be permitted to register for MOOCs offered through online platforms other than SWAYAM NPTEL. In such cases, credit transfer shall be permitted only after seeking approval of the college at least three months prior to the commencement of the semester.

10. **Re-registration for Improvement of Internal Evaluation Marks**:

A candidate shall be given one chance to re-register for each subject provided the internal marks secured by a candidate are less than 50% and has failed in the end examination

10.1 The candidate should have completed the course work and obtained examinations results for **I, II and III** semesters.

10.2 The candidate should have passed all the subjects for which the Internal Evaluation marks secured are more than 50%.

10.3 Out of the subjects the candidate has failed in the examination due to Internal Evaluation marks secured being less than 50%, the candidate shall be given one chance for each Theory subject and for a maximum of **three** Theory subjects for Improvement of Internal evaluation marks.

10.4 The candidate has to re-register for the chosen subjects and fulfill the academic requirements.

10.5 For reregistration the candidates have to apply to the college by paying the requisite fees and get approval from the college before the start of the semester in which re-registration is required

10.6 In the event of availing the Improvement of Internal evaluation marks, the internal evaluation marks as well as the End Examinations marks secured in the previous attempt(s) for the reregistered subjects stand cancelled.

11. Evaluation of Project/Research Work:

The Project work shall be initiated at the beginning of the III Semester and the duration of the Project is of two semesters. Evaluation of Project work is for 300 marks with 200 marks for internal evaluation and 100 marks for external evaluation. Internal evaluation of the Project Work – I & Project work – II in III & IV semesters respectively shall be for 100 marks each. External evaluation of final Project work viva voce in IV semester shall be for 100 marks.

A Project Review Committee (PRC) shall be constituted with the Head of the Department as Chairperson, Project Supervisor and one faculty member of the department offering the M.Pharm. program.

11.1 A candidate is permitted to register for the Project Work in III Semester after satisfying the attendance requirement in all the subjects, both theory and laboratory (in I & II semesters).

11.2 A candidate is permitted to submit Project dissertation with the approval of PRC. The candidate has to pass all the theory, practical and other courses before submission of the Thesis.

11.4 Project work shall be carried out under the supervision of teacher in the parent department concerned.

11.5 A candidate shall be permitted to work on the project in an industry/research organization on the recommendation of the Head of the Department. In such cases,one of the teachers from the department concerned would be the internal guide and an expert from the industry/ research organization concerned shall act as co-supervisor/ external guide. It is mandatory for the candidate to make full disclosure of all data/results on which they wish to base their dissertation. They cannot claim confidentiality simply because it would come into conflict with the Industry's or R&D laboratory's own interests. A certificate from the external supervisor is to be included in the dissertation.

11.6 Continuous assessment of Project Work - I and Project Work – II in III & IV semesters respectively will be monitored by the PRC.

11.7 The candidate shall submit status report by giving seminars in three different phases (two in III semester and one in IV semester) during the project work period. These seminar reports must be approved by the PRC before submission of the Project Thesis.

11.8 After registration, a candidate must present in Project Work Review - I, in consultation with his Project Supervisor, the title, objective and plan of action of his Project work to the PRC for approval within four weeks from the commencement of III Semester. Only after obtaining the approval of the PRC can the student initiate the project work.

11.9 The Project Work Review - II in III semester carries internal marks of 100.

Evaluation should be done by the PRC for 50 marks and the Supervisor will evaluate the work for the other 50 marks. The Supervisor and PRC will examine the Problem Definition, Objectives, Scope of Work, Literature Survey in the same domain and progress of the Project Work.

11.10 A candidate has to secure a minimum of 50% of marks to be declared successful in Project Work Review - II. Only after successful completion of Project Work Review – II, candidate shall be permitted for Project Work Review – III in IV Semester. The unsuccessful students in Project Work Review - II shall reappear for it as and when supplementary examinations are conducted.

11.11 The Project Work Review - III in IV semester carries 100 internal marks.

Evaluation should be done by the PRC for 50 marks and the Supervisor will evaluate it for the other 50 marks. The PRC will examine the overall progress of the Project Work and decide whether or not eligible for final submission. A candidate has to secure a minimum of 50% of marks to be declared successful in Project Work Review - III. If he fails to obtain the required minimum marks, he has to reappear for Project Work Review - III after a month.

11.12 . For the approval of PRC the candidate shall submit the draft copy of dissertation to the Head of the Department and make an oral presentation before the PRC.

11.13. After approval from the PRC, the students are required to submit a report showing that the plagiarism is within 30%. The dissertation report will be accepted only when the plagiarism is within 30%, which shall be submitted along with the dissertation report.

11.14. Research paper related to the Project Work shall be published in conference proceedings/UGC recognized journal. A copy of the published research paper shall be attached to the dissertation.

11.15 . After successful plagiarism check and publication of research paper, three copies of the dissertation certified by the supervisor and HOD shall be submitted to the College.

11.16 . The dissertation shall be adjudicated by an external examiner selected by the college. For this, the Principal of the College shall submit a panel of three examiners as submitted by the supervisor concerned and department head for each student. However, the dissertation will be adjudicated by one examiner nominated by the college.

11.17 . If the report of the examiner is not satisfactory, the candidate shall revise and resubmit the dissertation, in the time frame as decided by the PRC. If report of the examiner is unfavorable again, the thesis shall be summarily rejected. The candidate has to reregister for the project and complete the project within the stipulated time after taking the approval from the college.

11.18. If the report of the examiner is satisfactory, the Head of the Department shall coordinate and make arrangements for the conduct of Project Viva voce exam.

11.19. The Project Viva voce examinations shall be conducted by a board consisting of the Supervisor, Head of the Department and the external examiner who has adjudicated the dissertation. For Dissertation Evaluation (Viva voce) in IV Sem. there are external marks of 100 and it is evaluated by external examiner. The candidate has to secure a minimum of 50% marks in Viva voce exam.

11.20. If he fails to fulfill the requirements as specified, he will reappear for the Project Viva voce examination only after three months. In the reappeared examination also, if he fails to fulfill the requirements, he will not be eligible for the award of the degree.

12. Credits for Co-curricular Activities

The credits assigned for co-curricular activities shall be given by the principals of the colleges and the same shall be submitted to the examination branch.

A Student shall earn 02 credits under the head of co-curricular activities, viz., attending Conference, Scientific Presentations and Other Scholarly Activities.

Following are the guidelines for awarding Credits for Co-curricular Activities

Name of the Activity	Maximum Credits / Activity
Participation in National Level Seminar/ Conference / Workshop /Training programs (related to the specialization of the student)	1
Participation in International Level Seminar / Conference / workshop/Training programs held outside India (related to the specialization of the student)	2
Academic Award/Research Award from State Level/National Agencies	1
Academic Award/Research Award from International Agencies	2
Research / Review Publication in National Journals (Indexed in Scopus / Web of Science)	1
Research / Review Publication in International Journals with Editorial board outside India (Indexed in Scopus / Web of Science)	2

Note:

i) Credit shall be awarded only for the first author. Certificate of attendance and participation in a Conference/Seminar is to be submitted for awarding credit.

ii) Certificate of attendance and participation in workshops and training programs (Internal or External) is to be submitted for awarding credit. The total duration should be at least one week.

13. Grading:

As a measure of the student's performance, a 10-point Absolute Grading System using the following Letter Grades and corresponding percentage of marks shall be followed:

After each course is evaluated for 100 marks, the marks obtained in each course will be converted to a corresponding letter grade as given below, depending on the range in which the marks obtained by the student fall.

Structure of Grading of Academic Performance

Range in which the marks in the subject fall	Grade	Grade points Assigned
≥ 90	S (Superior)	10
≥ 80 < 90	A (Excellent)	9
≥ 70 < 80	B (Very Good)	8
≥ 60 < 70	C (Good)	7
≥ 50 < 60	D (Pass)	6
< 50	F (Fail)	0
Absent	Ab (Absent)	0

i) A student obtaining Grade 'F' or Grade 'Ab' in a subject shall be considered failed and will be required to reappear for that subject when it is offered the next supplementary examination.

ii) For noncredit audit courses, "Satisfactory" or "Unsatisfactory" shall be indicated instead of the letter grade and this will not be counted for the computation of SGPA/CGPA/Percentage.

Computation of Semester Grade Point Average (SGPA) and Cumulative Grade Point Average (CGPA):

The Semester Grade Point Average (SGPA) is the ratio of sum of the product of the number of credits with the grade points scored by a student in all the courses taken by a student and the sum of the number of credits of all the courses undergone by a student, i.e.,

$SGPA = \Sigma (C_i \times G_i)/\Sigma C_i$

where, C_i is the number of credits of the i^{th} subject and G_i is the grade point scored by the student in the i^{th} course.

i) The Cumulative Grade Point Average (CGPA) will be computed in the same manner considering all the courses undergone by a student over all the semesters of a program, i.e.,

$CGPA = \Sigma (C_i \times S_i)/ \Sigma C_i$

where "S_i" is the SGPA of the i^{th} semester and C_i is the total number of credits up to that semester.

ii) Both SGPA and CGPA shall be rounded off to 2 decimal points and reported in the transcripts.

iii) While computing the SGPA the subjects in which the student is awarded Zero grade points will also be included.

Grade Point: It is a numerical weight allotted to each letter grade on a 10-point scale. Letter Grade: It is an index of the performance of students in a said course. Grades are denoted by letters S, A, B, C, D and F.

14. Award of Class:

After a student has satisfied the requirements prescribed for the completion of the program and is eligible for the award of M. Pharm. Degree, he shall be placed in one of the following three classes:

Class Awarded	**Percentage of Marks to be secured**
First Class with Distinction	≥70%
First Class	< 70% ≥ 60%
Pass Class	< 60% ≥ 50%

15. **Exit Policy:** The student shall be permitted to exit with a PG Diploma based on his/her request to the college through the respective institution at the end of first year subject to passing all the courses in first year.

The college BoS/Academicv Council shall resolve any issues that may arise in the implementation of this policy from time to time and shall review the policy in the light of periodic changes brought by UGC, PCI, AICTE and State government.

16. Withholding of Results:

If the candidate has any case of in-discipline pending against him, the result of the candidate shall be withheld, and he will not be allowed/promoted into the next higher semester. The issue of degree is liable to be withheld in such cases.

17. **Transitory Regulations**

Discontinued, detained, or failed candidates are eligible for readmission as and when the semester is offered after fulfilment of academic regulations. Candidates who have been detained for want of attendance or not fulfilled academic requirements or who have failed after having undergone the course in earlier regulations or have discontinued and wish to continue the course are eligible for admission into the unfinished semester from the date of commencement of class work with the same or equivalent subjects as and when subjects are offered, subject to Section 2 and they will follow the academic regulations into which they are readmitted.

18. General:

18.1 The academic regulations should be read as a whole for purpose of any interpretation.

18.2 Disciplinary action for Malpractice/improper conduct in examinations is appended.

18.3 There shall be no places transfer within the constituent colleges and affiliated colleges of Jawaharlal Nehru Technological University, Anantapur.

18.4 Where the words “he”, “him”, “his”, occur in the regulations, they include “she”, “her”, “hers”.

18.5 In the case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Head of the institute is final.

18.6 The college may change or amend the academic regulations or syllabi at any time and the changes or amendments shall be made applicable to all the students on rolls with effect from the dates notified by the University.

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RULES FOR

DISCIPLINARY ACTION FOR MALPRACTICES / IMPROPER CONDUCT IN EXAMINATIONS

	Nature of Malpractices/Improper conduct	**Punishment**
	If the candidate:	
1.(a)	Possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, Cell phones, pager, palm computers or any other form of material concerned with or related to the subject of the examination (theory or practical) in which he is appearing but has not made use of (material shall include any marks on the body of the candidate which can be used as an aid in the subject of the examination)	Expulsion from the examination hall and cancellation of the performance in that subject only.
(b)	Gives assistance or guidance or receives it from any other candidate orally or by any other body language methods or communicates through cell phones with any candidate or persons in or outside the exam hall in respect of any matter.	Expulsion from the examination hall and cancellation of the 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.
2.	Has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the subject of the examination (theory or practical) in which the candidate is appearing.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the subjects of that semester/year. The Hall Ticket of the candidate is to be cancelled.
3.	Impersonates any other candidate in connection with the examination.	The candidate who has impersonated shall be expelled from examination hall. The candidate is also debarred for four consecutive semesters from class work and all examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. The performance of the original candidate who has been impersonated, shall be cancelled in all the subjects of the examination (including practicals and project work) already appeared and shall not be allowed to appear for examinations of the remaining subjects of that semester/year. The candidate is also debarred for four consecutive semesters from class work and all examinations if his involvement is established. Otherwise, the candidate is debarred for two consecutive semesters from class work and all examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. If the imposter is an outsider, he will be handed over to the police and a case is registered against him.

4.	Smuggles in the Answer book or additional sheet or takes out or arranges to send out the question paper during the examination or answer book or additional sheet, during or after the examination.	Expulsion from the examination hall and cancellation of 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 examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
5.	Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks.	Cancellation of the performance in that subject only.
6.	Refuses to obey the orders of the Chief Superintendent /Assistant - Superintendent /any officer on duty or misbehaves or creates disturbance of any kind in and around the examination hall or organizes a walk out or instigates others to walk out, or threatens the officer-in charge or any person on duty in or outside the examination hall of any injury to his person or to any of his relations whether by words, either spoken or written or by signs or by visible representation, assaults the officer-in-charge, or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction of property in the examination hall or any part of the College campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.	In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that subject and all other subjects the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the subjects of that semester/year. If the candidate physically assaults the invigilator/ officer-in-charge of the Examinations, then the candidate is also debarred and forfeits his/her seat. In case of outsiders, they will be handed over to the police and a police case is registered against them.
7.	Leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the examination hall.	Expulsion from the examination hall and cancellation of 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 examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
8.	Possess any lethal weapon or firearm in the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat.
9.	If student of the college, who is not a candidate for the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in clause 6 to 8.	Student of the colleges expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining

		examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat. Person (s) who do not belong to the College will be handed over to police and, a police case will be registered against them.
10.	Comes in a drunken condition to the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year.
11.	Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny.	Cancellation of the performance in that subject only or in that subject and all other subjects the candidate has appeared including practical examinations and project work of that semester / year examinations, depending
12.	If any malpractice is detected which is not covered in the above clauses 1 to 11 shall be reported to the exam branch for further action to award suitable punishment.	

1. Malpractices identified by squad or special invigilators
2. Punishments to the candidates as per the above guidelines.
3. Punishment for institutions: (if the squad reports that the college is also involved in encouraging malpractices)
4. A show cause notice shall be issued to the college.
5. Impose a suitable fine on the college.
6. Shifting the examination center from the college to another college for a specific period of not less than one year.

Note:

Whenever the performance of a student is cancelled in any subject/subjects due to Malpractice, he has to register for End Examinations in that subject/subjects consequently and has to fulfil all the norms required for the award of Degree.

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M.PHARM. PHARMACOLOGY (MPL)

COURSE STRUCTURE & SYLLABI

SEMESTER – I

S. No.	Course codes	Course Name	Hours per week			Credits
			L	T	P	
1.	24MPL101T	Modern Pharmaceutical Analytical Techniques	4	-	-	4
2.	24MPL102T	Advanced Pharmacology-I	4	-	-	4
3.	24MPL103T	Clinical Pharmacology and Pharmacotherapeutics	4	-	-	4
4.	24MPL104T	Cellular and Molecular Pharmacology	4	-	-	4
5.	24MPL105P	Modern Pharmaceutical Analytical Techniques Lab	-	-	6	3
6.	24MPL106P	Advanced Pharmacology Lab	-	-	6	3
7.	24MAC101a 24MAC101b 24MAC101c	**Audit Course – I (Any one)** English for Research paper writing Disaster Management Sanskrit for Technical Knowledge	2	-	-	0
8.	24MPL107P	Seminar/Assignment/Mini Project-I	-	1	6	4
		Total	18	1	18	26

SEMESTER – II

S. No.	Course codes	Course Name	Hours per week			Credits
			L	T	P	
1.	24MPL201T	Advanced Pharmacology II	4	-	-	4
2.	24MPL202T	Pharmacological Screening Methods and Toxicology	4	-	-	4
3.	24MPL203T	Principles of Drug Discovery	4	-	-	4
4.	24MPL204T	Clinical research and Pharmacovigilance	4	-	-	4
5.	24MPL205P	Advanced Pharmacology II Lab	-	-	6	3
6.	24MPL206P	Pharmacological Screening Methods and Toxicology Lab	-	-	6	3
7.	24MAC201a 24MAC201b 24MAC201c	**Audit Course – II (Any One)** Pedagogy Studies Stress Management for Yoga Personality Development through Life Enlightenment Skills	2	-	-	0
8.	24MPL207P	Seminar/Assignment/Mini Project-II	-	1	6	4
		Total	18	1	18	26

SEMESTER – III

S. No.	Course codes	Course Name	Hours per week			Credits
			L	T	P	
1.	24MPL301T	Research Methodology and Intellectual Property Rights	4	-	-	4
2.	24MEC301a 24MEC301b 24MEC301c	**Open Electives (Any one)** Pharmaceutical Validation Biostatistics Entrepreneurship Management	3	-	-	3
3.	24MPL302P	Teaching Practice/Assignment	-	-	4	2
4.	24MPL303P	Comprehensive viva voce	-	-	-	2
5.	24MPL304P	Research Work - I	-		24	12
		Total	7	-	32	23

SEMESTER – IV

S. No.	Course codes	Course Name	Hours per week			Credits
			L	T	P	
1.	24MPL401P	Co-Curricular Activities	2			2
2.	24MPL402P	Research Work – II	3		30	8
3.	24MPL4PVV	Project Work Viva Voce	-	-	-	10
		Total	5		30	20

Schemes for internal assessments and end semester examinations semester wise

Course Code	Course	Internal Assessment				End Semester Examinations		Total marks
		Continuous mode/Online Examination	Sessional Examinations		Total	Marks	Duration	
		Marks	Marks	Duration				
Semester-I								
24MPL101T	Modern Pharmaceutical Analytical Techniques	10	30	2 Hrs	40	60	3 Hrs	100
24MPL102T	Advanced Pharmacology-I	10	30	2 Hrs	40	60	3 Hrs	100
24MPL103T	Clinical Pharmacology and Pharmacotherapeutics	10	30	2 Hrs	40	60	3 Hrs	100
24MPL104T	Cellular and Molecular Pharmacology	10	30	2 Hrs	40	60	3 Hrs	100
24MPL105P	Modern Pharmaceutical Analytical Techniques Lab	20	20	3 Hrs	40	60	3 Hrs	100
24MPL106P	Advanced Pharmacology -I Lab	20	20	3 Hrs	40	60	3 Hrs	100
24MAC101a	English for Research paper writing	-	40	2 Hrs	40	-	-	40
24MAC101b	Disaster Management							
24MAC101c	Sanskrit for Technical Knowledge							
24MPA107P	Seminar/Assignment /Mini Project-I	-	-	-	-	-	-	100
Total Marks		**80**	**200**	-	**280**	**360**	-	**740**

Course Code	Course	Internal Assessment				End Semester Examinations		Total marks
		Continuous mode/Online Examination	Sessional Examinations		Total	Marks	Duration	
		Marks	Marks	Duration				
Semester-II								
24MPL201T	Advanced Pharmacology II	10	30	2 Hrs	40	60	3 Hrs	100
24MPL202T	Pharmacological Screening Methods and Toxicology	10	30	2 Hrs	40	60	3 Hrs	100
24MPL203T	Principles of Drug Discovery	10	30	2 Hrs	40	60	3 Hrs	100
24MPL204T	Clinical research and Pharmacovigilance	10	30	2 Hrs	40	60	3 Hrs	100
24MPL205P	Advanced Pharmacology -II Lab	20	20	3 Hrs	40	60	3 Hrs	100
24MPL206P	Pharmacological Screening Methods and Toxicology Lab	20	20	3 Hrs	40	60	3 Hrs	100
24MAC201a	Pedagogy Studies	-	40	2 Hrs	40	-	-	40
24MAC201b	Stress Management for Yoga							
24MAC201c	Personality Development through Life Enlightenment Skills							
24MPL207P	Seminar/Assignment/ Mini Project-I	-	-	-	-	-	-	100
Total Marks		**80**	**200**	**-**	**280**	**360**	**-**	**740**

Course Code	Course	Internal Assessment				End Semester Examinations		Total marks
		Continuous mode/Online Examination	Sessional Examinations		Total	Marks	Duration	
		Marks	Marks	Duration				
Semester-III								
24MPL301T	Research Methodology and Intellectual Property Rights	10	30	2 Hrs	40	60	3 Hrs	100
24MEC301a	Pharmaceutical Validation	10	30	2 Hrs	40	60	3 Hrs	100
24MEC301b	Biostatistics							
24MEC301c	Entrepreneurship Management							
24MPL302P	Teaching Practice/Assignment	-	-	-	-	-	-	100
24MPL303P	Comprehensive viva voce	-	-	-	-	-	-	100
24MPL304P	Research Work - I	-	-	-	-	-	-	100
Total Marks		**20**	**60**	**-**	**80**	**120**	**-**	**500**

Course Code	Course	Internal Assessment				End Semester Examinations		Total marks
		Continuous mode/Online Examination	Sessional Examinations		Total	Marks	Duration	
		Marks	Marks	Duration				
Semester-IV								
24MPL401P	Co-Curricular Activities	-	-	-	-	-	-	100
24MPL402P	Research Work – II	-	-	-	-	-	-	100
24MPL4PVV	Project Work Viva Voce	-	-	-	-	-	-	100
Total Marks		**0**	**0**	**-**	**0**	**0**	**-**	**300**

SEMESTER-I

Course Code	MODERN PHARMACEUTICAL ANALYTICAL TECHNIQUES	L	T	P	C	MARKS
24MPL101T		4	0	0	4	100

Course Category	Core Course

Course Objective

The course is designed to impart the knowledge in the field of Pharmaceutical Analysis. The various modern analytical techniques like UV-Visible, IR, NMR, Mass, GC, HPLC, different chromatographic methods and other important topics are taught to enable the students to understand and apply the principles involved in the determination of different bulk drugs and their formulation. In addition to the theoretical aspects, the basic practical knowledge relevant to the analysis is also imparted.

Course Outcomes

CO1	To understand the basic principles of various spectroscopic techniques, instrumentation and applications in pharmaceutical analysis.
CO2	To understand the principles, instrumentation and applications of NMR spectroscopy the structure determination of compounds.
CO3	Able to apply the mass spectrometry for the analysis if mass and structure of pharmaceutical compounds
CO4	Able to separate various sample mixtures by the application of various chromatographic techniques
CO5	To understand the concept of electrophoresis, crystallography and immune-assays in the field of pharmaceutical analysis

UNIT I — **10 Hrs**

UV-Visible spectroscopy

Introduction, Theory, Laws, and Instrumentation associated with UV-Visible spectroscopy, Choice of solvents and solvent effect and Applications of UV-Visible spectroscopy, Difference/ Derivative spectroscopy.

UNIT II — **10 Hrs**

IR spectroscopy

Theory, Modes of Molecular vibrations, Sample handling, Instrumentation of Dispersive and Fourier -Transform IR Spectrometer, Factors affecting vibrational frequencies and Applications of IR spectroscopy, Data Interpretation.

UNIT III — **10 Hrs**

NMR spectroscopy

Quantum numbers and their role in NMR, Principle, Instrumentation, Solvent requirement in NMR, Relaxation process, NMR signals in various compounds, Chemical shift, Factors influencing chemical shift, Spin-Spin coupling, Coupling constant, Nuclear magnetic double resonance, Brief outline of principles of FT-NMR and 13C NMR. Applications of NMR spectroscopy

UNIT IV — **10 Hrs**

Mass Spectroscopy

Principle, Theory, Instrumentation of Mass Spectroscopy, Different types of ionization like electron impact, chemical, field, FAB and MALDI, APCI, ESI, APPI Analyzers of Quadrupole and Time of Flight, Mass fragmentation and its rules, Meta stable ions, Isotopic peaks and Applications of Mass spectroscopy

UNIT V — **10 Hrs**

Chromatography

Introduction to chromatography and classification of chromatographic methods based on the mechanism of separation, Principle, instrumentation, selection of solvents; chromatographic parameters, factors affecting resolution, applications of the following:

a) Thin Layer chromatography;	b) High Performance Thin Layer Chromatography
c) Paper Chromatography;	d) Column chromatography
e) Gas chromatography;	f) High Performance Liquid chromatography
g) Affinity chromatography;	h) Gel Chromatography

i)Hyphenated techniques :

- Ultra High Performance Liquid chromatography- Mass spectroscopy
- Gas Chromatography-Mass Spectroscopy

Reference textbooks/Additional reading

1. Instrumental Methods of Chemical Analysis by B.K Sharma
2. Vogel's Text book of Quantitative Chemical Analysis by A.I. Vogel
3. Textbook of Pharmaceutical Analysis, KA.Connors, 3rd Edition, John Wiley& Sons, 1982.
4. Spectrometric Identification of Organic compounds - Robert M Silverstein, Sixth edition, John Wiley & Sons, 2004.
5. Principles of Instrumental Analysis - Doglas A Skoog, F. James Holler,T imothy A. Nieman, 5th edition, Eastern press, Bangalore, 1998.
6. Instrumental methods of analysis – Willards, 7th edition, CBS publishers.
7. Practical Pharmaceutical Chemistry – Beckett and Stenlake, Vol II, 4thedition, CBS Publishers, New Delhi, 1997.
8. Organic Spectroscopy - William Kemp, 3rd edition, ELBS, 1991.
9. Quantitative Analysis of Drugs in Pharmaceutical formulation - P D Sethi,3rd Edition, CBS Publishers, New Delhi, 1997.
10. Pharmaceutical Analysis - Modern Methods – Part B - J W Munson, Vol11, Marcel. Dekker Series
11. Spectroscopy of Organic Compounds, 2nd edn., P.S/Kalsi, Wiley estern Ltd., Delhi. Organic Chemistry by I. L. Finar
12. Quantitative Analysis of Drugs by D. C. Garrett
13. HPTLC by P.D. Seth
14. Indian Pharmacopoeia 2007
15. High Performance thin layer chromatography for the analysis of medicinal plants by Eike,Reich, Anne Schibli
16. Introduction to instrumental analysis by Robert. D. Braun

Course Code	ADVANCED PHARMACOLOGY-I	L	T	P	C	MARKS
24MPL102T		4	0	0	4	100

Course Category	Core Course

Course Objective

The subject is designed to strengthen the basic knowledge in the field of pharmacology and to impart recent advances in the drugs used for the treatment of various diseases. In addition, this subject helps the students to understand the concepts of drug action and mechanisms involved

Course Outcomes

CO1	Understand the pharmacodynamics and pharmacokinetics of a drug and its correlation in pharmacotherapy.
CO2	Be aware about the general aspects involved in neurotransmission, pathophysiology and pharmacotherapy of diseases
CO3	Explain the mechanism of drug action at cellular and molecular levels.
CO4	Understand the pharmacological effects, mode of drug action, and relevance in the treatment of different CNS and CVS disorders
CO5	Understand the pathological and physiological role of autacoids.

UNIT I — **10 Hrs**

a. Pharmacokinetics: The dynamics of drug absorption, distribution, biotransformation and elimination. Concepts of linear and non-linear compartment models. Significance of Protein binding.
b. Pharmacodynamics: Mechanism of drug action and the relationship between drug concentration and effect. Receptors, structural and functional families of receptors quantification of drug receptors interaction and elicited effects.

UNIT II — **10 Hrs**

Neurotransmission

a. General aspects and steps involved in neurotransmission.
b. Neurohumoral transmission in autonomic nervous system (Detailed study about neurotransmitters- Adrenaline and Acetylcholine).
c.Neurohumoral transmission in central nervous system (Detailed study about neurotransmitters histamine, serotonin, dopamine, GABA, glutamate and glycine].
d.Non-adrenergic non-cholinergic transmission (NANC). Co-transmission.
Systemic Pharmacology: A detailed study on pathophysiology of diseases, mechanism of action, pharmacology and toxicology of existing as well as novel drugs used in the following systems
Autonomic Pharmacology: Parasympathomimetics and lytics, sympathomimetics and lytics, agents affecting neuromuscular junction .

UNIT III — **10 Hrs**

Central nervous system Pharmacology

General and local anesthetics, Sedatives and hypnotics, drugs used to treat anxiety. Depression, psychosis, mania, epilepsy, neurodegenerative diseases. Narcotic and non-narcotic analgesics.

UNIT IV — **10 Hrs**

Cardiovascular Pharmacology

Diuretics, antihypertensives, antiischemics, anti- arrhythmics, drugs for heart failure and hyperlipidemia. Hematinics, coagulants, anticoagulants, fibrinolytics and antiplatelet drugs

UNIT V — **10 Hrs**

Autacoid Pharmacology

The physiological and pathological role of Histamine, Serotonin, Kinins Prostaglandins Opioid autacoids. Pharmacology of antihistamines, 5HT antagonists

Reference textbooks/Additional reading
1.The Pharmacological Basis of Therapeutics, Goodman and Gillman‘s 2. Principles of Pharmacology. The Pathophysiologic basis of drug Therapy by David E Golan, Armen H, Tashjian Jr, EhrinJ, Armstrong, April W, Armstrong, Wolters, Kluwer-Lippincott Williams & Wilkins Publishers. 3. Basic and Clinical Pharmacology by B. G Katzung 4. Hand book of Clinical Pharmacokinetics by Gibaldi and Prescott. 5. Applied biopharmaceutics and Pharmacokinetics by Leon Shargel and Andrew B. C. Yu. 6. Graham Smith. Oxford textbook of Clinical Pharmacology. 7. Avery’s Drug Treatment 8. Dipiro Pharmacology, Pathophysiological approach. 9. Green Pathophysiology for Pharmacists

Course Code	CLINICAL PHARMACOLOGY AND PHARMACOTHERAPEUTICS	L	T	P	C	MARKS
24MPL103T		4	0	0	4	100

Course Category	Core Course

Course Objective

This course is designed to impart knowledge and skills necessary for contribution to quality use of medicines. Chapters dealt cover briefly pathophysiology and mostly therapeutics of various diseases. This will enable the student to understand the pathophysiology of common diseases and their management.

Course Outcomes

CO1	Understand the pathophysiology of selected disease states and the rationale for drug therapy.
CO2	Outline the importance of preparation of individualized therapeutic plans based on diagnosis.
CO3	Identify the needs to the patient-specific parameters relevant in initiating drug therapy
CO4	Study the drug theraphay of paediatric, geriatrics and pregnant women.
CO5	Summarize the therapeutic approach to the management of various diseases

UNIT I	10 Hrs

Principles of Pharmacokinetics
1. Revision of basic concepts.
2. Clinical Pharmacokinetics.
a. Dose – response in man
b. Influence of renal and hepatic disease on Pharmacokinetics
c. Therapeutics drug monitoring & individualization of drug therapy
d. Population Pharmacokinetics.

UNIT II	10 Hrs

Adverse Drug Reactions, Drug Interactions, ADR monitoring & Pharmacovigilance

UNIT III	10 Hrs

Pathophysiology and drug therapy of the following disorders. Schizophrenia, anxiety, depression, epilepsy, Parkinson's, alzheimer's diseases, migraine, hypertension, angina pectoris, arrhythmias, atherosclerosis, myocardial infarction.

UNIT IV	10 Hrs

Pathophysiology and drug therapy of the following disorders. TB, leprosy, leukemia, solid tumors, lymphomas, psoriasis, respiratory, urinary, G.I. tract infections, endocarditis, fungal and HIV infection, rheumatoid arthritis, glaucoma, menstrual disorders, menopause.

UNIT V	10 Hrs

Drug therapy in
a) Geriatrics
b) Paediatrics
c) Pregnancy & Lactation.
d) Renal & hepatic insufficiency

Reference textbooks/Additional reading

1.Clinical Pharmacy and Therapeutics - Roger and Walker, Churchill Livingstone publication.
2. Pharmacotherapy: A Pathophysiologic approach - Joseph T. Dipiro et al. Appleton & Lange.
3. Pathologic basis of disease - Robins SL, W.B. Saunders publication.
4. Pathology and therapeutics for Pharmacists: A Basis for Clinical Pharmacy Practice - Green and Harris, Chapman and Hall publication.
5. Clinical Pharmacy and Therapeutics - Eric T. Herfindal, Williams and Wilkins Publication.
6. Applied Therapeutics: The clinical Use of Drugs. Lloyd Young and Koda-Kimble MA
7. Avery's Drug Treatment, 4th Edn, 1997, Adis International Limited.
8. Relevant review articles from recent medical and pharmaceutical literature.
9. Pharmacotherapy: A Pathophysiologic approach - Joseph T. Dipiro et al. Appleton & Lange
10. Clinical Pharmacy and Therapeutics - Eric T. Herfindal, Williams and Wilkins Publication
11. Applied Therapeutics: The clinical Use of Drugs. Lloyd Young and Koda-Kimble MA

Course Code	CELLULAR AND MOLECULAR PHARMACOLOGY	L	T	P	C	MARKS
24MPL104T		4	0	0	4	100

Course Category	Core Course

Course Objective

The subject imparts a fundamental knowledge on the structure and functions of cellular components and help to understand the interaction of these components with drugs. This information will further help the student to apply the knowledge in drug discovery process.

Course Outcomes

CO1	Study of the cellular components and their interaction with drugs
CO2	Obtain the knowledge on the receptors and signal transduction processes.
CO3	Understand the molecular pathways affected by drugs.
CO4	Application of molecular pharmacology and biomarkers in drug discovery process.
CO5	Explain molecular biology techniques as applicable for pharmacology.

UNIT I — **10 Hrs**

Cell biology

Structure and functions of cell and its organelles Genome organization. Gene expression and its regulation, importance of siRNA and micro RNA, gene mapping and gene sequencing

Cell cycles and its regulation. Cell death– events, regulators, intrinsic and extrinsic pathways of apoptosis. Necrosis and autophagy.

UNIT II — **10 Hrs**

Cell signaling

Intercellular and intracellular signaling pathways.

Classification of receptor family and molecular structure ligand gated ion channels; G-protein coupled receptors, tyrosine kinase receptors and nuclear receptors.

Secondary messengers: cyclic AMP, cyclic GMP, calcium ion, inositol 1,4,5-trisphosphate, (IP3), NO, and diacylglycerol.

Detailed study of following intracellular signaling pathways: cyclic AMP signaling pathway, mitogen-activated protein kinase (MAPK) signaling, Janus kinase (JAK)/signal transducer and activator of transcription (STAT) signaling pathway

UNIT III — **10 Hrs**

Principles and applications of genomic and proteomic tools DNA electrophoresis, PCR (reverse transcription and real time), Gene sequencing, micro array technique, SDS page, ELISA and western blotting, Recombinant DNA technology and gene therapy.

Basic principles of recombinant DNA technology-Restriction enzymes, various types of vectors. Applications of recombinantDNA technology.

Gene therapy- Various types of gene transfer techniques, clinical applications and recent advances in gene therapy

UNIT IV — **10 Hrs**

Pharmacogenomics

Gene mapping and cloning of disease gene.

Genetic variation and its role in health/ pharmacology

Polymorphisms affecting drug metabolism

Genetic variation in drug transporters

Genetic variation in G protein coupled receptors

Applications of proteomics science: Genomics, proteomics, metabolomics, functionomics, nutrigenomics.

Immunotherapeutics Types of immunotherapeutics, humanisation antibody therapy, Immunotherapeutics in clinical practice.		
UNIT V		**10 Hrs**
a. Cell culture techniques Basic equipments used in cell culture lab. Cell culture media, various types of cell culture, general procedure for cell cultures; isolation of cells, subculture, cryopreservation, characterization of cells and their application. Principles and applications of cell viability assays, glucose uptake assay, Calcium influx assays Principles and applications of flow cytometry b. Biosimilars.		

Reference textbooks/Additional reading

1.The Cell, A Molecular Approach. Geoffrey M Cooper.
2. Pharmacogenomics: The Search for Individualized Therapies. Edited by J.Licinio and M -L. Wong
3. Handbook of Cell Signaling (Second Edition) Edited by Ralph A. et.al
4. Molecular Pharmacology: From DNA to Drug Discovery. John Dickensonet.al
5. Basic Cell Culture protocols by Cheril D.Helgason and Cindy L.Miller
6. Basic Cell Culture (Practical Approach) by J. M. Davis (Editor)
7. Animal Cell Culture: A Practical Approach by John R. Masters (Editor)
8. Current porotocols in molecular biology vol I to VI edited by FrederickM.Ausuvel et al.

Course Code	MODERN PHARMACEUTICAL ANALYTICAL TECHNIQUES LAB	L	T	P	C	MARKS
24MPL105P		0	0	6	3	100

Course Category	Core Course

Course Objective

The main objective of this course is to impart the learner the knowledge to handle the sophisticated analytical instruments and perform the analytical methods using these instruments for the analysis of drug and other analytical samples.

Course Outcomes

CO1	To perform the analysis of pharmacopoeial compounds by various spectroscopic techniques
CO2	To determine the functional groups in various organic compounds
CO3	To separate and estimate various sample mixtures by various chromatographic techniques
CO4	To calibrate various analytical instruments like UV – Visible Spectrophotometer/ HPLC/ GC/ FTIR
CO5	To learn the cleaning validation of equipment.

List of Experiments

1. Analysis of Pharmacopoeial compounds and their formulations by UV Vis Spectrophotometer.
2. Simultaneous estimation of multi component containing formulations by UV Spectrophotometry
3. Effect of pH and solvent on UV –Spectrum
4. Determination of Molar absorption coefficient
5. Estimation of riboflavin/ quinine sulphate by fluorimetry
6. Study of quenching effect by fluorimetry
7. Estimation of sodium or potassium by flame photometry
8. Colorimetric determination of drugs by using different reagents
9. Qunatitative determination of functional groups
10. Experiments based on Column chromatography
11. Experiments based on HPLC
12. Experiments based on Gas Chromatography
13. Preparation of Master Formula Record.
14. Preparation of Batch Manufacturing Record.

Course Code	ADVANCED PHARMACOLOGY LAB I	L	T	P	C	MARKS
24MPA106P		0	0	6	3	100

Course Category	Core Course

Course Objective

Course Objective

Students will gain knowledge of the experimental techniques and how to record the drug's response using isolated preparations.

Course Outcomes

CO1	Develop and expertise in drug administration through various routes and withdrawal of blood.
CO2	Understand the principles of bioassay and its importance
CO3	To gain knowledge and to perform bioassays by using isolated ileum preparation.
CO4	Determination of PA2 value of antagonists on various isolated tissues

List of Experiments

Handling of laboratory animals.

1. Various routes of drug administration.
2. Study of techniques of blood sampling, anesthesia and euthanasia of experimental animals.
3. To record the dose response curve of Ach using isolated ileum/rectus abdominis muscle preparation.
4. To carry out bioassay of Ach using isolated ileum/rectus abdominis muscle preparation by interpolation method.
5. To carry out bioassay of Ach using isolated ileum/rectus abdominis muscle preparation by three point method.
6. To carry out bioassay of Ach using isolated ileum/rectus abdominis muscle preparation by four point method.
7. Estimation of pA2 value on isolated tissues
8. Bioassay of 5-HT using rat fundus strip
9. Bioassay of oxytocin using rat uterus

Reference Books:

1. CPCSEA, OECD, ICH, USFDA, Schedule Y, EPA guidelines,
2. Fundamentals of experimental Pharmacology by M. N. Ghosh
3. Handbook of Experimental Pharmacology by S.K. Kulkarni.
4. Drug discovery and Evaluation by Vogel H.G.
5. Practical Manual of Experimental and Clinical Pharmacology by Bikash Medhi (Author), Ajay Prakash (Author) Jaypee brothers' medical publishers Pvt. Ltd

AUDIT COURSE-I

Course Code	ENGLISH FOR RESEARCH PAPER WRITING	L	T	P	C	MARKS
24MAC101a		2	0	0	0	40

Course Category	Audit Course
Course Objective	
Understand the essentials of writing skills and their level of readability. Learn about what to write in each section. Ensure qualitative presentation with linguistic accuracy	
Course Outcomes	
CO1	Understand that how to improve your writing skills and level of readability
CO2	Learn about what to write in each section
CO3	Understand the skills needed when writing a Title
CO4	Ensure the good quality of paper at the very first-time submission

UNIT I		**10 Hrs**
Overview of a Research Paper- Planning and Preparation- Word Order- Useful Phrases - Breaking up Long Sentences-Structuring Paragraphs and Sentences-Being Concise and Removing Redundancy -Avoiding Ambiguity		
UNIT II		**10 Hrs**
Essential Components of a Research Paper- Abstracts- Building Hypothesis-Research Problem - Highlight Findings- Hedging and Criticizing, Paraphrasing and Plagiarism, Cauterization		
UNIT III		**10 Hrs**
Introducing Review of the Literature – Methodology - Analysis of the Data-Findings - Discussion-Conclusions-Recommendations.		
UNIT IV		**10 Hrs**
Key skills needed for writing a Title, Abstract, and Introduction		
UNIT V		**10 Hrs**
Appropriate language to formulate Methodology, incorporate Results, put forth Arguments and draw Conclusions		

Reference textbooks/Additional reading

1. Goldbort, Model Curriculum of Engineering & Technology PG Courses [Volume-I]
2. Day R (2006) How to Write and Publish a Scientific Paper, Cambridge University Press
3. Highman N (1998), Handbook of Writing for the Mathematical Sciences, SIAM. Highman'sbook
4. Adrian Wallwork , English for Writing Research Papers, Springer New York Dordrecht Heidelberg London, 2011

Course Code	DISASTER MANAGEMENT	L	T	P	C	MARKS
24MAC101b		2	0	0	0	40

Course Category	Audit Course

Course Objective

Learn to demonstrate a critical understanding of key concepts in disaster risk reduction and humanitarian response.

Course Outcomes

CO1	Critically evaluate disaster risk reduction and humanitarian response policy and practice from multiple perspectives.
CO2	Develop an understanding of standards of humanitarian response and practical relevance in specific types of disasters and conflict situations.
CO3	Critically understand the strengths and weaknesses of disaster management approaches, planning and programming in different countries, particularly their home country or the countries they work in

UNIT I — **10 Hrs**

Introduction:

Disaster:Definition,FactorsandSignificance;DifferenceBetweenHazardandDisaster;Naturaland Manmade Disasters: Difference, Nature, Types and Magnitude.

Disaster Prone Areas in India:

Study of Seismic Zones; Areas Prone to Floods and Droughts, Landslides and Avalanches; Areas Prone to Cyclonic and Coastal Hazards with Special Reference to Tsunami; Post- Disaster Diseases and Epidemics

UNIT II — **10 Hrs**

Repercussions of Disasters and Hazards:

Economic Damage, Loss of Human and Animal Life, Destruction of Ecosystem. Natural Disasters: Earthquakes, Volcanisms, Cyclones, Tsunamis, Floods, Droughts and Famines, Landslides and Avalanches, Man-made disaster: Nuclear Reactor Meltdown, Industrial Accidents, Oil Slicks and Spills, Outbreaks of Disease and Epidemics, War and Conflicts.

UNIT III — **10 Hrs**

Disaster Preparedness and Management:

Preparedness: Monitoring of Phenomena Triggering A Disaster or Hazard; Evaluation of Risk: Application of Remote Sensing, Data from Meteorological and Other Agencies, Media Reports: Governmental and Community Preparedness.

UNIT IV — **10 Hrs**

Risk Assessment Disaster Risk:

Concept and Elements, Disaster Risk Reduction, Global and National Disaster Risk Situation. Techniques of Risk Assessment, Global Co-Operation in Risk Assessment and Warning, People's Participation in Risk Assessment. Strategies for Survival.

UNIT V — **10 Hrs**

Disaster Mitigation: Meaning, Concept and Strategies of Disaster Mitigation, Emerging Trends In Mitigation. Structural Mitigation and Non-Structural Mitigation, Programs of Disaster Mitigation in India.

Reference textbooks/Additional reading

1. R.Nishith,SinghAK,"Disaster Management in India:Perspectives, issues and strategies "'New Royal book Company.

2.	Sahni, Pardeep Et.Al.(Eds.),"Disaster Mitigation Experiences And Reflections",Prentice Hall Of India, New Delhi.
3.	GoelS.L.,Disaster Administration And Management-Text And Case Studies",Deep&Deep Publication Pvt. Ltd., New Delhi

Course Code	SANSKRIT FOR TECHNICAL KNOWLEDGE	L	T	P	C	MARKS
24MAC101c		2	0	0	0	40

Course Category	Audit Course

Course Objective

To get a Learning of Sanskrit to improve brain functioning. Learning of Sanskrit to develop the logic in mathematics, science & other subjects enhancing the memory power. The engineering scholars equipped with Sanskrit will be able to explore the huge Knowledge from ancient literature.

Course Outcomes

CO1	Understanding basic Sanskrit language
CO2	Ancient Sanskrit literature about science & technology can be understood
CO3	Being a logical language will help to develop logic in students

UNIT I		**10 Hrs**
Alphabets in Sanskrit		
UNIT II		**10 Hrs**
Past/Present/Future Tense, Simple Sentences		
UNIT III		**10 Hrs**
Order, Introduction of roots		
UNIT IV		**10 Hrs**
Technical information about Sanskrit Literature		
UNIT V		**10 Hrs**
Technical concepts of Engineering-Electrical, Mechanical, Architecture, Mathematics		

Reference textbooks/Additional reading

1. "Abhyaspustakam" –Dr.Vishwas, Sanskrit-Bharti Publication, New Delhi
2. "Teach Yourself Sanskrit " Prat hama Deeksha- Vempati Kutumbshastri, Rashtriya Sanskrit Sansthanam, New Delhi Publication
3. "India's Glorious ScientificTradition" Suresh Soni, Ocean books (P) Ltd.,New Delhi

SEMESTER-II

Course Code	ADVANCED PHARMACOLOGY II	L	T	P	C	MARKS
24MPL201T		4	0	0	4	100

Course Category	Core Course

Course Objective

The subject is designed to strengthen the basic knowledge in the field ofpharmacology and to impart recent advances in the drugs used for the treatment of various diseases. In addition, the subject helps the student to understand the concepts of drug action and mechanism involved

Course Outcomes

CO1	Students will gain knowledge by analyzing and interpretation of various cellular changes at molecular level of hormone action.
CO2	Explain the mechanism of drug action at cellular and molecular levels
CO3	Discuss the pathophysiology and pharmacotherapy of drugs used in treatment of inflammation, immune responses.
CO4	Students will be able to understand the pharmacological effects that may change with biological time in diverse conditions such as cardiovascular disease, diabetes, asthma, and peptic ulcer.
CO5	Students will be able to interpret role of free radicals in aetiology of chronic health problem, and demonstrate antioxidant action.

UNIT I — **10 Hrs**

Endocrine Pharmacology: Molecular and cellular mechanism of action of hormones such as growth hormone, prolactin, thyroid, insulin and sex hormones Anti-thyroid drugs, Oral hypoglycemic agents, Oral contraceptives, Corticosteroids. Drugs affecting calcium regulation.

UNIT II — **10 Hrs**

Chemotherapy: Cellular and molecular mechanism of actions and resistance of antimicrobial agents such as ß-lactams, aminoglycosides, quinolones, Macrolide antibiotics. Antifungal, antiviral, and anti-TB drugs

UNIT III — **10 Hrs**

Chemotherapy: Drugs used in Protozoal Infections Drugs used in the treatment of Helminthiasis Chemotherapy of cancer Immunopharmacology Cellular and biochemical mediators of inflammation and immune response. Allergic or hypersensitivity reactions. Pharmacotherapy of asthma and COPD.
Immunosuppressants and Immunostimulants.

UNIT IV — **10 Hrs**

GIT Pharmacology: Antiulcer drugs, Prokinetics, antiemetics, anti-diarrheals and drugs for constipation and irritable bowel syndrome. Chronopharmacology Biological and circadian rhythms, applications of chronotherapy in various diseases like cardiovascular disease, diabetes, asthma, and peptic ulcer

UNIT V — **10 Hrs**

Free radicals Pharmacology: Generation of free radicals, role of free radicals in etiopathology of various diseases such as diabetes, neurodegenerative diseases and cancer. Protective activity of certain important antioxidant Recent Advances in Treatment: Alzheimer's disease, Parkinson's disease, Cancer, Diabetes mellitus

Reference textbooks/Additional reading

1.The Pharmacological basis of therapeutics- Goodman and Gill man‘s
2. Principles of Pharmacology. The Pathophysiologic basis of drug therapy by David E Golan et al.
3. Basic and Clinical Pharmacology by B. G -Katzung
4. Pharmacology by H.P. Rang and M.M. Dale.
5. Hand book of Clinical Pharmacokinetics by Gibaldi and Prescott.
6. Text book of Therapeutics, drug and disease management by E T. Herfindal and Gourley.
7. Applied biopharmaceutics and Pharmacokinetics by Leon Shargel and Andrew B. C. Yu.
8. Handbook of Essential Pharmacokinetics, Pharmacodynamics and Drug Metabolism for Industrial Scientists.
9. Robbins & Cortan Pathologic Basis of Disease, 9th Ed. (RobbinsPathology)
10. A Complete Textbook of Medical Pharmacology by Dr. S. K Srivastava published by A P C Avichal Publishing Company.
11 K D. Tripathi. Essentials of Medical Pharmacology Principles of Pharmacology.
12.The Pathophysiologic basis of drug Therapyby David E Golan, Armen H, Tashjian Jr., EhrinJ, Armstrong, April W, Armstrong, Wolters, Kluwer-Lippincott Williams & Wilkins Publishers

Course Code	PHARMACOLOGICAL SCREENING METHODS AND TOXICOLOGY	L	T	P	C	MARKS
24MPL202T		4	0	0	4	100

Course Category	Core Course

Course Objective

This subject is designed to impart the knowledge on preclinical evaluation of drugs and recent experimental techniques in the drug discovery and development. The subject content helps the student to understand the maintenance of laboratory animals as per the guidelines, basic knowledge of various in-vitro and in-vivo preclinical evaluation processes

Course Outcomes

CO1	Appraise the regulation and ethical requirement for the usage of experimental animals.
CO2	Describe the various animals used in the drug discovery process and good laboratory practices in maintenance and handling of experimental animals.
CO3	Describe the various newer screening methods involved in the drug discovery process.
CO4	Appreciate and correlate the preclinical data to humans.

UNIT I — **10 Hrs**

Laboratory Animals: Common laboratory animals: Description, handling and applications of different species and strains of animals. Transgenic animals: Production, maintenance and applications Anesthesia and euthanasia of experimental animals. Maintenance and breeding of laboratory animals.

CPCSEA guidelines to conduct experiments on animals Good laboratory practice. Bioassay-Principle, scope and limitations and methods.

UNIT II — **10 Hrs**

Preclinical screening of new substances for the pharmacological activity using *in- vivo, in -vitro,* and other possible animal alternative models. General principles of preclinical screening. CNS Pharmacology: behavioral and muscle co ordination, CNS stimulants and depressants, anxiolytics, anti-psychotics, anti epileptics and nootropics. Drugs for neurodegenerative diseases like Parkinsonism, Alzheimers and multiple sclerosis. Drugs acting on Autonomic Nervous System

UNIT III — **10 Hrs**

Preclinical screening of new substances for the pharmacological activity using in vivo, in vitro, and other possible animal alternative models. Respiratory Pharmacology: anti-asthmatics, drugs for COPD and anti allergics. Reproductive Pharmacology: Aphrodisiacs and antifertility agents Analgesics, anti-inflammatory and antipyretic agents. Gastrointestinal drugs: anti ulcer, anti -emetic, antidiarrheal and laxatives.

UNIT IV — **10 Hrs**

Preclinical screening of new substances for the pharmacological activity using in vivo, in vitro, and other possible animal alternative models. Cardiovascular Pharmacology: antihypertensives, antiarrhythmics, antianginal, antiatherosclerotic agents and diuretics. Drugs for metabolic disorders like anti-diabetic, antidyslipidemic agents. Anti cancer agents. Hepatoprotective screening methods

UNIT V — **10 Hrs**

Preclinical screening of new substances for the pharmacological activity using in vivo, in vitro, and other possible animal alternative models. Immunomodulators, Immunosuppressants and immunostimulants General principles of immunoassay: theoretical basis and optimization of immunoassay, heterogeneous and homogenous immunoassay systems. Immunoassay methods evaluation; protocol outline, objectives and preparation. Immunoassay for digoxin and insulin.

Limitations of animal experimentation and alternate animal experiments. Extrapolation of in vitro data to preclinical and preclinical to humans

Reference textbooks/Additional reading
1. Biological standardization by J. H. Burn D.J. Finney and I.G. Goodwin 2. Screening methods in Pharmacology by Robert Turner. A 3. Evaluation of drugs activities by Laurence and Bachrach 4. Methods in Pharmacology by Arnold Schwartz. 5. Fundamentals of experimental Pharmacology by M. N. Ghosh 6. Pharmacological experiment on intact preparations by Churchill Livingstone 7. Drug discovery and Evaluation by Vogel H.G. 8. Experimental Pharmacology by R. K. Goyal. 9. Preclinical evaluation of new drugs by S. K. Guta 10. Handbook of Experimental Pharmacology, S K. Kulkarni 11. Practical Pharmacology and Clinical Pharmacy, S K. Kulkarni, 3rd Edition. 12. David R. Gross. Animal Models in Cardiovascular Research, 2nd Edition, Kluwer Academic Publishers, London, UK. 13. Screening Methods in Pharmacology, Robert A. Turner. 14. Rodents for Pharmacological Experiments, Dr. Tapan Kumar chatterjee. 15. Practical Manual of Experimental and Clinical Pharmacology by Bikash Medhi (Author), Ajay Prakash (Author)

Course Code	PRINCIPLES OF DRUG DISCOVERY	L	T	P	C	MARKS
24MPL203T		4	0	0	4	100

Course Category	Core Course

Course Objective

The subject imparts basic knowledge of drug discovery process. This information will make the student Competent in drug discovery process.

Course Outcomes

CO1	Explain the various stages of drug discovery.
CO2	Appreciate the importance of the role of genomics, proteomics and bioinformatics in drug discovery.
CO3	Explain various targets of drug discovery
CO4	Explain various lead seeking method and lead optimization
CO5	Appreciate the importance of the role of computer aided drug design in drug discovery

UNIT I — **10 Hrs**

An overview of modern drug discovery process: Target identification, target validation, lead identification, and lead Optimization. Economics of drug discovery. Target Discovery and validation- Role of Genomics, Proteomics and Bioinformatics. Role of Nucleic acid microarrays, Protein microarrays, Antisense technologies, siRNAs, antisense oligonucleotides, Zinc finger proteins. Role of transgenic animals in target validation.

UNIT II — **10 Hrs**

Lead Identification: combinatorial chemistry & high throughput screening, *in silico* lead discovery techniques; Assay development for hit identification. Protein structure Levels of protein structure, Domains, motifs, and folds in protein structure. Computational prediction of protein structure: Threading and homology modeling methods. Application of NMR and X-ray crystallography in protein structure prediction.

UNIT III — **10 Hrs**

Rational Drug Design: Traditional vs rational drug design, Methods followed in traditional drug design, High throughput screening, Concepts of Rational Drug Design, Rational Drug Design Methods: Structure and Pharmacophore based approaches. Virtual Screening techniques: Drug likeness screening, Concept of pharmacophore mapping and pharmacophore-based Screening

UNIT IV — **10 Hrs**

Molecular docking: Rigid docking, flexible docking, manual docking; Docking based screening. Denovo drug design. Quantitative analysis of Structure Activity Relationship History and development of QSAR, SAR versus QSAR, Physicochemical parameters, Hansch analysis, Fee Wilson analysis, and relationship between them.

UNIT V — **10 Hrs**

QSAR Statistical methods: regression analysis, partial least square analysis (PLS) and other multivariate statistical methods. 3D-QSAR approaches like COMFA and COMSIA Prodrug design-Basic concept, Prodrugs to improve patient acceptability, Drug solubility, Drug absorption, and distribution, site specific drug delivery and sustained drug action. Rationale of prodrug design and practical consideration of prodrug design.

Reference textbooks/Additional reading
1. Mouldy Sioud. Target Discovery and Validation Reviews and Protocols: Volume 2 Emerging Molecular Targets and Treatment Options. 2007 Humana Press Inc. 2. Darryl León. Scott MarkelIn. Silico Technologies in Drug Target Identification and Validation 2006 by Taylor and Francis Group, LLC. 3. Johanna K. DiStefano. Disease Gene Identification. Methods and Protocols. Springer New York Dordrecht Heidelberg London. 4. Hugo Kubiny. QSAR: Hansch Analysis and Related Approaches. Methods and Principles inMedicinal Chemistry. Publisher Wiley-VCH 5. Klaus Gubernator, Hans-Joachim Böhm. Structure-Based Ligand Design. 6. Methods and Principles in Medicinal Chemistry. Publisher Wiley-VCH 7. Abby L .Parrill. M. Rami Reddy. Rational Drug Design. Novel Methodology and Practical Applications. ACS Symposium Series; American Chemical Society: Washington, DC, 1999. 8. J. Rick Turner. New drug development design, methodology and, analysis. John Wiley & Sons, Inc., New Jersey.

Course Code	CLINICAL RESEARCH AND PHARMACOVIGILANCE	L	T	P	C	MARKS
24MPL204T		4	0	0	4	100

Course Category	Core Course

Course Objective

This subject will provide a value addition and current requirement for the students in clinical research and pharmacovigilance. It will teach the students on conceptualizing, designing, conducting, managing and reporting of clinical trials. This subject also focuses on global scenario of pharmacovigilance in different methods that can be used to generate safety data. It will teach the students in developing drug safety data in pre-clinical, clinical phases of drug development and post market surveillance.

Course Outcomes

CO1	Understand the regulatory requirements for conducting clinical trials.
CO2	Describe the types of clinical trial designs
CO3	Discuss the responsibilities of key players involved in clinical trials
CO4	Explain the principles of Pharmacovigilance
CO5	Detect new adverse drug reactions and their assessment

UNIT I	10 Hrs
Regulatory Perspectives of Clinical Trials: Origin and Principles of International Conference on Harmonization - Good Clinical Practice (ICH-GCP) guidelines Ethical Committee: Institutional Review Board, Ethical Guidelines for Biomedical Research and Human Participant-Schedule Y, ICMR, Informed Consent Process: Structure and content of an Informed Consent Process Ethical principles governing informed consent process	
UNIT II	**10 Hrs**
Clinical Trials: Types and Design: Experimental Study- RCT and Non RCT, Observation Study: Cohort, Case Control, Cross sectional Clinical Trial Study Team Roles and responsibilities of Clinical Trial Personnel: Investigator, Study Coordinator, Sponsor, Contract Research Organization and its management.	
UNIT III	**10 Hrs**
Clinical Trials: Types and Design: Experimental Study- RCT and Non RCT, Observation Study: Cohort, Case Control, Cross sectional Clinical Trial Study Team Roles and responsibilities of Clinical Trial Personnel: Investigator, Study Coordinator, Sponsor, Contract Research Organization and its management.	
UNIT IV	**10 Hrs**
Basic aspects, terminologies and establishment of pharmacovigilance: History and progress of pharmacovigilance, Significance of safety monitoring, Pharmacovigilance in India and international aspects, WHO international drug monitoring programme, WHO and Regulatory terminologies of ADR, evaluation of medication safety, Establishing pharmacovigilance centres in Hospitals, Industry and National programmes related to pharmacovigilance. Roles and responsibilities in Pharmacovigilance.	
UNIT V	**10 Hrs**
Methods, ADR reporting and tools used in pharmacovigilance: International classification of diseases, International Nonproprietary names for drugs, Passive and Active surveillance, Comparative observational studies, targeted clinical investigations and Vaccine safety surveillance. Spontaneous reporting system and Reporting to regulatory authorities, Guidelines for ADRs	

reporting. Argus, Aris G Pharmacovigilance, Vigi Flow, Statistical methods for evaluating medication safety data.
Reference textbooks/Additional reading
1.Central Drugs Standard Control Organization- Good Clinical Practices, Guidelines for Clinical Trials on Pharmaceutical Products in India. New Delhi: Ministry of Health; 2001. 2. International Conference on Harmonization of Technical requirements for registration of Pharmaceuticals for human use. ICH Harmonized Tripartite Guideline. Guideline for Good Clinical Practice. E6; May 1996.230 3. Ethical Guidelines for Biomedical Research on Human Subjects 2000. Indian Council of Medical Research, New Delhi. 4. Textbook of Clinical Trials edited by David Machin, Simon Day and Sylvan Green, March 2005, John Wiley and Sons. 5. Clinical Data Management edited by R K Rondels, S A Varley, C F Webbs. Second Edition, Jan 2000, Wiley Publications. 6. Handbook of clinical Research. Julia Lloyd and Ann Raven Ed. Churchill Livingstone. 7. Principles of Clinical Research edited by Giovanna di Ignazio, Di Giovanna and Haynes. 8. Textbook of Pharmacovigilance: Concept and Practice. G. P. Mohanta and P. K. Manna. 2016, Pharma Med Press. 9. A textbook of Clinical Pharmacy Practice: Essential Concepts and Skills. Second Edition, 2012, University Press

Course Code		**L**	**T**	**P**	**C**	**MARKS**

24MPL205P	ADVANCED PHARMACOLOGY II LAB	0	0	6	3	100

Course Category	Core Course

Course Objective

Students will learn about Blood pressure recordings, various assay techniques, and enzymatic activities**.**

Course Outcomes

CO1	To know the effect of drugs on chick/rat mean arterial blood pressure (MABP) by using Condon's mercury manometer
CO2	To isolate and identify the DNA and RNA from various sources
CO3	To understood the enzyme based in-vitro assays, cell viability assays.
CO4	To understand the DNA fragmentation assays.
CO5	To Conduct Enzyme inhibition and induction activity

List of Experiments

1.Effect of drugs on chick/rat mean arterial blood pressure (MABP) by using Condon's mercury manometer.
2. Isolation and identification of DNA from various sources (Bacteria, Cauliflower, onion, Goat liver).
3. Isolation of RNA from yeast
4. Gene amplification by PCR.
5. Enzyme based in-vitro assays (MPO, AChEs, α amylase, α glucosidase).
6. Cell viability assays (MTT/Trypan blue/SRB).
7. DNA fragmentation assay by agarose gel electrophoresis.
8. DNA damage study by Comet assay.
9. Apoptosis determination by fluorescent imaging studies.
10. Enzyme inhibition and induction activity

Course Code	PHARMACOLOGICAL SCREENING METHODS AND TOXICOLOGY LAB	L	T	P	C	MARKS
24MPL206P		0	0	6	3	100

Course Category	Core Course

Course Objective

Students will learn about the guidelines required for conducting the preclinical studies and alternative methods to perform the animal studies.

Course Outcomes

CO1	Describe the regulatory guidelines for conducting toxicological studies
CO2	Explain Alternative methods to animal toxicity testing.
CO3	Evaluate various methods employed in drug discovery and development

List of Experiments

1. Analgesic property of drug using analgesiometer.
2. Anti-inflammatory effect of drugs using rat-paw edema method.
3. Anticonvulsant activity of drugs using maximal electroshock and pentylenetetrazole methods.
4. Antidepressant activity of drugs using pole climbing apparatus and pentobarbitone induced sleeping time methods.
5. Locomotor activity evaluation of drugs using actophotometer and rotarod.
6. Cardiotonic activity of drugs using isolated frog heart and mammalian heart preparations.
7. Antidiabetic activity using rats / mice
8. Hepatoprotective activity
9. Anti ulcer activity
10. Antioxidant activity
11. Toxicity studies as per OECD guidelines.
12. Functional observation battery tests (modified Irwin test)

AUDIT COURSE-II

Course Code		L	T	P	C	MARKS

24MAC201a	PEDAGOGY STUDIES	2	0	0	0	40

Course Category	Audit Course

Course Objective

Review existing evidence on the review topic to inform programme design and policy making undertaken by the DfID, other agencies and researchers. Identify critical evidence gaps to guide the development.

Course Outcomes

CO1	What pedagogical practices are being used by teachers in formal and informal classrooms in developing countries?
CO2	What is the evidence on the effectiveness of these pedagogical practices, in what conditions, and with what population of learners?
CO3	How can teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy?

UNIT I		10 Hrs

Introduction and Methodology:
Aims and rationale, Policy background, Conceptual framework and terminology. Theories of learning, Curriculum, Teacher education. Conceptual framework, Research questions. Overview of methodology and Searching.

UNIT II		10 Hrs

Thematic overview: Pedagogical practices are being used by teachers in formal and informal classrooms in developing countries. Curriculum, Teacher education.

UNIT III		10 Hrs

Evidence on the effectiveness of pedagogical practices. Methodology for the in depth stage: quality assessment of included studies. How can teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy? Theory of change. Strength and nature of the body of evidence for effective pedagogical practices. Pedagogic theory and pedagogical approaches. Teachers' attitudes and beliefs and Pedagogic strategies.

UNIT IV		10 Hrs

Professional development: alignment with classroom practices and follow-up support. Peer support. Support from the head teacher and the community. Curriculum and assessment. Barriers to learning: limited resources and large class sizes.

UNIT V		10 Hrs

Research gaps and future directions
Research design. Contexts. Pedagogy. Teacher education. Curriculum and assessment. Dissemination and research impact.

Reference textbooks/Additional reading

1. Ackers J, Hardman F (2001) Classroom interaction in Kenyan primary schools, Compare, 31 (2): 245-261.
2. Agrawal M (2004) Curricular reform in schools: The importance of evaluation, Journal of Curriculum Studies, 36 (3): 361-379.
3. Akyeampong K (2003) Teacher training in Ghana - does it count? Multi-site teacher education research project (MUSTER) country report 1. London: DFID.
4. Akyeampong K, Lussier K, Pryor J, Westbrook J (2013) Improving teaching and learning of basic maths and reading in Africa: Does teacher preparation count? International Journal Educational Development, 33 (3): 272–282.

5. Alexander RJ (2001) Culture and pedagogy: International comparisons in primary education. Oxford and Boston: Blackwell.
6. Chavan M (2003) Read India: A mass scale, rapid, 'learning to read' campaign.
7. 7. www.pratham.org/images/resource%20working%20paper%202.pdf.

Course Code	STRESS MANAGEMENT FOR YOGA	L	T	P	C	MARKS
24MAC201b		2	0	0	0	40

Course Category	Audit Course
Course Objective	
To achieve overall health of body and mind. To overcome stress	
Course Outcomes	
CO1	Develop healthy mind in a healthy body thus improving social health
CO2	Improve efficiency

UNIT I		**10 Hrs**
Definitions of Eight parts of yog. (Ashtanga)		
UNIT II		**10 Hrs**
Yam and Niyam.		
UNIT III		**10 Hrs**
Do`s and Don't's in life. i) Ahinsa, satya, astheya, bramhacharya and aparigraha ii) Shaucha, santosh, tapa, swadhyay, ishwarpranidhan		
UNIT IV		**10 Hrs**
Asan and Pranayam		
UNIT V		**10 Hrs**
i) Various yoga poses and their benefits for mind & body ii)Regularization of breathing techniques and its effects-Types of pranayam		

Reference textbooks/Additional reading

1. Yogic Asanas for Group Training-Part-I": Janardan Swami Yogabhyasi Mandal, Nagpur
2. "Rajayogaor conquering the Internal Nature" by Swami Vivekananda, Advaita Ashrama (Publication Department), Kolkata

Course Code	PERSONALITY DEVELOPMENT THROUGH LIFE ENLIGHTENMENT SKILLS	L	T	P	C	MARKS
24MAC201c		2	0	0	0	40

Course Category	Audit Course
Course Objective	
Develop healthy mind in a healthy body thus improving social health also. Improve efficiency	
Course Outcomes	
CO1	To learn to achieve the highest goal happily
CO2	To become a person with stable mind, pleasing personality and determination
CO3	To awaken wisdom in students

UNIT I	**10 Hrs**
Neetisatakam-Holistic development of personality Verses- 19,20,21,22 (wisdom) Verses- 29,31,32 (pride & heroism) Verses- 26,28,63,65 (virtue)	
UNIT II	**10 Hrs**
Neetisatakam-Holistic development of personality Verses- 52,53,59 (dont's) Verses- 71,73,75,78 (do's)	
UNIT III	**10 Hrs**
Approach to day to day work and duties. Shrimad Bhagwad Geeta : Chapter 2-Verses 41, 47,48 Chapter 3-Verses 13, 21, 27, 35, Chapter 6-Verses 5,13,17, 23, 35 Chapter 18-Verses 45, 46, 48	
UNIT IV	**10 Hrs**
Statements of basic knowledge. Shrimad Bhagwad Geeta: Chapter2-Verses 56, 62, 68 Chapter 12 -Verses 13, 14, 15, 16,17, 18 Personality of Role model.	
UNIT V	**10 Hrs**
Shrimad Bhagwad Geeta: Chapter 2-Verses 17, Chapter 3-Verses 36,37,42, Chapter 4-Verses 18, 38,39 Chapter18 – Verses 37,38,63	

Reference textbooks/Additional reading

1. "SrimadBhagavadGita"bySwamiSwarupanandaAdvaitaAshram(PublicationDepartment), Kolkata
2. Bhartrihari'sThree Satakam (Niti-sringar-vairagya) by P.Gopinath, RashtriyaSanskrit Sansthanam, New Delhi.

SEMESTER-III

Course Code	RESEARCH METHODOLOGY AND INTELLECTUAL PROPERTY RIGHTS	L	T	P	C	MARKS
24MPL301T		4	0	0	4	100

Course Category	Research Course

Course Objective

To understand the research problem
To know the literature studies, plagiarism and ethics
To get the knowledge about technical writing
To analyze the nature of intellectual property rights and new developments
To know the patent rights

Course Outcomes

CO1	Understand research problem formulation
CO2	Analyze research related information and Follow research ethics
CO3	Understanding that when IPR would take such important place in growth nation, it is needless to emphasis the need of information about Intellectual Property Right to be promoted among students in general & engineering in particular.
CO4	Understand that IPR protection provides an incentive to inventors for further research work and investment in R & D, which leads to creation of new and better products, and in turn brings about, economic growth and social benefits.

UNIT I — **10 Hrs**

Research Problem

Meaning of research problem, Sources of research problem, Criteria Characteristics of a good research problem, Errors in selecting a research problem, Scope and objectives of research problem. Approaches of investigation of solutions for research problem, data collection, analysis, interpretation, Necessary instrumentations

UNIT II — **10 Hrs**

Literature review

Effective literature studies approaches, analysis, Plagiarism, Research ethics.

UNIT III — **10 Hrs**

Report writing

Effective technical writing, how to write report, Paper Developing a Research Proposal, Format of research proposal, a presentation and assessment by a review committee

UNIT IV — **10 Hrs**

Nature of Intellectual Property

Patents, Designs, Trade and Copyright. Process of Patenting and Development: technological research, innovation, patenting, development. International Scenario: International cooperation on Intellectual Property. Procedure for grants of patents, Patenting under PCT.

UNIT V — **10 Hrs**

Patent Rights:

Scope of Patent Rights. Licensing and transfer of technology. Patent information and databases. Geographical Indications. New Developments in IPR: Administration of Patent System. New developments in IPR; IPR of Biological Systems, Computer Software etc. Traditional knowledge Case Studies, IPR and IITs.

Reference textbooks/Additional reading

1. Stuart Melville and Wayne Goddard, "Research methodology: an introduction for science & engineering students'"
2. Wayne Goddard and Stuart Melville, "Research Methodology: An Introduction"

3. Ranjit Kumar, 2nd Edition, “Research Methodology: A Step by Step Guide for beginners”
4. Halbert, “Resisting Intellectual Property”, Taylor & Francis Ltd ,2007.
5. Mayall, “Industrial Design”, McGraw Hill, 1992. Niebel, “Product Design”, McGraw Hill, 1974.
6. Asimov, “Introduction to Design”, Prentice Hall, 1962.
7. Robert P. Merges, Peter S. Menell, Mark A. Lemley, “Intellectual Property in New Technological Age”, 2016.
8. T. Ramappa, “Intellectual Property Rights Under WTO”, S. Chand, 2008

OPEN ELECTIVES

Course Code	PHARMACEUTICAL VALIDATION	L	T	P	C	MARKS
24MEC301a		3	0	0	3	100

Course Category	Research Course

Course Objective

The main purpose of the subject is to understand about validation and how it can be applied to industry and thus to improve the quality of the products. The subject covers the complete information about validation, types, methodology and application.

Course Outcomes

CO1	Able to explain the concept of validation and qualification in pharmaceutical industry
CO2	To qualify and calibrate various analytical instruments
CO3	To understand the qualification of various utility systems and cleaning of equipment in pharmaceutical industry
CO4	Able to develop and validate analytical method as per regulatory guidelines
CO5	To understand the concept of IPR, Patents and copyrights in pharmaceutical industry setup

UNIT I	10 Hrs

Introduction: Definition of Qualification and Validation, Advantage of Validation, Streamlining of Qualification & Validation process and Validation Master Plan. Qualification: User Requirement Specification, Design Qualification, Factory Acceptance Test (FAT)/ Site Acceptance Test (SAT), Installation Qualification, Operational Qualification, Performance Qualification, Re- Qualification (Maintaining status -Calibration Preventive Maintenance, Change management), Qualification of Manufacturing Equipment, Qualification of Analytical Instruments and Laboratory equipments

UNIT II	10 Hrs

Qualification of analytical instruments: Electronic balance, pH meter, UV-Visible spectrophotometer,
FTIR, GC, HPLC, HPTLC
Qualification of Glassware: Volumetric flask, pipette, Measuring cylinder, beakers and burette. .

UNIT III	10 Hrs

Qualification of laboratory equipments: Hardness tester, Friability test apparatus, tap density tester, Disintegration tester, Dissolution test apparatus.
Validation of Utility systems: Pharmaceutical water system & pure steam, HVAC system, Compressed air and nitrogen.

UNIT IV	10 Hrs

Cleaning Validation: Cleaning Validation - Cleaning Method development, Validation and validation of analytical method used in cleaning. Cleaning of Equipment. Cleaning of Facilities. Cleaning in place (CIP).

UNIT V	10 Hrs

Analytical method validation: General principles, Validation of analytical method as per ICH guidelines and USP.

Reference textbooks/Additional reading
1.T. Loftus & R. A. Nash, "Pharmaceutical Process Validation", Drugs and Pharm Sci. Series, Vol.129, 3rd Ed., Marcel Dekker Inc., N.Y. 2. The Theory & Practice of Industrial Pharmacy, 3rd edition, Leon Lachman, Herbert A. Lieberman,Joseph. L. Karig, Varghese Publishing House, Bombay. 3. Validation Master plan by Terveeks or Deeks, Davis Harwood International publishing. 4. Validation of Aseptic Pharmaceutical Processes, 2nd Edition, by Carleton & Agalloco, (Marcel Dekker). 5. Michael Levin, Pharmaceutical Process Scale-Up‖, Drugs and Pharm. Sci. Series, Vol. 157, 2nd Ed., Marcel Dekker Inc., N.Y.

Course Code	BIOSTATISTICS	L	T	P	C	MARKS
24MEC301b		3	0	0	3	100

Course Category	Research Course

Course Objective

The student shall know the introduction, scope of biostatistics and Research work, calculation and present of the data

Course Outcomes

CO1	The student will be known the Biostatistics arrangement, presentation and formation of tables and charts.
CO2	They also know the correlation and regression & application of different methods, analysis of data.

UNIT I		10 Hrs
An introduction to statistics and biostatistics-collection and organization of data, graphical, pictorial presentation of data, measures of central tendency and dispersion, sampling techniques, sample size, Coefficient of variation, mean error, relative error, precision and accuracy		
UNIT II		**10 Hrs**
Tests of significance: Testing hypotheses – Principles and applications of Z, t, F–ratio and chi-square tests in pharmaceutical and medical research. Non-parametric tests: sign test, Wilcoxon signed rank test, Wilcoxon rank sum test, Kruskal Wallis test, run test and median tests. .		
UNIT III		**10 Hrs**
Design of Experiments: Principles of randomization, replication and local control; CRD, RBD, LSD – their applications and analysis of data;		
UNIT IV		**10 Hrs**
Factorial Experiments – Principles and applications; Probit analysis: Dose – effect relationships, calculation of LD50, ED50		
UNIT V		**10 Hrs**
Statistical quality control: Meaning and uses, Construction of X, R, P, ηp and charts.		

Textbooks

1. Statistics for business and economics 3rd edition by Vikas books publications
2. Biostatistics & Computer applications by GN Rao and NK Tiwari
3. Sokal, R.R. and Rohlf, F.J. 1987. An Introduction to Biostatistics. W.H. Freeman and Company.
4. Bailey, N.T.J. 1981. Statistical Methods in Biology. English University Press.
5. Mitchell, K. and Glover, T. 2001. Introduction to Biostatistics. McGraw Hill, Publishing Co.

Reference Books:

1. Remington"s Pharmaceutical Sciences
2. Theory & Practice of Industrial Pharmacy by Lachman
3. Statistics for business and economics 3rd edition by Vikas books publications
4. Biostatistics & Computer applications by GN Rao and NK Tiwari
5. Sokal, R.R. and Rohlf, F.J. 1987. An Introduction to Biostatistics. W.H. Freeman and Company.
6. Bailey, N.T.J. 1981. Statistical Methods in Biology. English University Press.
7. Mitchell, K. and Glover, T. 2001. Introduction to Biostatistics. McGraw Hill, Publishing Co.

Course Code	ENTREPRENEURSHIP MANAGEMENT	L	T	P	C	MARKS
24MEC301c		3	0	0	3	100

Course Category	Research Course

Course Objective

This course is designed to impart knowledge and skills necessary to train the students on entrepreneurship management

Course Outcomes

CO1	The Role of enterprise in national and global economy
CO2	Dynamics of motivation and concepts of entrepreneurship
CO3	Demands and Challenges of Growth Strategies and Networking

UNIT I — **10 Hrs**

Conceptual Frame Work: Concept need and process in entrepreneurship development. Role of enterprise in national and global economy. Types of enterprise – Merits and Demerits. Government policies and schemes for enterprise development. Institutional support in enterprise development and management

UNIT II — **10 Hrs**

Entrepreneur: Entrepreneurial motivation – dynamics of motivation. Entrepreneurial competency – Concepts. Developing Entrepreneurial competencies - requirements and understanding the process of entrepreneurship development, self-awareness, interpersonal skills, creativity, assertiveness, achievement, factors affecting entrepreneur role.

UNIT III — **10 Hrs**

Launching and Organizing an Enterprise: Environment scanning – Information, sources, schemes of assistance, problems. Enterprise selection, market assessment, enterprise feasibility study, SWOT Analysis. Resource mobilization -finance, technology, raw material, site and manpower. Costing and marketing management and quality control. Feedback, monitoring and evaluation

UNIT IV — **10 Hrs**

Growth Strategies and Networking: Performance appraisal and assessment. Profitability and control measures, demands and challenges. Need for diversification. Future Growth – Techniques of expansion and diversification, vision strategies. Concept and dynamics. Methods, Joint venture, coordination and feasibility study.

UNIT V — **10 Hrs**

Preparing Project Proposal to Start on New Enterprise Project work – Feasibility report; Planning, resource mobilization and implementation

Reference textbooks/Additional reading

1.Akhauri, M. M. P.(1990): Entrepreneurship for Women in India, NIESBUD, New Delhi.
2. Hisrich, R. D & Brush, C.G. (1996) The Women Entrepreneurs, D.C. Health& Co., Toranto.
3. Hisrich, R.D. and Peters, M.P. (1995): Entrepreneurship – Starting Developing and Managing a New Enterprise, Richard D., Inwin, INC, USA.
4. Meredith, G.G. etal (1982): Practice of Entrepreneurship, ILO, Geneva.
5. Patel, V.C. (1987): Women Entrepreneurship – Developing New Entrepreneurs, Ahmedabad EDII
6. Arya kumar.(2012): Entrepreneurship- Creating and Leading an Entrepreneurial Organization, Pearson