1.1.1: The Institution ensures effective curriculum planning and delivery through a well-planned and documented process including Academic calendar and conduct of continuous internal Assessment

INDEX

Principal

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

ESTD : 2005

AVANTHIINSTITUTE OFPHARMACEUTICALSCIENCES

(Approved byA.I.C.T.E,P.C.I, NewDelhi,Recognized by the Govt.of A.P.&Affiliated to JNTUK, Kakinada)
Cherukupally (Village), Chittivalasa (SO),Bhogapuram (Mandal),Vizianagaram (Dist)-531162.
www.avanthipharma.ac.in, principal@avanthipharma.ac.in

AIPS/PO/APAC-2021/01 **Date: 26-04-2021**

CIRCULAR

This is to inform all the staff members that Academic Planning and Advisory Committee will be meeting to discuss important issues at 10.00 Am in the Principals chamber on 01st June 2021. All members are requested to attend the meeting without fail.

Agenda:

1. Preparation of institute academic calendar of 2021-22
2. Value added courses
3. Hospital training sessions and visits
4. Pharmacological and Analytical Project works
5. Research works and collaboration
6. Workshops/FDPs
7. Industrial visits
8. Training and Placements
9. Extracurricular/Co-curricular activities
10. Sports/NSS activities
11. Any other issues

Copy to

Dr.M.B. V.Raju	Principal
Mr.V.Umasankar	Professor, M.Pharma, PGDCR, PGDAS, Ph.D, Vice principal
Prof.S.Satyanarayana	M.Pharma,Ph.D,Scientist Emirates, Former Principal,Andhra University college of PharmaceuticalSciences, Andhra University
Dr.S.Vijay Srinivas	Ph.D,Industrial Person
Shri.C.S.Mujebuddhin	M.Pharma,CEO,CLINISOL research pvt ltd
Dr.Ch.Hemasudha	MD Gynaecology & Obstetrics Sri Sai Aditya Hospital, Visakhapatnam
Dr.N Nelima	HOD–Department of Pharmacy
Dr.G.Prashanti	Professor, M.Pharm Pharmaceutical Technology
Mr.R.Ramana	Librarian
Mr.D.KoteswaraRao	Physical Director

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., 531162

MINUTESOFTHEACADEMICPLANNINGANDADVISORYCOMMITTEE

The Academic Planning and Advisory Committee meeting was held on 10:30 AM at Principal Sir's chamber.

The Principal gave a brief description on the above objective of the Academic Planning and Advisory Committee meeting. The principal started discussing about the academic issues and emphasized the need to follow the new University regulations.

Agenda Item 1:

Preparation of Institute academic calendar of 2021-22.

Resolution:

- Mr.V.Uma Shankar, IQAC Coordinator, prepared the college Academic Calendar based on the Academic Calendar issues by the University and is handed over to the Head of the Department of Pharmacy.
- Department wise Academic Calendar was prepared by the Head of the Department basing on the Calendar issued by the Coordinator and was sent to the IQAC coordinator for his approval.
- Timetableswerepreparedandworkloadswereallottedtothefacultybasedon Academic Calendar of the institute as per the curriculum of the current semester.

Agenda Item 2:

Value added Courses

Resolution:

The members of the committee have been proposed that value added courses should be included in each department though it's not included in the curriculum as it find important for the development and employability of the students.

Agenda Item 3:

Hospital training sessions and visits:

Resolution:

The member suggested that every student should complete at least one internship per year.

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

Agenda Item 4:

Pharmacological and Analytical Project works

Resolution:

The members of the committee assigned the faculty to guide the students in project works.

Agenda Item 5:

Resear
ch works

Resolution:

- Prof.S.Satyanaran advised the faculty members to publish at least one research paper per semester in High Indexed Journal. The entire remaining faculties were suggested to publish one paper in Scopus journal.
- Shri C.S.Mujebuddhin advised all the faculty members to attend the FDP every year.
- Dr.S.Vijay Srinivas advised all the faculty members to undergo Internship Academic Interaction programmes.

Agenda Item 6:

Training and placements

Resolution:

- The Principal, AIPS staff members discussed and took is solution and informed and the faculty members to implement the following from the academic year.
- Students who cleared all the subjects and secured CGPA above 7 should enroll for GPAT Programme.
- Students who cleared all the subjects and obtained CGPA between6-7shouldenroll for

  PGECET programme.
- All the remaining students should attend CRT classes conducted by the college.
- The coordinator. S. Chandrasekhar informed the faculty members to organize various activities in the form of Competitions, Guest lectures, Career guidance, Entrepreneurship programmes etc for the students to improve their knowledge, skills and keep them abreast with the changing demands of the industries.

Agen

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

Agenda Item 7:

Workshops/FDPs

Resolution:

- Dr.Ch.Hema Sudha suggested the faculty to attend the FDP every year.
- She suggested the importance of proving training programmes to non-teaching staff in

Ms Office, Ms Word and Excel which are very useful in drafting and for preparing documents.

- She also advised the English faculty to train the junior faculty and non teaching staff to

Compose emails, notices, official letters, circulars which are necessary for the need so of their

job and also for the professional development of the institution.

Agenda Item 8:

Hospital Training and Rosters:

Resolution:

- Dr.Ch.Hemasudha suggested the faculty of followed side teaching to the students in their hospital visits which is a main programme of the curriculum.

Agenda Item 9:

Industrial Visits

Resolution:

- Dr.S.Vijay Srinivas proposed an idea of organizing regular industrial visits for the students in reputed industries like Pfizer, Aurabindo.
- To acquire knowledge on the working of men and machinery in different pharmacy industries.
- Prof.S.Satyanarayana, suggested for arranging at least two guest lecturers to students in a semester.

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

AgendaItem10:

Sports/NSS Activities

Resolution:

- Dr.M.B.V.RAJU proposed organizing Sports activities for the students and encourages the students to participate in competitions at the university, state or national level tournaments.
- He also informed the faculty members to conduct various technical events and NSS activities like Blood donation campus, Plantation drive, Swacch Bharat Campaign ,Health check-up programs etc.

AgendaItem11:

Any other Issues

Res olution :

- The IQAC coordinator instructed all the staff members to maintain updated stock registers, Maintenance registers, Complaint registers etc of all the laboratories duly verified by the committee.
- It was also resolved after the discussion and should follow IQAC Audit Action Taken Report.

Attendance Sheet:

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

S.No	Name	Designation	Signature
1.	Dr.M.B.V.Raju	Professor, M.Pharma, Ph.D, Principal	
2.	Mr.V.Uma sankar	Professor, M.Pharma, PGDCR, PGDAS,Ph.D, Viceprincipal	
3.	Prof.S.Satyanarayana	M.Pharma,Ph.D,Scientist emirates,Former Principal, Andhra University collegeof Pharmaceutical Sciences,Andhra University	
4.	Dr.S.VijaySrinivas	Ph.D,Industrial Person	VIJAYSRINIVAS
5.	Shri.C.S.Mujebuddhin	M.Pharma,CEO,CLINISOL Research pvt ltd.	
6.	Dr.Ch.HemaSudha	MDGynaecology&Obstetrics Sri Sai Aditya Hospital,Visakhapatnam	
7.	Dr.N.Neelima	HOD-Department of Pharmacy	
8.	Dr.G.Prasanthi	Professor,M.Pharm Pharmaceutical Technology	
9.	Mr.R.Ramana	Librarian	
10.	Mr.D.KoteswaraRao	Physical Director	

Principal

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

DEPARTMENT OF PHARMACY

Date: 14-06-2021

CIRCULAR

This is to inform that the Department Academic Committee (DAC) will be held on 21th June 2021 10:30 AM at Principal Sir's chamber.

Agenda:

1. Preparation of Department progress academic year 2021-22
2. Value added courses related to medical coding ,Clinical SAS
3. Certificate courses/Internship programs on Instrumentation handling
4. Project works on Pharmacological activities and Analytical designs
5. Research works on Plant extracts and their Pharmacological action
6. Training and Placements with respect to Multinational Pharmaceutical Industry needs
7. Industrial visits of formulation Pharmaceutical Industries
8. Extra curricular / Co-curricular activities
9. Sports/NSS activities
10. Any other issues

AgendaItem1:

Preparation of Department progress academic year 2021-22

Resolution:

- HOD Pharmacy analysed the results of B.Pharmacy 2020-2021 academic year and expressed satisfaction for getting more than 85% of pass percentage.
- Committee congratulated the faculty who met the target of 90% or more.

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

AgendaItem2:

Value added Courses related to medical coding ,Clinical SAS

Resolution:

The members of the committee have been proposed that value added courses related to medical coding, medical scribing and clinical SAS related to be included in each department thoughit's not included in the curriculum as it finds important for the development and employability of the B.Pharmacy & M.Pharmacy students.

Agenda Item 3:

Certificate courses/Internship programs on Instrumentation handling

Resolution:

The members suggested that every B.Pharmacy & M..Pharmacy students should complete certification courses /Internship courses related to latest instrumentation handling, thesis writing courses.

Agenda Item 4:

Project works on Pharmacological activities and Analytical designs

Resolution:

The members of the committee assigned the faculty to guide the B.Pharmacy & M.Pharmacy students in project works related to plant extracts and pharmacological activities, pharmaceutics related projects and analytical projects.

Agenda Item 5:

Research works on Plant extracts and their Pharmacological action

Resolution:

•Dr.M.B.V.RAJU Principal adviced the faculty members to publish at least one research Paper per semester in High Indexed Journal.The entire remaining faculty were suggested To publish one paper in Scopus journal.

•Mr.A.Nanaji advised all the faculty members to attend the FDP programs every year.

•Ms.D. Purnima Yadav advised all the faculty members to register in APTI.

Agenda Item6:

Training and placements with respect to Multi national Pharmaceutical Industry needs

Resolution:

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

•The Principal, AIPS staff members discussed and took are solution and informed and the faculty members to implement the following from the academic year:

•Students who cleared all the subjects and secured CGPA above7 should enroll for GPAT Programme

• Students who cleared all the subjects and obtained CGPA between 6-7 should enroll For PGECET programme.

•All the remaining students should attend CRT classes conducted by the college.

•The coordinatorY.Pavani informed the faculty members to organize various activities in the form of Competitions ,Guest lectures ,Career guidance, Entrepreneurship programmes etc for the students to improve their knowledge, skills and keep them abreast with the changing demand so for the industries.

Agenda Item 7:

Industrial Visits to formulation Pharmaceutical Industries

Resolution:

•Mr.A.Naga Srinivas proposed an idea of organizing regular industrial visits for the students in reputed industries like Pfizer, Aurabindo, Dr.Reddys Laboratories ,DIVIS Laboratories.

• To acquire knowledge on the working of men and machinery in different pharma industries.

Mr.S.Rama Krishna, suggested for arranging atleast two guest lecturers to students in a Semester.

Agenda Item 8:

Sports/NSS Activities

Resolution

•Mr.D.KoteswaraRao proposed organizing Sports activities for the students and encourages the students to participate in competitions at the university,state or national level tournaments.

•He also informed the faculty members to conduct various technical events and NSS activities like Blood donation camps, Plantation drive,Swacch Bharat Campaign, Health check-up programs etc.

Agenda Item 9:

Any other Issues

Resolution:

•The IQAC coordinator instructed all the staff members to maintain updated stock registers, Maintenance registers, Complaint registers etc of all the laboratories duly verified by the

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

committee.

•It was also resolved after the discussion and should follow IQAC Audit Action Taken Report.

List of DAC members attended:

S.No	Name	Designation	Signature
1.	Dr.M.B.V.Raju	Principal	
2.	Mr.V.UmaSankar	HOD-Department of Pharmacy Practice	
3	Mr.A.Nanaji	Associate Professor	
4.	Ms.D.Purnima Yadav	Associate Professor	
5.	Mr.Bhargav Krishna Raju	Associate Professor	
6.	Mr.V.H.S Reddy	Associate Professor	
7.	Mr.M.Vasu	Associate Professor	
8.	Mr.Vamsi KrishnaYadav	Associate Professor	
9	Ms.B.Mehree.Jyothi	Assistant Professor	
10.	Mrs.Y.Anveshi Dhanunjaya	Assistant Professor	

Principal

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

ESTD : 2005

AVANTHIINSTITUTE OFPHARMACEUTICALSCIENCES

(Approved byA.I.C.T.E,P.C.I, NewDelhi,Recognized by the Govt.of A.P.&Affiliated to JNTUK, Kakinada)
Cherukupally (Village), Chittivalasa (SO),Bhogapuram (Mandal),Vizianagaram (Dist)-531162.
www.avanthipharma.ac.in, principal@avanthipharma.ac.in

DEPARTMENT OF PHARMACY PRACTICE

Date:02-06-2021

CIRCULAR

This is to inform that the Department Academic Committee (DAC) will be held on 09th June 2021 10:30 AM at Principal Sir's chamber.

Agenda:

1. Preparation of department academic calendar of 2021-22
2. Hospital training and Hospital visits
3. Clinical Project works
4. Community centers correlated training
5. Placement in Pharma-IT Sector Companies.
6. Value added courses
7. Research works
8. Sports/NSS activities
9. Any other issues

AgendaItem1:

Preparation of Department progress academic year 2021-22

Resolution:

- HOD Pharmacy Practice analysed the results of Pharm.D 2020-2021 academic year and expressed satisfaction for getting more than 85% of pass percentage.
- Committee congratulated the faculty who met the target of 90% or more.

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

Agenda Item 2:

Hospital training and Hospital visits

Resolution:

- Mr.V.Umasankar suggested faculty to train the students to participate in bed side learning.
- Dr.V.C.Randeep Raj proposed an idea of organizing regular hospital visits for the students in reputed hospitals like K.G.H& MIMS.

Agenda Item 3:

Clinical Project works:

Resolution:

The members suggested that every student should complete atleast one clinical project which includes both cases and controls

Agenda Item 4

Community centers correlated training

Resolution:

The members of the committee assigned the Pharmacy practice faculty to guide the students to participate in community center correlated training such as B.P monitoring, Glucose monitoring.

AgendaItem5:

Placement in Pharma–IT Sector Companies:

Resolution:

- The Principal, AIPS staff members discussed and took is solution and informed and the faculty members to implement the following from the academic year:
- Students should attend CRT classes conducted by the college.
- The coordinator Dr.V.C.Randeep Raj informed the faculty members to organize various activitiesintheformofCompetitions, Guestlectures, Careerguidance, Entrepreneurship programmes etc for the students to improve their knowledge, skills and keep them abreast with the changing demands of the industries.

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

Agenda Item 6:

Value added courses

Resolution:

The members of the committee have been proposed that value added courses related to clini-SAP, clinicalresearch,Pharmacovigilance should be included in each department though its not included in the curriculum as it finds important for the development and employability of the students.

Agenda Item 7:

Research works

Resolution:

- Dr.T.Rushi advised the faculty members to publish at least one research paper per semester in High Indexed Journal. The entire remaining faculty was suggested to publish one paper in Scopus journal.

Agenda Item 8:

Sports/NSS activities

Resolution:

- Mr.D.Koteswara Rao proposed organizing Sports activities for the students and encourages the students to participate in competitions at the university, state or national level tournaments.
- Dr.T.Rushialsoinformedthefacultymemberstoconductvaroustechnicaleventsand NSS activities like Blood donation camps, Plantation drive, Swacch Bharat Campaign, Health check-up programs etc.

Agenda Item 9:

Any other Issues

Resolution:

- The IQAC coordinator instructed all the staff members to maintain updated stock registers, Maintenance registers, and Complaint registers of all the laboratories duly verified by the committee.
- It was also resolved after the discussion and should follow IQAC Audit Action Taken Report

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

List of DAC members attended:

S.No	Name	Designation	Signature
1.	Dr.M.B.V.Raju	Principal	
2.	Mr.V.Uma Sankar	HOD-Department of Pharmacy Practice	V. Uma Sankar
3.	Dr.V.C.Randeep Raj	Associate Professor	
4.	Dr.B.Manoj Kumar	Associate Professor	B. Manoj
5.	Dr.T.Rushi	Assistant Professor	
6.	Dr.D.SubhaSri	Assistant Professor	Subhasri
7.	Dr.A.Jyotsna	Assistant Professor	
8.	Dr.B.Tejasree	Assistant Professor	B. Tejasree
9.	Dr.NagaPhani Sharma	Assistant Professor	
10.	Dr.N.Hema Madhuri	Assistant Professor	Hema Madhuri

Principal

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

AVANTHI INSTITUTE OF PHARMACEUTICAL SCIENCES

(Approved by A.I.C:T.E, P.C.I, New Delhi, Recognized by the Govt. of A.P. & Affiliated to JNTUK,Kakinada)
Cherukupally (Village), Chittivalasa (SO), Bhogapuram (Mandal), Vizianagaram (Dist) -531162.
www.avanthipharma.ac.in, principal@avanthipharma.ac.in

DEPARTMENT OF PHARMACY

Ref:AIPS/B.PHARM/PAC/Cir/2022-23/01 **Date: 17-08-2021**

CIRCULAR

Members of the **Program Assessment Committee (PAC)** are requested to attend a meeting at **2:00 PM** on **23rd August 2021** in the HOD's chamber.

Agenda:

1. Review on CO-PO attainment level for academic year 2020-2021.
2. Spreading of Vision, Mission of the department.
3. Explanation of CO, PO and PSOs to the newly appointed faculty members and discussion on lab COs attainment level.
4. Attainment of CO-PO-PSO & measures taken for continuous improvement.
5. Program effectiveness.
6. Faculty and student's motivation and participation.
7. Activities leading to Quality improvement.
8. Curriculum gap identification.
9. Verification of lab maintenance record and equipments.
10. Remedial classes schedule for 2022-2023 first semester.
11. Add-on Courses Schedule

Copy To:

1. Principal Office
2. HOD
3. PAC Members

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

AVANTHI INSTITUTE OF PHARMACEUTICAL SCIENCES

(Approved by A.I.C.T.E, P.C.I, New Delhi, Recognized by the Govt. of A.P. & Affiliated to JNTUK,Kakinada)
Cherukupally (Village), Chittivalasa (SO), Bhogapuram (Mandal), Vizianagaram (Dist) -531162.
www.avanthipharma.ac.in, principal@avanthipharma.ac.in

DEPARTMENT OF PHARMACY

Ref:AIPS/B.PHARM/PAC/Cir/2021-22/01 **Date: 17-08-2021**

MINUTES OF PAC MEETING

A meeting of Program assessment committee (PAC) was held at HOD's chamber at **2:00 P.M** on **22nd August** 2021. The following members were present.

S.No	Name	Designation	Category
1.	Dr.N.Neelima	Head of the Department	Chair Person
2.	Ms.D.PurnimaYadav	Department PAC Coordinator	Member
3.	Mr.A.Nanaji	Exam Cell Coordinator	Member
4.	Mrs.Y.AnveshiDhanunjaya	Student Mentoring Coordinator	Member
5.	Mrs.B.MeherJyothi	Attendance Coordinator	Member
6.	Dr.S.Vijay Srinivas	M.Pharm Coordinator	Member

Review on Action taken in Previous Meeting:

- Chairperson presented the earlier meeting action report

S.No	Agenda Points	Action Taken
1.	Analysis of CO,PO and PSO attainment level	CO,PO and PSO attainments for all the courses is verified and discussed to improve attainment levels

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

Minutes of Meeting:

Item-1:

- Review on CO-PO attainment level in the academic year 2021-2022.

Resolution:

- HOD PHARMACY discussed and observed the CO-PO attainment target levels of the previous year and directed the faculty members concerned to take appropriate steps to attain satisfactory levels.
- HOD PHARMACY appraised the faculty members to involve the students in knowledge upgradation programs like Workshops, seminars, guest lectures etc, for the it was also suggested to organize various training programs in soft skills to improve the confidence levels, leadership qualities, team working, creative skills etc, of the students.

Item-2:

- Spreading of Vision, Mission of the department.

Resolution:

- HOD PHARMACY explained the process followed in evolving vision and mission and also presented the relation between vision and mission with institute and department and explained the process of spreading and publicizing of vision and mission through website and through stake holders etc.

Item-3:

- Explanation of CO,PO and PSOs to the newly appointed faculty members and discussion on lab COs attainment level

Resolution:

- HOD PHARMACY directed the senior faculty members to explain and train the newly appointed faculty members about COs, POs and PSOs.
- HOD PHARMACY instructed the faculty members to provide the knowledge and information to the students regarding laboratory course objectives, outcomes and ways of achieving it.

Item-4:

- Attainment of CO-PO-PSO & measures taken for continuous improvement

Resolution:

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

- The attainment of CO, PO & PSOs for all the courses was verified and discussions to improve attainments levels were carried out.
- In addition Academic performance, suggestions to improve PO &PSOs attainments are discussed and it was proposed to conduct guest lectures and seminars to create OBE awareness.
- Learning activities conducted by the faculty in the previous semester was analyzed and appreciated by the HOD.

Item-5:

- Program Effectiveness

Resolution:

- Mr.Bhargav Krishna Raju advised to improve Quality Teaching Learning process Methodologies to support week students and encourage bright students.
- He also insisted to identify curriculum gaps, content beyond the syllabus in process implementation for attaining the program outcomes and program specific outcomes.

Item-6:

- Faculty and student's motivation and participation

Resolution:

- Members of PAC suggested that department must have a plan for every semester to improve the academic result and placements.
- The students should be motivated to do multidisciplinary projects during their course of study which will enhance their understanding of multidisciplinary subjects.
- The students must be encouraged to participate in project exhibitions, which will create a project based learning environment inside the campus.

Item-7:

- Activities leading Quality improvement.

Resolution:

- Association activities should be organized and conducted by the students. It will help in not only belongingness to the college but also their leadership qualities.
- Industrial visit can be arranged with the MOU signed industries / organizations.

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

Item-8:

- Curriculum gap identification

Resolution:

- Discussed to instruct the students to register in Swayam, NPTEL,Moocs online courses to reduce the gap between academic and industry.
- HOD-PHARMACY proposed to organize regular industrial visits for the students in reputed multinational organizations like Pfizer, AUROBINDO.

Item-9:

- The verification of lab maintenance records and equipment's.

Resolution:

- Mr.M.Vasu has been appointed as Department Overall Lab in-charge to find the required maintenance and to purchase the required equipment.
- The Lab technicians were asked to verify the minimum Lab requirements such as manuals, equipment login books to ensure the smooth functioning of Lab experiments for the coming semester.
- A discussion on the new labs introduced as per the current regulation for the next semester was carried out.
- Suggested maintaining lab manuals according to university.
- The conduction of experiments beyond the syllabus in the respective labs to enhance the practical knowledge of students.

Item-10:

- Remedial classes schedule for 2022-2023 first semester

Resolution:

- Mrs.M.Venkata Naga Deepika has been appointed as Remedial classes in-charge to identify the underperforming students basing their semester results.
- After completion of mid I exams, remedial classes are going to conduct for slow learners based on their performance in mid exams.
- A proposal was made to conduct extra classes and remedial classes to slow learners with an aim to improve the pass percentage.

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

Item-11:

- Add-on courses

Resolution:

- PAC discussed the schedule of Add-on courses , proposed to be conducted for II and IV B.Pharmacy students.
- Based on the Add-on courses options given by the students, the courses will be according scheduled.
- Some faculty members suggested starting of courses like Medical coding, Pharmacovigilance, Clinical SAS.
- Swayam, NPTEL,APSCHE training program were recommended.

Venue: HOD'S Cabin

S.NO	Name	Signature
1.	Dr.N.Neelima HOD Pharmacy	N. Neelima
2.	Ms.D.PurnimaYadav Department PAC Coordinator	D. Purima
3.	Mr.Ch.Madhu Exam Cell Coordinator	
4.	Mrs.Y.Anveshi Dhanunjaya Student Mentoring Coordinator	
5.	Mrs.B.Meher Jyothi Attendance Coordinator	B. Meher Jyothi
6.	Dr.G.Prashanti M.Pharm Coordinator	G. Prasanthi

N. Neelima
HOD Pharmacy

Principal

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

ESTD : 2005

AVANTHI INSTITUTE OF PHARMACEUTICAL SCIENCES

(Approved by A.I.C.T.E, P.C.I, New Delhi, Recognized by the Govt. of A.P. & Affiliated to JNTUK,Kakinada)
Cherukupally (Village), Chittivalasa (SO), Bhogapuram (Mandal), Vizianagaram (Dist) -531162.
www.avanthipharma.ac.in, principal@avanthipharma.ac.in

DEPARTMENT OF PHARMACY

Ref:AIPS/B.PHARM/PAC/Cir/2021-22/01 **Date: Date:09-02-2021**

CIRCULAR

This is to inform that a meeting will be held for the Members of the Program Assessment Committee (PAC) in the HOD's chamber on date 2023 at 2:00 P.M. All the members are requested to attend the meeting without fail.

Agenda:

1. Teaching Learning methods practiced.
2. Result Analysis.
3. Assessment methods, attainment of COs, Pos, with program effectiveness.
4. Training and placement progress with feedback from recruiters.
5. Report on program activities and status.
6. Industrial training and Internships.
7. Students participation in co curricular and extracurricular activities.
8. Faculty Research and publications and participation in FDP's, seminars. Workshops etc.
9. Add-on Courses Schedule.

Copy To:

1. Principal Office
2. HOD
3. PACMembers

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

AVANTHI INSTITUTE OF PHARMACEUTICAL SCIENCES

(Approved by A.I.C.T.E, P.C.I, New Delhi, Recognized by the Govt. of A.P. & Affiliated to JNTUK,Kakinada)
Cherukupally (Village), Chittivalasa (SO), Bhogapuram (Mandal), Vizianagaram (Dist) -531162.
www.avanthipharma.ac.in, principal@avanthipharma.ac.in

DEPARTMENT OF PHARMACY

Ref:AIPS/B.PHARM/PAC/Cir/2021-22/01 **Date:14-02-2021**

MINUTES OF PAC MEETING

A meeting of Program assessment committee (PAC) was held in HOD's chamber at 2:00 P.M on date 2022. The following members were present.

S.No	Name	Designation	Category
1.	Dr.N.Neelima	Professor & Head of the Department	Chair Person
2.	Mrs.B.Chaitanya	Training and Placement Coordinator	Member
3.	Ms.D.PurnimaYadav	Department PAC Coordinator	Member
4.	Mrs.Y.AnveshiDhanunjaya	Student MentoringCoordinator	Member
5.	Mrs.B.MeherJyothi	Attendance Coordinator	Member
6.	Mr.Ch.Madhu	Exam Cell Coordinator	Member
7.	Mr.A.Nanaji	Project Coordinator	Member
8.	Dr.G.Prashanti	M.Pharm Coordinator	Member

Review on Action taken in Previous Meeting:

- Welcome to our beloved Chairperson Dr.M.B.Venkatapathi Raju Garu to review the action taken in previous meeting.
- Committee discussed about recently announced B.Pharmacy II semester and IV semester results
- Chairperson expressed satisfaction for getting > 80% of results.
- Committee discussed about minor changes in course outcome of B.Pharmacy final semester Elective subjects.

S.No	Agenda Points	Action Taken
1.	Analysis of CO,PO and PSO attainment level	CO,PO and PSO attainments for all the courses is verified and discussed to improve attainment levels

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

Minutes of Meeting:

Item-1:

- Teaching and Learning methods practiced.

Resolution:

- PAC members suggested that every faculty should practice innovative ideas of teaching that can be updated periodically.
- The Outcome of the FDP Participation can be shared with other faculty members in the department.
- The knowledge gained from online courses completed by faculty should be disseminated to the students.
- The identified curriculums gap and fulfillment of the same can be documented in the course file.

Item-2:

- Result Analysis.

Resolution:

- Class wise results were presented and department wise comparisons were also done.
- The results for the students in some subjects are need to be analyzed.
- The class mentors are requested to closely interact with students during the mentor meetings and identify the difficulties faced by them in learning subjects.
- The faculty members are advised to follow effective teaching learning methods for improvement of academic performance.
- Members suggested to get the feedback from the students for poor results and based on that remedial action can be planned.
- Faculty members are requested to analyze internal and external factors influencing the performance of their subject and based on that plan should prepared to improve performance of students.

Item-3:

- Assessment methods, attainment of COs, POs, with program effectiveness.

Resolution:

- The reasons for decrease in attainment level of few subjects are analyzed and the result arediscussed with faculty members who is currently taking the course.

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

- The faculty members provide the reasons behind the decrease in the attainment level for few subjects and the remedial actions can be suggested.
- The CO calculations for odd semester can be filed in the corresponding course files.

Item-4:

- Training and placement progress with feedback from recruiters.

Resolution:

- It has been suggested to collect feedback given by the employers specific to the B.PHARMACY department, analyze the same and provide the reports.
- Members are asked to provide the actions taken based on feedback and suggested to implement those actions for the current final year students.
- Members suggested to display the placed students in various places of the department.
- Insisted to motivate the II and III year students to participate in virtual internship training.
- Suggested to include department faculty in the group discussion and mock interviews along with English faculty.

Item-5:

- Report on program activities and status

Resolution:

- Members suggested executing all the planned activities without fail and the benefits received by the students should be recorded.
- The members advised to publish the activities and events organized by the department in the respective newsletters and college website.

Item-6:

- Industrial training and Internships.

Resolution:

- The students must undergo atleast one internship during the course of study and hence members advised to check the status of the final year students and encourage them to undergo the training in online.

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

- Members suggested to incorporate industrial training outcomes as a quantitative measure in outcome attainment.

Item-7:

- Students participation in co curricular and extracurricular activities.

Resolution:

- Members suggested to consolidate the number of events participated by students and the number of prizes won by the students.
- The students publications need to be properly tracked by the faculty members and should be documented.
- The certificates of recent online courses completed by the students are to be collected.

Item-8:

- Faculty Research and publications and participations in FDP's, seminars, workshops etc.

Resolution:

- HOD - PHARMACY advised the faculty members to attend at least one FDP organized by AICTE/ Universities and informed each and every faculty to enroll in NPTEL courses and to complete certification.
- She further stated about the provision of research incentives to the faculty involved in Research and Development activities as per the Research Promotion Policy of the college in order to promote research culture and to encourage faculty to involve in research activities.
- Discussions were carried out on the learning activities conducted by the faculty members in the last semester.

Item-9:

- Add –on Courses Schedule.

Resolution:

- PAC discussed the schedule of Add- on courses, proposed to be conducted in semester - III B.Pharmacy students.
- Based upon the Add – on courses options given by the students, the courses will be according scheduled.

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

- Some faculty members suggested starting of courses like Clinical SAS programming, Pharmacovigilance and Medical coding.

Venue: HOD's Cabin

S.No	Name	Signature
1.	Dr.N.Neelima Professor&Head of the Department	N. Neelima
2.	Mrs.B.Chaitanya Training and Placement Coordinator	B. Chaitanya
3.	Ms.D.PurnimaYadav Department PAC Coordinator	D. Purnima
4.	Mrs.Y.Anveshi Dhanunjaya Student Mentoring Coordinator	
5.	Mrs.B.Meher Jyothi Attendance Coordinator	B. Meher Jyothi
6.	Mr.Ch.Madhu Exam Cell Coordinator	
7.	Mr.A.Nanaji Project Coordinator	
8.	Dr.G.Prashanti M.Pharm Coordinator	G. Prasanthi

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

AVANTHI INSTITUTE OF PHARMACEUTICAL SCIENCES

(Approved by A.I.C.T.E, P.C.I, New Delhi, Recognized by the Govt. of A.P. & Affiliated to JNTUK,Kakinada)
Cherukupally (Village), Chittivalasa (SO), Bhogapuram (Mandal), Vizianagaram (Dist) -531162.
www.avanthipharma.ac.in, principal@avanthipharma.ac.in

DEPARTMENT OF PHARMACY PRACTICE

Ref:AIPS/PHARM.D/PAC/Cir/2021-22/01 **Date: 18-08-2021**

MINUTES OF PAC MEETING

A meeting of Program assessment committee (PAC) was held at HOD's chamber at 10:00 A.M on 18th August 2021. The following members were present.

S.No	Name	Designation	Category
1.	Mr.V.Uma Sankar	Head of the Department	Chair Person
2.	Dr.V.C.Randeep Raj	Training and Placement Coordinator	Member
3.	Dr.B.Tejasree	Department PAC Coordinator	Member
4.	Dr.T.Rushi	Student MentoringCoordinator	Member
5.	Dr.B.Manoj Kumar	Attendance Coordinator	Member
6.	Mr.Ch.Madhu	Exam Cell Coordinator	Member

Review on Action taken in Previous Meeting:

Welcome to our beloved Chairperson Dr.V.Uma Sankar Garu to review the action taken in previous meeting. Chairperson presented the earlier meeting action report

S.No	Agenda Points	Action Taken
1.	Analysis of CO,PO and PSO attainment level	CO,PO and PSO attainments for all the courses is verified and discussed to improve attainment levels

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

Minutes of Meeting:

Item-1:

- Teaching and Learning methods practiced.

Resolution:

- PAC members suggested that every faculty practice innovative ideas of teaching that can be updated periodically.
- The Outcome of the FDP Participation related to Pharmacovigilance and clinical research can be shared with other faculty members in the department.
- The knowledge gained from online courses completed by faculty should be disseminated to the students.
- The identified curriculums gap and fulfillment of the same can be documented in the course file.

Item-2:

- Result Analysis.

Resolution:

- Class wise results were presented.
- The results for some subjects are need to be analyzed.
- The class mentors are requested to closely interact with students during the mentor meetings and identify the difficulties faced by them in learning subjects.
- The faculty members are advised to identify the follow effective teaching learning methods for improvement of academic performance.
- Members suggested to get the feedback from the students for poor results and based on that remedial action can be planned.
- Faculty members are requested to analyze internal and external factors influencing the performance of their subject and based on that plan should prepared to improve performance of students.

Item-3:

- Assessment methods, attainment of COs, POs, with program effectiveness.

Resolution:

- The attainment levels of subjects can be analyzed and the result can be discussed with faculty members who is currently taking the course.

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

Item-4:

- Training and placement progress with feedback from recruiters.

Resolution:

- It has been suggested to collect feedback given by the employers specific to the PHARM.D department, analyze the same and provide the reports.
- Members asked to provide theactions taken based on feedback and suggested to implement those actions for the current final year students.
- Members suggested to display the placed students in various places of the department.
- Insisted to motivate the II and III year students to participate in virtual internship training.
- Suggested to include department faculty in the group discussion and mock interviews along with English faculty.

Item-5:

- Report on program activities and status

Resolution:

- Members suggested executing all the planned activities without fail and the benefits received by the students should be recorded.
- The members advised to publish the activities and events organized by the department in the respective newsletters and college website.

Item-6:

- Internships.

Resolution:

- The students must undergo one internship during the course of study and hence members advised to check the status of the final year students and encourage them to undergo the training in multispeciality hospitals such as KGH, Medicover hospitals, Apollo hospitals etc.

AVANTHI INSTITUTE OF PHARMACEUTICAL SCIENCES * AVANTHI EDUCATIONAL SOCIETY * HYDERABAD * VIZIANAGARAM *

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

Item-7:

- Students participation in co curricular and extracurricular activities.

Resolution:

- Members suggested to consolidate the number of events participated by students and the number of prizes won by the students.
- The students research articles and review articles need to be properly tracked by the faculty members and should be documented.
- The certificates of recent online courses completed by the students should be collected.

Item-8:

- Faculty Research and publications and participations in FDP's, seminars, workshops etc.

Resolution:

- HOD – PHARM.D advised the faculty members to attend at least one FDP organized by AICTE/ Universities/ Hospitals and informed each and every faculty to enroll in NPTEL courses,Vigilance related courses and to complete certification.
- He further stated about the provision of research incentives to the faculty involved in Research and Development activities as per the Research Promotion Policy of the college in order to promote research culture and to encourage faculty to involve in research activities.
- Discussions were carried out on the learning activities conducted by the faculty members in the last year.

Item-9:

- Add –on Courses Schedule.

Resolution:

- PAC discussed the schedule of Add- on courses, proposed to be conducted for III& IV PHARM.D Students.
- Based upon the Add – on courses options given by the students, the courses will be accordingly scheduled.
- Some faculty members suggested starting of courses like Clinical SAS programming, Pharmacovigilance and Medical coding.

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

Venue: HOD's Cabin

S.NO	Name	Signature
1.	Mr.V.Uma Sankar Head of the Department	V. Uma Sankar
2.	Dr.V.C.Randeep Raj Training and Placement Coordinator	
3.	Dr.B.Tejasree Department PAC Coordinator	B. Tejasree
4.	Dr.T.Rushi Student MentoringCoordinator	
5.	Dr.B.Manoj Kumar Attendance Coordinator	B. Manoj
6.	Mr.Ch.Madhu Exam Cell Coordinator	

Principal

AVANTHI INSTITUTE OF PHARMACEUTICAL SCIENCES
AVANTHI EDUCATIONAL SOCIETY
HYDERABAD
VIZIANAGARAM

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

DEPARTMENT OF PHARMACY PRACTICE

Ref:AIPS/PHARM.D/PAC/Cir/2021-22/01 **Date: 10-11-2021**

MINUTES OF PAC MEETING

A meeting of Program assessment committee (PAC) was held in HOD's chamber at 10:00 A.M on 12th Feb 2021. The following members were present.

S.No	Name	Designation	Category
1.	Mr.V.Uma Sankar	Head of the Department	Chair Person
2.	Dr.V.C.Randeep Raj	Training and Placement Coordinator	Member
3.	Dr.B.Tejasree	Department PAC Coordinator	Member
4.	Dr T Rushi	Student MentoringCoordinator	Member
5.	Dr.B.Manoj Kumar	Attendance Coordinator	Member
6.	Mr.Ch.Madhu	Exam Cell Coordinator	Member
7.	Dr.A.Jyotsna	Project Coordinator	Member
8.	Dr.D.Subhasree	Pharm.D Coordinator	Member

Review on Action taken in Previous Meeting:

Chairperson presented the meeting action report.

S.No	Agenda Points	Action Taken
1.	Analysis of CO,PO and PSO attainment level	CO,PO and PSO attainments for all the courses is verified and discussed to improve attainment levels

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

Minutes of Meeting:

Item-1:

- Teaching and Learning methods practiced.

Resolution:

- PAC members suggested that every faculty practice innovative ideas of teaching that can be updated periodically.
- The Outcome of the FDP Participation can be shared with other faculty members in the department.
- The rubrics can be formed for the evaluation of the assignments and tutorials.
- The knowledge gained from online courses completed by faculty should be disseminated to the students.
- The identified curriculums gap and fulfillment of the same can be documented in the course file.

Item-2:

- Result Analysis.

Resolution:

- Class wise results were presented and department wise comparisons were also done.
- The results for the results in some subjects are need to be analyzed.
- The class mentors are requested to closely interact with students during the mentor meetings and identify the difficulties faced by them in learning subjects.
- The faculty members are advised to identify the follow effective teaching learning methods for improvement of academic performance.
- Members suggested to get the feedback from the students for poor results and based on that remedial action can be planned.
- Faculty members are requested to analyze internal and external factors influencing the performance of their subject and based on that plan should prepared to improve performance of students.

Item-3:

- Assessment methods, attainment of COs,POs, with program effectiveness.

Resolution:

- The reasons for decrease in attainment level of few subjects can be analyzed and the result can be discussed with faculty members who is currently taking the course.

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

- The faculty members can provide the reasons behind the decrease in the attainment level for few subjects and the remedial actions can be suggested.
- The CO calculations for odd semester can be filed in the corresponding course files.
- The members insisted to check the attainment of PO6 and PO7 measures taken by the faculty members to attain PO6 and PO and must be recorded properly.

Item-4:

- Training and placement progress with feedback from recruiters.

Resolution:

- It has been suggested to collect feedback given by the employers specific to the PHARM.D, analyze the same and provide the reports.
- Members asked to provide the actions taken based on feedback and suggested to implement those actions for the current final year students.
- Members suggested to display the placed students in various places of the department.
- Insisted to motivate the II and III year students to participate in virtual internship training.
- Suggested to include department faculty in the group discussion and mock interviews along with English faculty.
- The appointment orders of the current passed students should be collected and filled properly.

Item-5:

- Report on program activities and status

Resolution:

- Members suggested executing all the planned activities without fail and the benefits received by the students should be recorded.
- The members advised to publish the activities and events organized by the department in the respective newsletters and college website.

Item-6:

- Internships.

Resolution:

- The students must undergo one internship during the course of study and hence members advised to check the status of the final year students and encourage them to undergo the training in Hospital.

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., 531162

Item-7:

- Student's participation in co curricular and extracurricular activities.

Resolution:

- Members suggested to consolidate the number of events participated by students and the number of prizes won by the students.
- The student's publications need to be properly tracked by the faculty members and should be documented.
- The certificates of recent online courses completed by the students should be collected.

Item-8:

- Faculty Research and publications and participations in FDP's, seminars, workshops etc.

Resolution:

- HOD – PHARM.D advised the faculty members to attend at least one FDP organized by AICTE/ Universities and informed each and every faculty to enroll in NPTEL courses and to complete certification.
- He further stated about the provision of research incentives to the faculty involved in Research and Development activities as per the Research Promotion Policy of the college in order to promote research culture and to encourage faculty to involve in research activities.
- Discussions were carried out on the learning activities conducted by the faculty members in the last year.

Item-9:

- Add –on Courses Schedule.

Resolution:

- PAC discussed the schedule of Add- on courses, proposed to be conducted for - II & III PHARM.D
- Based upon the Add – on courses options given by the students, the courses will be according scheduled.
- Some faculty members suggested starting of courses like Clinical SAS programming, Pharmacovigilance and Medical coding.

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

Venue: HOD's Cabin

S.NO	Name	Signature
1.	Mr.V.Uma Sankar Head of the Department	V. Umasankar
2.	Mr.V.C.Randeep Raj Training and Placement Coordinator	
3.	Mrs.B.Tejasree Department PAC Coordinator	B. Tejasree
4.	Mr.T.Rushi Student MentoringCoordinator	
5.	Mr.B.Manoj Kumar Attendance Coordinator	
6.	Mr.Ch.Madhu Exam Cell Coordinator	
7.	Dr.A.Jyotsna Project Coordinator	A. Jyotsna
8.	Dr.D.Subhasree Pharm.D Coordinator	Subha Sree

Principal

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

Website: www.jntuk.edu.in
Email: dap@jntuk.edu.in

Mobile: 9849136135

Directorate of Academic and Planning

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA
KAKINADA-533003, Andhra Pradesh, INDIA
(Established by AP Government Act No. 30 of 2008)

Lr. No. JNTUK/DAP/AC/B. Pharmacy/I Year/2021-22 *Date: 21-01-2022*

Dr. KVSG Murali Krishna,
M.E., Ph.D.
Director, Academic and Planning
JNTUK, Kakinada

To
All the Principals of Affiliated Colleges
JNTUK, Kakinada.

Revised Academic Calendar for I Year - B. Pharmacy for the AY 2021-22

I SEMESTER			
Description	**From**	**To**	**Weeks**
Commencement of Class Work	**10.01.2022**		
I Unit of Instructions	10.01.2022	05.03.2022	8W
I Mid Examinations	28.02.2022	05.03.2022	
II Unit of Instructions	07.03.2022	30.04.2022	8W
II Mid Examinations	25.04.2022	30.04.2022	
Preparation & Practicals	02.05.2022	07.05.2022	1W
End Examinations	09.05.2022	21.05.2022	2W
Commencement of II Semester Class Work	**30.05.2022**		
II SEMESTER			
I Unit of Instructions	**30.05.2022**	23.07.2022	8W
I Mid Examinations	18.07.2022	23.07.2022	
II Unit of Instructions	25.07.2022	17.09.2022	8W
II Mid Examinations	12.09.2022	17.09.2022	
Preparation & Practicals	19.09.2022	24.09.2022	1W
End Examinations	26.09.2022	08.10.2022	2W
Commencement of next Year Class Work	**17.10.2022**		

Director Academic and Planning
JNTUK Kakinada

Director
Academic Planning
JNTUK Kakinada

Copy to the Secretary to Hon'ble Vice Chancellor, JNTUK
Copy to the PA to Rector, JNTUK
Copy to the PA to Registrar, JNTUK
Copy to Director Academic Audit, JNTUK
Copy to Director of Evaluation, JNTUK

PRINCIPAL
Avanthi Institute of Pharmaceutical Scien
Cherukupally (V), Bhogapuram Man
Vizianagaram Dt., - 531162

Website: www.jntuk.edu.in
Email: dapa jntuk.edu.in

Mobile: 9849136135

Directorate of Academic and Planning

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA
KAKINADA-533003, Andhra Pradesh, INDIA
(Established by AP Government Act No. 30 of 2008)

Lr. No. JNTUK DAP/EAC/B. Pharmacy I Year/2021-22 *Date: 10-03-2022*

Dr. KVSG Murali Krishna,
M.E., Ph.D.
Director, Academic and Planning
JNTUK, Kakinada

To
All the Principals of Affiliated Colleges
JNTUK, Kakinada.

Revised Academic Calendar for I Year - B. Pharmacy for the AY 2021-22

I SEMESTER			
Description	**From**	**To**	**Weeks**
Commencement of Class Work	**24.01.2022**		
Induction Programme	24.01.2022	12.02.2022	3W
I Unit of Instructions	14.02.2022	09.04.2022	8W
I Mid Examinations	03.04.2022	09.04.2022	
II Unit of Instructions	11.04.2022	04.06.2022	8W
II Mid Examinations	30.05.2022	04.06.2022	
Preparation & Practicals	06.06.2022	11.06.2022	1W
End Examinations	13.06.2022	25.06.2022	2W
Commencement of II Semester Class Work	**27.06.2022**		
II SEMESTER			
I Unit of Instructions	**27.06.2022**	20.08.2022	8W
I Mid Examinations	15.08.2022	20.08.2022	
II Unit of Instructions	22.08.2022	15.10.2022	8W
II Mid Examinations	17.10.2022	22.10.2022	
Preparation & Practicals	24.10.2022	29.10.2022	1W
End Examinations	31.10.2022	12.11.2022	2W
Commencement of next Year Class Work	**14.11.2022**		

KVSG

Director Academic and Planning
JNTUK Kakinada

Director
Academic Planning
JNTUK Kakinada

Copy to the Secretary to Hon'ble Vice Chancellor, JNTUK
Copy to the PA to Rector, JNTUK
Copy to the PA to Registrar, JNTUK
Copy to Director Academic Audit, JNTUK
Copy to Director of Evaluation, JNTUK

AVANTHI INSTITUTE OF PHARMACEUTICAL SCIENCES · AVANTHI EDUCATIONAL SOCIETY · HYDERABAD · VIZIANAGARAM

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

Website: www.jntuk.edu.in
Email: dap@jntuk.edu.in

Phone: 0884-2300991

Directorate of Academic Planning

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA
KAKINADA-533003, Andhra Pradesh, INDIA
(Established by AP Government Act No. 30 of 2008)

Lr. No. DAP/RAC/ II Year B. Pharmacy/2021 *Date 29.10.2021*

Dr. R. Srinivasa Rao,
Director, Academic Planning
JNTUK, Kakinada

To
All the Principals of Affiliated Colleges,
JNTUK, Kakinada.

Revised Academic Calendar for II B. Pharmacy for the AY 2021-22
(As per G.O. Rt. No.242, Higher Education (U.E) Dept., dated 13.09.2021)

I SEMESTER			
Description	**From**	**To**	**Weeks**
Commencement of Class Work	**12.10.2021**		
I Unit of Instruction	12.10.2021	27.11.2021	7W
I Mid Examinations	29.11.2021	04.12.2021	1W
II Unit of Instructions	06.12.2021	22.01.2022	7W
II Mid Examinations	24.01.2022	29.01.2022	1W
Preparation & Practicals	31.01.2022	05.02.2022	1W
End Examinations	07.02.2022	19.02.2022	2W
Commencement of II Semester Class Work	**21.02.2022**		
II SEMESTER			
I Unit of Instructions	**21.02.2022**	09.04.2022	7W
I Mid Examinations	11.04.2022	16.04.2022	1W
II Unit of Instructions	18.04.2022	04.06.2022	7W
II Mid Examinations	06.06.2022	11.06.2022	1W
Preparation & Practicals	13.06.2022	18.06.2022	1W
End Examinations	20.06.2022	02.07.2022	2W
Commencement of next Year Class Work			
Note: Calendar is prepared with 8 hrs/day hence 7 weeks per instruction period			

R. Srinivasa Rao
Director Academic Planning
Director
Academic Planning
JNTUK Kakinada

Copy to the Secretary to the Hon'ble Vice Chancellor, JNTUK
Copy to Rector, Registrar, JNTUK
Copy to Director Academic Audit, JNTUK
Copy to Director of Evaluation, JNTUK

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

Website: www.jntuk.edu.in
Email: dap@jntuk.edu.in

Phone: 0884-2300991

Directorate of Academic Planning

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA
KAKINADA-533003, Andhra Pradesh, INDIA
(Established by AP Government Act No. 30 of 2008)

Lr. No. DAP/RAC/ II,III & IV Year /B. Tech/B. Pharmacy/2021 *Date 08.10.2021*

Dr. R. Srinivasa Rao,
Director, Academic Planning
JNTUK, Kakinada

To
All the Principals of Affiliated Colleges,
JNTUK, Kakinada.

Revised Academic Calendar for II, III, IV Year - B. Tech/B. Pharmacy for the AY 2021-22
(As per G.O. Rt. No. 242, Higher Education (U.E) Dept., dated 13.09.2021)

I SEMESTER			
Description	**From**	**To**	**Weeks**
Commencement of Class Work	**01.10.2021**		
I Unit of Instruction	01.10.2021	20.11.2021	7W
I Mid Examinations	22.11.2021	27.11.2021	1W
II Unit of Instructions	29.11.2021	15.01.2022	7W
II Mid Examinations	17.01.2022	22.01.2022	1W
Preparation & Practicals	24.01.2022	29.01.2022	1W
End Examinations	31.01.2022	12.02.2022	2W
Commencement of II Semester Class Work	**14.02.2022**		
II SEMESTER			
I Unit of Instructions	**14.02.2022**	02.04.2022	7W
I Mid Examinations	04.04.2022	09.04.2022	1W
II Unit of Instructions	11.04.2022	28.05.2022	7W
II Mid Examinations	30.05.2022	04.06.2022	1W
Preparation & Practicals	06.06.2022	11.06.2022	1W
End Examinations	13.06.2022	25.06.2022	2W
Commencement of next Year Class Work			
Note: Calendar is prepared with 8 hrs/day hence 7 weeks per instruction period			

R. Srinivasa Rao
Director Academic Planning

Director
Academic Planning
JNTUK Kakinada

Copy to the Secretary to the Hon'ble Vice Chancellor, JNTUK
Copy to Rector, Registrar, JNTUK
Copy to Director Academic Audit, JNTUK
Copy to Director of Evaluation, JNTUK

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

Website: www.jntuk.edu.in
Email: dap@jntuk.edu.in

Phone: 0884-2300991
Mobile: 7032894555

Directorate of Academic Planning

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA
KAKINADA-533003, Andhra Pradesh, INDIA
(Established by AP Government Act No. 30 of 2008)

Lr. No. JNTUK/DAP/R AC/M. Pharmacy/I Year/2021-22 *Date: 10-03-2021*

Dr. KVSG Murali Krishna,
M.E, Ph.D.,
Director, Academic Planning
JNTUK, Kakinada

To
All the Principals of Affiliated Colleges,
JNTUK, Kakinada.

Revised Academic Calendar for I Year M. Pharmacy
Academic year 2021-22

I SEMESTER			
Description	**From**	**To**	**Weeks**
Commencement of Class Work	**24.01.2022**		
Induction Programme	24.01.2022	12.02.2022	3W
I Unit of Instructions	14.02.2022	09.04.2022	8W
I Mid Examinations	03.04.2022	09.04.2022	
II Unit of Instructions	11.04.2022	04.06.2022	8W
II Mid Examinations	30.05.2022	04.06.2022	
Preparation & Practicals	06.06.2022	11.06.2022	1W
End Examinations	13.06.2022	25.06.2022	2W
Commencement of II Semester Class Work	**27.06.2022**		
II SEMESTER			
I Unit of Instructions	**27.06.2022**	20.08.2022	8W
I Mid Examinations	15.08.2022	20.08.2022	
II Unit of Instructions	22.08.2022	15.10.2022	8W
II Mid Examinations	17.10.2022	22.10.2022	
Preparation & Practicals	24.10.2022	29.10.2022	1W
End Examinations	31.10.2022	12.11.2022	2W
Commencement of next Year Class Work	**14.11.2022**		

10/3/22
Director Academic Planning
Dr. KVSG Murali Krishna
Director
Academic Planning
JNTUK Kakinada

Copy to the Secretary to the Hon'ble Vice Chancellor, JNTUK.
Copy to the PA to the Rector, JNTUK
Copy to the PA to the Registrar, JNTUK.
Copy to Director of Evaluation, JNTUK
Copy to Director, IST, JNTUK.

AVANTHI INSTITUTE OF PHARMACEUTICAL SCIENCES * AVANTHI EDUCATIONAL SOCIETY * HYDERABAD * VIZIANAGARAM

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

Website: www.jntuk.edu.in
Email: dap@jntuk.edu.in

Phone: 0884-2300991
Mobile: 8008631555

Directorate of Academic Planning

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA
KAKINADA-533003, Andhra Pradesh, INDIA
(Established by AP Government Act No. 30 of 2008)

Lr. No. JNTUK/DAP/AC/M. Tech/M. Pharmacy/I Year/2021-22 *Date: 31-12-2021*

Dr. KVSG Murali Krishna,
M.E, Ph.D.,
Director, Academic Planning
JNTUK, Kakinada

To
All the Principals of Affiliated Colleges,
JNTUK, Kakinada.

Revised Academic Calendar for I Year M. Tech/M. Pharmacy
Academic year 2021-22

I SEMESTER			
Description	**From**	**To**	**Weeks**
Commencement of Class Work	**03.01.2022**		
I Unit of Instruction	**03.01.2022**	26.02.2022	8W
I Mid Examinations	21.02.2022	26.02.2022	
II Unit of Instructions	28.02.2022	23.04.2022	8W
II Mid Examinations	18.04.2022	23.04.2022	
Preparation & Practicals	25.04.2022	30.04.2022	1W
End Examinations	02.05.2022	14.05.2022	2W
Commencement of II Semester Class Work	**23.05.2022**		
II SEMESTER			
I Unit of Instructions	**23.05.2022**	16.07.2022	8W
I Mid Examinations	11.07.2022	16.07.2022	
II Unit of Instructions	18.07.2022	10.09.2022	8W
II Mid Examinations	12.09.2022	17.09.2022	
Preparation & Practicals	19.09.2022	24.09.2022	1W
End Examinations	26.09.2022	08.10.2022	2W
Commencement of next Year Class Work	**10.10.2022**		

31.12.21

Director Academic Planning

Director
Academic Planning
JNTUK Kakinada

Copy to the Secretary to the Hon'ble Vice Chancellor, JNTUK.
Copy to the PA to the Rector, JNTUK
Copy to the PA to the Registrar, JNTUK.
Copy to Director of Evaluation, JNTUK.
Copy to Director, IST, JNTUK.

PRINCIPAL
Avanthi Institute of Pharmaceutical Science
Cherukupally (V), Bhogapuram Mand
Vizianagaram Dt., - 531162

Website: www.jntuk.edu.in
Email: dap@jntuk.edu.in

Phone: 0884-2300991

Directorate of Academic Planning

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA
KAKINADA-533003, Andhra Pradesh, INDIA
(Established by AP Government Act No. 30 of 2008)

Lr. No. JNTUK/DAP/AC/II Year/ M. Pharmacy /2021-22 *Date: 29-10-2021*

Dr. R. Srinivasa Rao,
Director, Academic Planning
JNTUK, Kakinada

To
All the Principals of Affiliated Colleges,
JNTUK, Kakinada.

Academic Calendar for II Year M. Pharmacy Academic Year 2021-22
(As per G.O. Rt. No.242, Higher Education (U.E) Dept., dated 13.09.2021)

III & IV SEMESTER			
Description	**From**	**To**	**Weeks**
Commencement of Project Work	**01.11.2021**		
III Semester*	01.11.2021	02.04.2022	22 W
IV Semester	04.04.2022	03.09.2022	22 W
Thesis submission duration	05.09.2022	30.09.2022	4 W

***Non-University examination, but department has to conduct internal mid-term examinations as per University norms. The student should get at least 50% marks in internal examinations to get satisfactory in the Research Methodology & Biostatics.**

Director Academic Planning

Director
Academic Planning
JNTUK Kakinada

Copy to the Secretary to the Hon'ble Vice Chancellor, JNTUK
Copy to Rector, JNTUK
Copy to Registrar, JNTUK
Copy to Director Academic Audit, JNTUK
Copy to Director of Evaluation, JNTUK

PRINCIPAL
Avanthi Institute of Pharmaceutical Science
Cherukupally (V), Bhogapuram Manda
Vizianagaram Dt., - 531162

Email: dapa@jntuk.edu.in

Phone: 0884-2300991
Mobile: 7032894555

Directorate of Academic Planning

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA
KAKINADA-533003, Andhra Pradesh, INDIA
(Established by AP Government Act No. 30 of 2008)

Lr. No. JNTUK/DAP AC Pharm D/I Year/2021-22 Date: 16-02-2022

Dr. KVSG Murali Krishna,
M.E., Ph.D
Director, Academic Planning
JNTU K, Kakinada

To
All the Principals of Affiliated Colleges,
JNTUK, Kakinada

Academic Calendar of I Year Pharm D for the Academic year 2021-22

Description	From	To	Weeks
Commencement of Class Work	**14.02.2022**		
I Unit of Instruction	14.02.2022	30.04.2022	11W
I Mid Examinations	25.04.2022	30.04.2022	
II Unit of Instructions	02.05.2022	16.07.2022	11W
II Mid Examinations	11.07.2022	16.07.2022	
III Unit of Instructions	18.07.2022	01.10.2022	11W
III Mid Examinations	26.09.2022	01.10.2022	
Preparation & Practical Exams	04.10.2022	08.10.2022	1W
End Examinations	10.10.2022	22.10.2022	2W
Commencement of next Year Class Work	**31.11.2022**		

Director Academic Planning
Director
Academic Planning
JNTUK Kakinada

Copy to the Secretary to the Hon'ble Vice Chancellor, JNTUK.
Copy to the PA to the Rector, JNTUK
Copy to the PA to the Registrar, JNTUK.
Copy to Director of Evaluation, JNTUK.

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

Website: www.jntuk.edu.in
Email: dap@jntuk.edu.in

Phone: 0884-2300991

Directorate of Academic Planning

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA
KAKINADA-533003, Andhra Pradesh, INDIA
(Established by AP Government Act No. 30 of 2008)

Lr. No. JNTUK/DAP/RAC/ II Year/Pharm D/2021 *Date: 31-08-2021*

Dr. R. Srinivasa Rao,
Director, Academic Planning
JNTUK, Kakinada

To
All the Principals of Affiliated Colleges,
JNTUK, Kakinada.

Revised Academic Calendar of II Year Pharm D
Academic year 2021-22

Description	From	To	Weeks
Commencement of Class Work	**01.11.2021**		
I Unit of Instruction	01.11.2021	15.01.2022	11W
I Mid Examinations	17.01.2022	22.01.2022	1W
II Unit of Instructions	24.01.2022	09.04.2022	11W
II Mid Examinations	11.04.2022	16.04.2022	1W
III Unit of Instructions	18.04.2022	02.07.2022	11W
III Mid Examinations	04.07.2022	09.07.2022	1W
Preparation & Practical Exams	11.07.2022	16.07.2022	1W
End Examinations	18.07.2022	30.07.2022	2W
Commencement of next Year Class Work	**01.08.2022**		
Note: Calendar is prepared with 8 hrs/day hence 7 weeks per instruction period			

Director Academic Planning

Director
Academic Planning
JNTUK Kakinada

Copy to the Secretary to the Hon'ble Vice Chancellor, JNTUK
Copy to Rector, Registrar, JNTUK
Copy to Director Academic Audit, JNTUK
Copy to Director of Evaluation, JNTUK

PRINCIPAL
Avanthi Institute of Pharmaceutical Scienc
Cherukupally (V), Bhogapuram Ma
Vizianagaram Dt., - 531

Website: www.jntuk.edu.in
Email: dap@jntuk.edu.in

Phone: 0884-2300991

Directorate of Academic Planning

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA
KAKINADA-533003, Andhra Pradesh, INDIA
(Established by AP Government Act No. 30 of 2008)

Lr. No. JNTUK/DAP/RAC II,III,IV & V Years Pharm D 2021 *Date:08-10-2021*

Dr. R. Srinivasa Rao,
Director, Academic Planning
JNTU K, Kakinada

To
All the Principals of Affiliated Colleges,
JNTU K, Kakinada.

Revised Academic Calendar of II, III, IV and V Year Pharm D for the AY 2021-22
(As per G.O. Rt. No. 242, Higher Education (U.E) Dept., dated 13.09.2021)

Description	From	To	Weeks
Commencement of Class Work	**01.10.2021**		
I Unit of Instruction	01.10.2021	18.12.2021	11W
I Mid Examinations	20.12.2021	25.12.2021	1W
II Unit of Instructions	27.12.2021	12.03.2022	11W
II Mid Examinations	14.03.2022	19.03.2022	1W
III Unit of Instructions	21.03.2022	04.06.2022	11W
III Mid Examinations	06.06.2022	11.06.2022	1W
Preparation & Practical Exams	13.06.2022	18.06.2022	1W
End Examinations	20.06.2022	02.07.2022	2W
Note: Calendar is prepared with 8 hrs/day hence 7 weeks per instruction period			

Director Academic Planning

Director
Academic Planning
JNTUK Kakinada

Copy to the Secretary to the Hon'ble Vice Chancellor, JNTUK
Copy to Rector, Registrar, JNTUK
Copy to Director Academic Audit, JNTUK
Copy to Director of Evaluation, JNTUK

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

Website: www.jntuk.edu.in
Email: dap@jntuk.edu.in

Phone: 0884-2300991

Directorate of Academic Planning

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA
KAKINADA-533003, Andhra Pradesh, INDIA
(Established by AP Government Act No. 30 of 2008)

Lr. No. JNTUK/DAP/RAC/VI Year Pharm D/2021 *Date:08-10-2021*

Dr. R. Srinivasa Rao,
Director, Academic Planning
JNTUK, Kakinada

To
All the Principals of Affiliated Colleges,
JNTUK, Kakinada.

Revised Academic Calendar of VI Year Pharm D for the Academic year 2021-22
(As per G.O. Rt. No. 242, Higher Education (U.E) Dept., dated 13.09.2021)

Description	Date
Commencement of Class Work for Internship	01.10.2021
Closing of Internship (12 Months)	30.09.2022

Director Academic Planning

Director
Academic Planning
JNTUK Kakinada

Copy to the Secretary to the Hon'ble Vice Chancellor, JNTUK
Copy to Rector, Registrar, JNTUK
Copy to Director Academic Audit, JNTUK
Copy to Director of Evaluation, JNTUK

PRINCIPAL
Avanthi Institute of Pharmaceutical Scienc
Cherukupally (V), Bhogapuram Ma
Vizianagaram Dt., - 531162

ESTD : 2005

AVANTHI INSTITUTE OF PHARMACEUTICAL SCIENCES

(Approved by A.I.C.T.E, PCI, New Delhi,Recognized by the Govt. of A.P. & Affiliated to JNTUKakinada)
Cherukupally (Village), Chittivalasa (SO), Bhogapuram (Mandal), Vizianagaram (Dist) -531162.
www.avanthipharma.ac.in, principal@avanthipharma.ac.in

INSTITUTE ACADEMIC CALANDER 2021-2022

B PHARMACY

DESCRIPTION	I YEAR		II YEAR		III YEAR		IV YEAR	
	Semester I	Semester II	Semester I	Semester II	Semester I	Semester II	Semester I	Semester II
Commencement of classwork	24-01-2022	27-06-2022	01-10-2022	28-02-2022	15-09-2021	31-01-2022	01-09-2021	17-01-2021
I unit of instructions	14-02-2022	27-06-2022	01-10-2021	28-02-2022	15-09-2021	31-01-2022	01-09-2021	17-01-2021
I mid examinations	03-04-2022	15-08-2022	22-11-2021	18-04-2022	01-11-2021	21-03-2022	18-10-2021	07-03-2022
II unit of instructions	11-04-2022	22-08-2022	29-11-2021	25-04-2022	08-11-2021	28-03-2022	25-10-2021	14-03-2022
II mid examinations	30-05-2022	17-10-2022	07-02-2022	13-06-2022	27-12-2021	16-05-2022	13-12-2021	02-05-2022
Preparation and practicals	06-06-2022	24-10-2022	12-02-2022	20-06-2022	03-01-2022	23-05-2022	10-12-2021	09-05-2022
End examinations	13-06-2022	31-10-2022	14-02-2022	27-06-2022	10-01-2022	30-05-2022	27-12-2021	16-05-2022

Principal

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

ESTD : 2005

AVANTHI INSTITUTE OF PHARMACEUTICAL SCIENCES

(Approved by A.I.C.T.E, PCI, New Delhi,Recognized by the Govt. of A.P. & Affiliated to JNTUKakinada)
Cherukupally (Village), Chittivalasa (SO), Bhogapuram (Mandal), Vizianagaram (Dist) -531162.
www.avanthipharma.ac.in, principal@avanthipharma.ac.in

INSTITUTE ACADEMIC CALANDER 2021-2022
PHARM D

DESCRIPTION	I YEAR	II YEAR	III YEAR	IV YEAR	V YEAR
Commencement of classwork	14-02-2022	16-08-2021	16-08-2021	16-08-2021	16-08-2021
I unit of instruction	14-02-2022	16-08-2021	16-08-2021	16-08-2021	16-08-2021
I mid examinations	25-04-2022	01-11-2021	01-11-2021	01-11-2021	01-11-2021
II unit of instructions	02-05-2022	08-11-2021	08-11-2021	08-11-2021	08-11-2021
II mid examinations	11-07-2022	24-01-2022	24-01-2022	24-01-2022	24-01-2022
III unit instructions	08-07-2022	31-01-2022	31-01-2022	31-01-2022	31-01-2022
III mid examinations	26-09-2022	18-04-2022	18-04-2022	18-04-2022	18-04-2022
Preparation and practicals examinations	04-10-2022	25-04-2022	25-04-2022	25-04-2022	25-04-2022
End examinations	10-10-2022	02-05-2022	02-05-2022	02-05-2022	02-05-2022

Principal

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

ESTD : 2005

AVANTHI INSTITUTE OF PHARMACEUTICAL SCIENCES

(Approved by A.I.C.T.E, PCI, Recognized by the Govt. of A.P. & Affiliated to JNTUK, Kakinada)
Cherukupally (Village), Chittivalasa (SO), Bhogapuram (Mandal), Vizianagaram (Dist) -531162.
www.avanthipharma.ac.in, principal@avanthipharma.ac.in

COLLEGE ACADEMIC CALENDAR 2021-2022

DATE	DESCRIPTION
05-06-2021	World Environment Day Observance
24-06-2021	RESEARCH METHODOLOGY – Designing and Application of AI in NDDS Preparation
03-07-2021	Awareness program "Say No to Plastic"
29-07-2021	Vanam-Manam
15-08-2021	75th Independence Day Commemorance
16-08-2021	Commencement of classwork for V,IV,III,II Pharm D
20-08-2021	Blood Donation
01-09-2021	Commencement of classwork for IV BPharm Semester-I
06-09-2021	Nutrition Day
14-09-2021	One day seminar on "IMPORTANCE OF HINDI LANGUAGE"
15-09-2021	Commencement of classwork for III BPharm Semester-I
20-09-2021 to 25-09-2021	VAC- Pharmacy Automation And Robotics
29-09-2021	ENTERPRENEURSHIP – One Day Enterpreneurship Awareness Programme
01-10-2021	Commencement of classwork for II BPharm Semester-I
06-10-2021	INTELLECTUAL PROPERTY RIGHTS – Intellectual Property In Trade And Development
18-10-2021	Commencement of Mid-I exams for IV BPharm Semester-I
18-10-2021 to 23-10-2021	VAC-Regulatory Compliance in pharmacy practice

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

25-10-2021	Commencement of II Unit of instructions for IV BPharm Semester-I
31-10-2021	National Unity Day Observance
01-11-2021	Commencement of Mid-I exams for V,IV,III,II Pharm D and III BPharm Semester-I
05-11-2021	INTELLECTUAL PROPERTY RIGHTS – Procedural And Registration Aspects Of Trade Marks
08-11-2021	Commencement of II unit of instructions for V,IV,III,II Pharm D Commencement of II Unit of instructions for III BPharm Semester-I
10-11-2021	A Program on Ek Bharat Shresht Bharat
22-11-2021	Commencement of Mid-I exams for V,IV,III,II Pharm D and III BPharm Semester-I
29-11-2021	Commencement of II Unit of instructions for II BPharm Semester-I
29-11-2021 04-12-2021	VAC-Strategies, intervention and pharmacy's role in managing communicable diseases
06-12-2021 - 11-12-2021	VAC- Fluid Dynamics in Pharmacy; Navigating the stream of Pharmaceutical liquids
09-12-2021	RESEARCH METHODOLOGY –Pliagarism Checking And Their Application In Thesis
10-12-2021	Commencement of Practical Examinations for IV BPharm Semester-I
13-12-2021	Commencement of Mid-II exams for IV BPharm Semester-I
27-12-2021	Commencement of Mid-II exams for III BPharm Semester-I
03-01-2022	Commencement of Practical Examinations for III BPharm Semester-I
03-01-2022	ENTERPRENEURSHIP – Methodological Advances In Enterpreneurship Research
03-01-2022 08-01-2022	VAC- Herbal medicine and alternative therapy management
05-01-2022	RESEARCH METHODOLOGY – Importance Of Sentence Framing And Paraphrasing In Paper Writing

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

11-01-2022	Sankranthi Sambaralu
17-01-2022	Commencement of classwork for IV BPharm Semester-II
24-01-2022	Commencement of classwork for I BPharm Semester-I
24-01-2022	Commencement of Mid-II exams for V,IV,III,II Pharm D
26-01-2022	73rd Republic Day Commemorance
31-01-2022	Commencement of classwork for III BPharm Semester-II Commencement of III unit of instructions for V,IV,III,II Pharm D
07-02-2022	Commencement of Mid-II exams for II BPharm Semester-I
07-02-2022 12-02-2022	VAC- Mastering medication therapy management
10-02-2022	RESEARCH METHODOLOGY – PHARMACY PROFESSION AND ITS GLOBAL SCENARIO
12-02-2022	Commencement of Practical Examinations for II BPharm Semester-I
14-02-2022	Commencement of classwork for I Pharm D
14-02-2022 19-02-2022	VAC- Statistical softwares used in pharmacy practice
21-02-2022 26-02-2022	VAC- A detailed study of bioassay in drug development and quality assurance
22-02-2022	INTELLECTUAL PROPERTY RIGHTS – Recent Advancements In Patent Filling
28-02-2022	Commencement of classwork for II BPharm Semester-II
07-03-2022	Commencement of Mid-I exams for IV BPharm Semester-II
14-03-2022	Commencement of II Unit of instructions for IV BPharm Semester-II
14-03-2022 19-03-2022	VAC- Holistic Approaches to Green pharmacy practices

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

16-03-2022	Fresher's Day Celebrations
16-03-2022	RESEARCH METHODOLOGY – Artificial Intelligence In Drug Design In Pharmacy
18-03-2022	Holi Celebrations
21-03-2022	Commencement of Mid-I exams for II BPharm Semester-II
21-03-2022 26-03-2022	VAC- Critical thinking and problem solving skills
27-03-2022	International Women's Day Celebration
28-03-2022	Commencement of II Unit of instructions for III BPharm Semester-II
03-04-2022	Commencement of Mid-I exams for I BPharm Semester-I
06-04-2022	INTELLECTUAL PROPERTY RIGHTS – The Interference Between Design And Copy Right Laws
07-04-2022	World Health Day
11-04-2022	Commencement of II Unit of instructions for I BPharm Semester-I
11-04-2022 16-04-2022	VAC- Pharmacy Automation and Robotics
18-04-2022	Commencement of Mid-III exams for V,IV,III,II Pharm D Commencement of Mid-I exams for II BPharm Semester-II
25-04-2022	Commencement of Mid-I exams for I Pharm D Commencement of Practical Examinations for V,IV,III,II Pharm D Commencement of II Unit of instructions for II BPharm Semester-II
02-05-2022	Commencement of II unit of instructions for I Pharm D Commencement of Mid-II exams for IV BPharm Semester-II
05-05-2022	ENTERPRENEURSHIP –Youth Enterpreneurship – The Mindset
09-05-2022	Commencement of Practical Examinations for IV BPharm Semester-II
16-05-2022	Commencement of Mid-II exams for III BPharm Semester-II

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

23-05-2022	Commencement of Practical Examinations for III BPharm Semester-II
30-05-2022	Commencement of Mid-II exams for I BPharm Semester-I
06-06-2022	Commencement of Practical Examinations for I BPharm Semester-I
13-06-2022	Commencement of Mid-II exams for II BPharm Semester-II
20-06-2022	Commencement of Practical Examinations for II BPharm Semester-II
27-06-2022	Commencement of classwork for I BPharm Semester-II
08-07-2022	Commencement of III unit of instructions for I Pharm D
11-07-2022	Commencement of Mid-II exams for I Pharm D
15-08-2022	Commencement of Mid-I exams for I BPharm Semester-II
22-08-2022	Commencement of II Unit of instructions for I BPharm Semester-I
26-09-2022	Commencement of Mid-III exams for I Pharm D
04-10-2022	Commencement of Practical Examinations for I Pharm D
17-10-2022	Commencement of Mid-II exams for I BPharm Semester-II
24-10-2022	Commencement of Practical Examinations for I BPharm Semester-II

Principal

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

ESTD : 2005

AVANTHI INSTITUTE OF PHARMACEUTICAL SCIENCES

(Approved by A.I.C.T.E, PCI, New Delhi,Recognized by the Govt. of A.P. & Affiliated to JNTUKakinada)
Cherukupally (Village), Chittivalasa (SO), Bhogapuram (Mandal), Vizianagaram (Dist) -531162.
www.avanthipharma.ac.in, principal@avanthipharma.ac.in

FACULTY WORKLOAD (2021 – 2022) December -May

S. No	Name of the faculty	Subjects					Department/ Institute Level duties	Work Load (hrs)	Signature
		Theory -1	Theory-2	Lab-1	Lab-2	Project/ Seminar			
1.	Dr. M.B.V. Raju	I/I M.PHARM MPAT	----	Practical-I	----	Project GPAT	Professor& Principal	11	
2.	Dr. S Vijaya Srinivas	I/I M.PHARM MPAT	----	Practical-I	----	GPAT	Professor	11	
3.	Dr. G. Prasanthi	I/I M.PHARM MPAT	----	Practical-I	----	----	Professor	10	
4.	Dr. K. Murali Krishna	I/I M.PHARM MPAT	----	Practical-I	----	----	Professor	10	
5.	Dr. S. Arun Satya Dev	III PHARM.D MC	----	III PHARM.D MC	----	----	Student Mentor	7	
6.	Mrs. Saraswathi Sowmya	III/II MC-III Sec-A	----	III/II MC-III Sec-A	----	Project	1. Class Teacher 2. Tutorial	11	
7.	B. Ramavathi	III PHARM.D COLOGY	I/I M.PHARM PTSM-1	III PHARM.D COLOGY	----	----	Student Mentor	10	
8.	Ch. Madhu	I/I M.PHARM SEM-1 CMB	II/I M.PHARM SEM-1 RM&BS	I/I M.PHARM Practical-I	----	Project	Exam Cell Incharge	14	
9.	A. Nanaji	II/II COGNOSY (SEC – A&B)	----	II/II COGNOSY (SEC – A&B)		Project GPAT	Exam Cell Member	23	

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

10.	V. Uma Shankar	IV PHARM.D HP	----	IV PHARM.D HP	----	Project GPAT	1. Vice-Principal & HOD of Pharmacy Practice. 2. Member , Women Empowerment Cell 3. Member , NSS 4. Co-ordinator, IQAC. 5. Co-ordinator, Purchase & Store	8	V. Umashankar
11.	B. Chaitanya	I/I M. PHARM APA	----	Practical- II	----	Project GPAT	Student Mentor	10	B. Chaitanya
12.	A. H. V. Santhoshi	I/I M. PHARM PV	----	----	----	Seminars Project GPAT	Student Mentor	10	A.H.V. Santhoshi
13.	Y. Vishnu Vandana	I/I M. PHARM DDS	----	Practical-II	----	Project GPAT	1. Women Empowerment Cell Co-ordinator 2. Student Mentor	10	V. Vandana
14.	M. Krishna Rekha	I/I M. PHARM DDS		PRACTICAL-II		Project	Student Mentor	10	M.K Rekha
15.	M. Madhavi Kumari	I/I M.PHARM SEM-1 AP-I	----	Practical-II		Project	Student Mentor	10	Madhavi
16.	B. Sravani	I/I M.PHARM RA	----	Practical-II	----	Seminars Project GPAT	Student Mentor	16	
17.	Dr. B. Manoj Kumar	IV PHARM.D THERAPY-I	V PHARM.D EPIDIMEOLOGY	II PHARM.D THERAPY-I	----	Project	1. Class Incharge-V Pharm.D. 2. Member , NSS	11	B. Manoj

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

							3. Member , IQAC 4. NAAC Incharge-7 5. Co-ordinator, Relation & Media.		
18.	M. Suresh Kumar	III/II HDT (SEC- A)	I/I M. PHARM MP	III/II HDT (SEC- A)	----	Project	Student Mentor	15	M. Suresh Kumar
19.	S. Chandra Sekhar	I/I CEUTICS –I (SEC- B)	I/I M.PHARM DDS	I/I CEUTICS –I (SEC- B)	----	Assignments	Student Mentor	16	S. Chandra Sekhar
20.	B. Poornima	II/I MB (SEC- B)	----	II/I MB (SEC- B)	----	Assignment/ Project	Student Mentor	12	B. Poornima
21.	L. Divya Sree	III/II HDT (SEC- B)	----	III/II HDT (SEC- B)	----	Project	Tutorial	12	L. Divya Sree
22.	B. Bhagya Sri	I/I M. PHARM RA	----	----	----	Seminars	Student Mentor	10	B. Bhagya Sri
23.	P. Sandeep	IV PHARM. D BPPK .	----	IV PHARM. D BPPK	----	Assignments	Student Mentor	7	P. Sandeep
24.	D. Purnima Yadav	II/I PE (SEC- B)	----	II/I PE (SEC- B)	----	----	Student Mentor	11	D. Purnima Yadav
25.	S. Rama Krishna	II/I POC– II (SEC – A)	----	II/I POC– II (SEC – A)	----	Project	Student Mentor	11	S. Rama Krishna
26.	A. Naga Srinivas	II/I POC– II (SEC – B)	----	II/I POC– II (SEC – B)	----	Project	Student Mentor	11	A. Naga Srinivas
27.	Y. Anveshi Dhananjaya	IV /II SPP SEC – A&B	----	----	----	Project	Class Teacher	10	Y. Anveshi Dhananjaya

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

28.	B. Meher Jyothi	III/II COLOGY (SEC – A)	----	III/II COLOGY (SEC – A)	----	Project	Tutorial	11	
29.	M. Divya	IV /II CS (SEC A&B)	----	----	----	Assignments Project	Student Mentor	10	
30.	V. C. Randeep Raj	III PHARM D THERAPY	IV PHARM D CP	III PHARM D THERAPY	IV PHARM .D CP	Project	1. Class Incharge – VI Year 2. Member , Women Empowerment Cell 3. Member , NSS 4. Coordinator, Sports & Games.	14	
31.	J. Vinay Ramji	III/II COLOGY (SEC – B)	----	III/II COLOGY (SEC – B)	----	Project	Tutorial	11	
32.	B. Aruna	III / II QA (SEC – A&B)	----	----	----	Project GPAT	Class Teacher	11	
33.	B. Rama Madhuri	I /I PA-I (SEC-B)	IV/II BRM (SEC-B)	I /I PA-I (SEC-B)	----	Project	Student Mentor Student Mentor	16	
34.	Vamsi Krishna Yadav	I/I HAP-I (SEC- A)	----	I/I HAP-I (SEC- A)	----	Project	Student Mentor	11	
35.	K. Venkata Radhika	I /I PIC (SEC – B)	----	I /I PIC (SEC – B)	----	Project	Student Mentor	11	
36.	I. Adi Lakshmi	I/I CEUTICS (SEC- A)	----	I/I CEUTICS –I (SEC- A)	----	Project	1. Class Teacher 2. Tutorial	11	

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

37.	M. Venkat Naga Deepika	II/I PE (SEC- A)	----	II/I PE (SEC- A)	----	Project	Tutorial	12	DEEPIKA
38.	Y. Pavani	I /I PA-I (SEC-A)	III/II BIOTECH (SEC-A)	I /I PA-I (SEC-A)	----	----	Student Mentor	15	Y. pavani
39.	B. Yerni Kumar	I/I HAP-I (SEC- B)	IV/II BRM (SEC-B)	I/I HAP-I (SEC- B)	----	Project	Student Mentor	16	Yerni Kumar
40.	Bhargav Krishna Raju	III/II BPPK (SEC – A&B)	----	----	----	Project	Student Mentor	10	B.K.Raju
41.	M. Vasu	III/II MC III Sec- B	----	III/II MC III Sec- B	----	Project	1.Class Teacher 2.Tutorial	11	Vasu
42.	V. H. S. Reddy	II / I PP-I (SEC –B)	III/II BIOTECH (SEC –B)	II / I PP-I (SEC –B)	----	----	1. Class Teacher 2. Tutorial 3. Student Teacher Interaction	17	
43.	M. Rajeswara Rao	II / I PP-I (SEC –A)	----	II / I PP-I (SEC –A)	----	Project	1..Class Teacher 2. Tutorial 3.Student-Teacher Interaction	13	
44.	M. S. V Sudeep	I PHARM D CEUTICS	V PHARM D CR	I PHARM D CEUTICS	----	Project	Student Mentor	11	MS.V Sudeep
45.	D. Subha Sri	I PHARM D PIC	II PHARM D MB	I PHARM D PIC	II PHARM D MB	Project	Class Incharge – I Pharm.D	14	
46.	M. Geetanjali	I /I PIC (SEC – A)		I /I PIC (SEC – A))	----	----	Student Mentor	11	Geetanjali

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt.; - 531162

47.	B. Teja Sree	II PHARM D COLOGY	III PHARM D PF	III PHARM D PF	IV PHARM D CT	Project	Class Incharge – IV Pharm.D	15	B Teja Sree
48.	T. Rushi	IV PHARM D THERAPY	V PHARM D PKTDM	IV PHARM D THERAPY	----	Project	1.NSS Coordinator 2.Member , WEC Senior Administrative Officer	11	T. Rushi
49.	A. Jyotsna	I PHARM D POC	II PHARM D COGNOSY	I PHARM D POC	II PHARM D COGNOSY	Project	Class Incharge – II Pharm.D.	14	A Jyotsna
50.	K. Rohini	II/I MB (SEC - A)	----	II/I MB (SEC - A)	----	Project	Tutorial	12	K. Rohini
51.	G Sravani Girija	I PHARM D HAP	II PHARM D PP	I PHARM D HAP	----	Project	1. Member, NSS. 2. Member , WEC	11	Sravani.G
52.	S Dhana Lakshmi	I PHARM D BIOCHEM	II PHARM D CP III PHARM D PJ	I PHARM D BIOCHEM	----	Project	Student Mentor	15	Lakshmi
53.	Ch. Geetha	III PHARM D PA	IV PHARM D – BRM	III PHARM D PA	----	Project	1. Class Incharge- III Pharm.D.	11	Ch. Geetha
54	A. Seshu	I PHARM.D RM	I/I RM (SEC-A&B)	----	----	----	----	7	Sesu
55	Subba lakshmi	I/I CS (SEC-A&B)	----	----	----	----	----	8	S.Lakshmi
56	G Durga rao	I /I PIC (SEC – B)	----	I /I PIC (SEC – B)	----	----	Student Mentor	11	

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

Principal

AVANTHI INSTITUTE OF PHARMACEUTICAL SCIENCES

(Approved by A.I.C.T.E, PCI, New Delhi, Recognized by the Govt. of A.P. & Affiliated to JNTUKakinada)
Cherukupally (Village), Chittivalasa (SO), Bhogapuram (Mandal), Vizianagaram (Dist) -531162.
www.avanthipharma.ac.in, principal@avanthipharma.ac.in

ESTD : 2005

Faculty Workload (2021 - 2022) June - November

S. No.	Name of the Faculty	Subjects					Department/ Institute Level duties	Work Load (hrs)	Signature
		Theory -1	Theory-2	Lab-1	Lab-2	Project/ Seminar			
1.	Dr. M.B.V. Raju	I/II/M Pharm CQA	----	Practical-IV	----	Project GPAT	Professor & Principal	11	
2.	Dr. S. Vijaya Srinivas	I/II M Pharm CADDS	----	Practical-IV	----	Project GPAT	Pharmaceutical Technology Professor	11	
3.	Dr. G. Prasanthi	I/II M Pharm CADDS	----	Practical-IV	----	Project	Pharmaceutics Professor	10	
4.	Dr. K. Murali Krishna	I//II M Pharm PTSM-II	----	----	----	Seminar/ Assignments Project	Pharmacology Professor	10	
5.	Dr. S. Arun Satya Dev	III Pharm D MC	----	III Pharm D MC	----	Project	Student Mentor	7	
6.	Mrs. Saraswathi Sowmya	III/I B Pharm MC II	----	----	----	Project	1.Coordinator, library. 2.Class Incharge– III-B-Pharm (Sec -B)	12	
7.	B. Ramavathi	I/II M Pharm PDD	II- Pharm D COLOGY	III- Pharm D COLOGY	----	Project	Student Mentor	10	
8.	Ch. Madhu	I/II M Pharm CMB	----	Practical-IV	----	Project	Exam cell Incharge	10	
9.	A. Nanaji	III/I COGNOSY-II (SEC- A)	----	III/I COGNOSY-II (SEC- A)	----	Project GPAT	1. Member, IQAC 2. Member, AC& AC	12	

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

							3. Coordinator, Examination, Time Table and Admissions.		
10.	V. Uma Sankar	IV-Pharm D HP	I Pharm D RB	IV-Pharm D HP	I Pharm D RB	Project GPAT	1. Vice-Principal &HOD of Pharmacy Practice. 2. Member, Women Empowerment cell 3. Member, NSS 4. Coordinator, IQAC 5. Coordinator, Purchase & Store.	10	
11.	B. Chaitanya	I/II M.Pharm -AIA	----	Practical – III	----	Project GPAT	Student mentor	11	
12.	A.H.V. Santhoshi	I/II M Pharm MBT	----	Practical – IV	----	Project GPAT	Student mentor	11	
13.	Y. Vishnu Vandana	I/II M Pharm MP	----	Practical - III	----	Project	1.Women Empowerment cell Coordinator 2. Student Mentor	10	
14.	M. Krishna Rekha	I/II M Pharm MP	----	PRACTICAL - III	----	Project	1.Timetables in-charge 2.Student mentor	10	
15.	M. Madhavi Kumari	I/II M Pharm AP-II	----	PRACTICAL - III	----	Project	Student mentor	10	
16.	B. Sravani	I/II M Pharm BPPK	----	----	----	1. Project 2.Seminars 3.GPAT	Student mentor	11	
17.	Dr. B. Manoj	II Pharm D		II Pharm D	----	Project	1.Class Incharge-		

PRINCIPAL
Avanthi Institute of Pharmaceutical Sc
Cherukupally (V), Bhogapuram M
Vizianagaram Dt., - 531162

	Kumar	THERAPY-1	V- Pharm D EPIDIMEOLOGY	THERAPY-1			V Pharm D 2. Member , NSS 3. Member , IQAC 4. NAAC Incharge-7 5. Coordinator, relation & media.		
18.	M. Suresh Kumar	III/I B. Pharm PJ	I/II M Pharm JOURNAL CLUB	----	----	Project	Member, NSS	7	
19.	S. Chandra Sekhar	I/II POC –I (SEC- B)	----	I/II POC –I (SEC- B)	----	Project	Tutorial	13	
20.	B. Poornima	I/II PH. BIOCHEM (SEC- B)	----	I/II BIOCHEM (SEC- B)	----	Project	Student mentor	12	
21.	L. Divyasri	I/II BIOCHEM (SEC- A)	----	I/II BIOCHEM (SEC- A)	---	Project	Student mentor	11	
22.	B. Bhagya Sri	I/II M PHARMBPPK	----	----	----	1. Project 2.Seminars	Student mentor	10	
23.	P. Sandeep	IV-PHARM D BPPK	----	IV-PHARM D BPPK	----	Project	----	10	
24.	D. Purima Yadav	I ;I/II POC – (SEC- A)	----	I/II POC –I (SEC- A)	----	Project	Member , IQAC Tutorial	12	
25.	S. Rama Krishna	IV/I IP (SEC- B)	----	----	----	Project	Student mentor	5	

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt. - 531162

26.	A. Naga Srinivas	III/I COGNOSY- II (SEC – B)	----	III/I COGNOSY- II (SEC – B)	----	Project	Student mentor	11	
27.	Y. Anveshi Dhananjaya	I /II – HAP -II (SEC– B)	----	I /II HAP (SEC – B)	----	Project	Student mentor	11	
28.	B. Meher Jyothi	I/II PP (SEC – A&B)	----	----	----	Project	Student mentor	10	
29.	M. Divya	IV /I PP (SEC- B)	----	----	----	Project	Student mentors	6	
30.	V. C. Randeep Raj	III Pharm D THERAPY	IV Pharm D CP	III Pharm D THERAPY	IV Pharm D CP	Project	1. Class Incharge –VI Pharm D. 2.Member , women empowerment cell 3.Member , NSS 4. Coordinator sports	14	
31.	J. Vinay Ramji	I /II HAP	----	I /II HAP	----	Project	Tutorial	12	
32.	B. Aruna	IV / I IMA (SEC – A)	----	IV / I IMA (SEC – A)	----	Project GPAT	1.Class teacher 2. Tutorial 3. Member, IQAC	14	
33.	B. Rama Madhuri	I /II CA (SEC – B)	----	I /II CA (SEC – B)	----	----	Student mentor	10	
34.	Vamsi Krishna Yadav	III/I COLOGY – II (SEC- A)	----	III/I COLOGY – II (SEC- A)	----	----	Tutorial	12	
35.	K. Venkata Radhika		----	I /II CA	----	----	Student mentors	10	

PRINCIPAL
Avanthi Institute of Pharmaceutical S...
Cherukupally (V), Bhogapuram M...

		(SEC – A)		(SEC – A)					
36.	I. Adi Lakshmi	III/I IP – I (SEC– A)	----	III/I IP – I (SEC– A)	----	Project	1. Class teacher 2. tutorial	12	
37.	M. Venkat Naga Deepika	IV / I NDDS (SEC- B)	----	----	----	Project	Student Ment	5	
38.	Y. Pavani	IV / I IMA (SEC – B)	----	IV / I IMA (SEC – B)	----	Project	1. Class Incharge – IV B. Pharm (SEC –B)	11	
39.	Ch. Geetha	III PHARM D PA	IV PHARM D BIOSTAT	III PHARM D PA	----	Project	1.Class Incharge- III Pharm D	11	
40.	B. Yerni Kumar	III/I COLOGY – II (SECT– B)	----	III/I COLOGY – II (SEC – B)	----	Project	Student Mentors	12	
41.	Bhargav Krishna Raju	III/I IP – I (SEC – B)	----	III/I IP – I (SEC – B)	----	Project	Student Mentors	11	
42.	M. Vasu	IV /I PP (SEC- A)	----	----	----	Project	Student Mentors	5	
43.	V. H. S. Reddy	IV / I NDDS (SEC- A)	----	----	----	Project	Class Incharge – II B.Pharm (Sec – B)	5	
44.	M. Rajaswara Rao	IV/I IP – II (SEC – A)	----	----	----	Project	1.Class Incharge – II B. Pharm (Sec – A) 2.Student Mentor	5	
45.	M.S.V Sudeep	I PHARM D CEUTICS	V PHARM D CR	I PHARM .D CEUTICS	----	Project	Student Mentor	11	

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

46.	D. Subha Sri	I Pharm D PIC	II Pharm D MB	I Pharm D PIC	II Pharm D MB	Project	Class Incharge – I Pharm D.	14	
47.	M. Geetanjali	III/I PJ (SEC-A)	----	----	----	Project	Student Mentor	5	
48.	B. Teja Sree	II Pharm D COLOGY	III Pharm D PF IV Pharm D CT	III Pharm D PF	----	Project	Class Incharge – IV Pharm D	15	
49.	T. Rushi	IV Pharm D THERAPY	V Pharm D PKTDM	IV Pharm D THERAPY	----	Project	1.NSS Coordinator 2. Member, WEC 3. Senior AO	10	
50.	A. Jyotsna	I Pharm D POC	II Pharm D COGNOSY	I Pharm D POC	II Pharm D COGNOSY	Project	Class Incharge – II Year.	14	
51.	K. Rohini	I/II B. Pharm EVS (SEC-A&B)	----	----	----	Project	Student Mentor	6	
52.	G Sravani Girija	I Pharm D HAP	II Pharm D – PP	I Pharm D HAP	----	Project	Student Mentor	11	
53	S Dhana Lakshmi	I Pharm D BIOCHEM	II Pharm D CP III PHARM D PJ	I Pharm D BIOCHEM	----	Project	1. Member, NSS. 2.Member, WEC	14	
54	A. Seshu	I Pharm D RM	-----	-----	----	----	-----	3	
55	K Subha Lakshmi	I/II B. Pharm CA	-----	-----	----	----	-----	16	
56	G Durga Rao	II/I POC-II SEC- A	-----	II/I POC-II SEC- A	----	----	Student Mentor	11	

Principal
PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

ESTD : 2005

AVANTHI INSTITUTE OF PHARMACEUTICAL SCIENCES

(Approved by A.I.C.T.E, P.C.I, New Delhi,Recognized by the Govt. of A.P. & Affiliated to JNTUK, Kakinada)
Cherukupally (Village), Chittivalasa (SO), Bhogapuram (Mandal),Vizianagaram (Dist)-531162.
www.avanthipharma.ac.in, principal@avanthipharma.ac.in

CLASS TIME TABLE AY: 2021-22

CLASS:IB.Pharm I Sem (PCI Regulation) **w.e.f:14/02/2022**
SECTION– A (2021 Admitted Batch)

Class Teacher: Mrs.M. Geethanjali			**Batch A:Roll 01-25**			**Batch B: Roll 26-55**		
DAY/TIME	**9.30 - 10.30**	**10.30 - 11.20**	**11.20 - 12.10**	**12.10 - 01.00**	**1.00 - 1.50**	**1.50 - 2.40**	**2.40 - 3.20**	**3.20 - 4.30**
MON	HAP	CEUTICS	PA - I	**L U N C H**	CS	BATCH A -HAP LAB BATCH B – PA I LAB		
TUE	PA - I	HAP	CEUTICS		PIC	BATCH A - PA I LAB BATCH B -HAP LAB		
WED	RM / RB	PA - I	HAP		PIC	BATCH A - PIC LAB BATCH B- CEUTICS LAB		
THU	CEUTICS	HAP	PIC		RM/ RB	BATCH A - CEUTICS LAB BATCH B- PIC LAB		
FRI	PA - I	PIC	CEUTICS		HAP	BATCH A - RM /RB BATCH B- CS		
SAT	CEUTICS	PA - I	CS		PIC	BATCH A- CS BATCH B- RM /RB		

S. No	NAME OF THE FACULTY	DESIGNATION	NAME OF THE SUBJECT(Hrs)	PROGRAMME
1.	Mr. Vamsi Krishna Yadav	Assistant Professor	Human Anatomy and Physiology -1(HAP-I) (5)	B. Pharm
2.	Mrs.Y. Pavani	Assistant Professor	Pharmaceutical Analysis -I(PA-I) (5)	B. Pharm
3.	Mrs. M. Geethanjali	Assistant Professor	Inorganic Chemistry (PIC) (5)	B. Pharm
4.	Mr. M. Vasu	Assistant Professor	Pharmaceutics (CEUTICS) (5)	B. Pharm
5.	Mrs. B. Meher Jyothi	Assistant Professor	Remedial Biology – (RB) (2)	B. Pharm
6.	Mr. A Seshu	Assistant Professor	Remedial Maths- (RM) (2)	B. Pharm
7.	Mrs. K. Subha Lakshmi	Assistant Professor	Communication Skills-(CS) (2)	B. Pharm
8.	Mr. Vamsi Krishna Yadav	Assistant Professor	Human Anatomy and Physiology (HAP-I) Lab (6)	B. Pharm
9.	Mrs.Y. Pavani	Assistant Professor	Pharmaceutical Analysis -1(PA-I) Lab (6)	B. Pharm
10.	Mrs.M. Geethanjali	Assistant Professor	Inorganic Chemistry Lab – (PIC) (6)	B. Pharm
11.	Mr. M. Vasu	Assistant Professor	Pharmaceutics Lab-(CEUTICS)(6)	B. Pharm
12.	Mrs. B. Meher Jyothi	Assistant Professor	Remedial Biology Lab- (RB) (3)	B. Pharm
13.	Mrs.K. Subha Lakshmi	Assistant Professor	Communication Skills Lab-(CS) (2)	B. Pharm

B. Bhagyasri
Time Table Incharge

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

ESTD : 2005

AVANTHI INSTITUTE OF PHARMACEUTICAL SCIENCES

(Approved by A.I.C.T.E, P.C.I, New Delhi,Recognized by the Govt. of A.P. & Affiliated to JNTUK, Kakinada)
Cherukupally (Village), Chittivalasa (SO), Bhogapuram (Mandal),Vizianagaram (Dist)-531162.
www.avanthipharma.ac.in, principal@avanthipharma.ac.in

CLASS TIME TABLE AY: 2021-22

CLASS:IB.Pharm I Sem (PCI Regulation) **w.e.f:14/02/2022**
SECTION– B (2021 Admitted Batch)

Class Teacher: Mr.B.Yerni KumarBatch C: Roll 56-80 Batch D: Roll 81-A7								
DAY/ TIME	**9.30 - 10.30**	**10.30 - 11.20**	**11.20 - 12.10**	**2.10- 01.00**	**1.00 – 1.50**	**1.50- 2.40**	**2.40- 3.20**	**3.20 - 4.30**
MON	CEUTICS	HAP	PIC	L U N C H	PA-1	Batch C: RB Lab Batch D:CS Lab		
TUE	PA-1	RM/RB	CEUTICS		HAP	Batch C: Tutorial Batch D: CS Lab		
WED	PIC	PA-1	CS		HAP	Batch C: HAP Lab Batch D: PA1 Lab		
THU	CS	PIC	PA-1		CEUTICS	Batch C: PA1 Lab Batch D: HAP Lab		
FRI	CEUTICS	PIC	HAP		CEUTICS	Batch C: PIC Lab Batch D: CEUTICS Lab		
SAT	HAP	RM/RB	PA-1		PIC	Batch C: CEUTICS Lab Batch D: PIC Lab		

S.No	NAME OF THE FACULTY	DESIGNATION	NAME OF THE SUBJECT	PROGRAMME
1.	Mr. B. Yerni Kumar	Assistant Professor	Human Anatomy and Physiology -I(HAP-I) - (5)	B. Pharm
2.	Mrs. B. Rama Madhuri	Assistant Professor	Pharmaceutical Analysis - 1(PA-I) -(5)	B. Pharm
3.	Mrs. K. Venkata Radhika	Associate Professor	Inorganic Chemistry (PIC)- (5)	B. Pharm
4.	Mrs. I. Adi Lakshmi	Assistant Professor	Pharmaceutics (5)	B. Pharm
5.	Mrs. B. Meher Jyothi	Assistant Professor	Remedial Biology (RB) - (3)	B. Pharm
6.	Mr. A Seshu	Assistant Professor	Remedial Maths (RM) -(2)	B. Pharm
7.	Mrs. K. Subha Lakshmi	Assistant Professor	Communication Skills (CS) - (2)	B. Pharm
8.	Mr. B. Yerni Kumar	Assistant Professor	Human Anatomy and Physiology -1 Lab(HAP)- (6)	B. Pharm
9.	Ms. B Rama Madhuri	Assistant Professor	Pharmaceutical Analysis -1 Lab (PA)-(6)	B. Pharm
10.	Mrs. K. Venkata Radhika	Associate Professor	Inorganic Chemistry Lab (PIC) - (6)	B. Pharm
11.	Mrs. I. Adi Lakshmi	Assistant Professor	Pharmaceutics Lab -(6)	B. Pharm
12.	Mrs. B. Meher Jyothi	Assistant Professor	Remedial Biology Lab (RB)- (3)	B. Pharm
13.	Mrs. K. Subha Lakshmi	Assistant Professor	Communication Skills Lab (CS)-(2)	B. Pharm

Time Table Incharge **Principal**

B. Bhagya Sri

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

ESTD : 2005

AVANTHI INSTITUTE OF PHARMACEUTICAL SCIENCES

(Approved by A.I.C.T.E, P.C.I, New Delhi.Recognized by the Govt. of A.P. & Affiliated to JNTUK, Kakinada)
Cherukupally (Village), Chittivalasa (SO), Bhogapuram (Mandal),Vizianagaram (Dist)-531162.
www.avanthipharma.ac.in, principal@avanthipharma.ac.in

CLASS TIME TABLE AY: 2021-22

CLASS:I B.PharmIISem (PCI Regulation) **w.e.f: 27/06/2022**
SECTION– A (2021 Admitted Batch)

CLASS TEACHER: Mrs. L. Divya Sri				Batch A:Roll01-25	Batch B: Roll 26-55			
DAY/ TIME	9:30 – 10:30	10:30 - 11:20	11:20 – 12:20	12:00 1:00	1:00 - 1:50	1:50 2:40	2:40 3:30	3:30 – 4:20
MON	POC-I	PATHO	BIOCHEM	LUNCH	HAP-II	Batch A: POC-I Lab Batch B: BIOCHEM Lab		
TUE	BIOCHEM	HAP-II	POC-I		ES	Batch A: BIOCHEM Lab Batch B: POC-II Lab		
WED	HAP-II	CA	PATHO		POC-I	Batch A: HAP-II Lab Batch B :CA Lab		
THU	BIOCHEM	PATHO	CA		TUTORIAL (OC)	Batch A :CA Lab Batch B :HAP-II Lab		
FRI	PATHO	POC-I	CA		BIOCHEM	ES	HAP-II	TUTORIAL (HAP)
SAT	CA	BIOCHEM	HAP-II		PATHO	POC-I	ES	L/S

S. No	NAME OF THE FACULTY	DESIGNATION	NAME OF THE SUBJECT (Hrs)	PROGRAMME
1.	Mrs. B. Poornima	Associate Professor	Pharmaceutical Organic Chemistry-I (POC-I) (5)	B. Pharm
2.	Mrs. Y.Pavani	Assistant Professor	Pharmaceutical Biochemistry(BIOCHEM) (5)	B. Pharm
3.	Mr. Vamsi Krishna Yadav	Assistant Professor	Human Anatomy and Physiology- II (HAP-II) (5)	B. Pharm
4.	Mrs. I. Adi Lakshmi	Assistant Professor	Pathophysiology (PATHO) (5)	B. Pharm
5.	Mrs. Y. Anveshi Dhananjaya	Assistant Professor	Environmental Sciences (ES) (3)	B. Pharm
6.	Mrs. M. Geethanjali	Assistant Professor	Computer Applications (CA) (4)	B. Pharm
7.	Mrs. B. Poornima	Associate Professor	Pharmaceutical Organic Chemistry-I (POC-I)Lab (6)	B. Pharm
8.	Mrs. Y.Pavani	Assistant Professor	Pharmaceutical Biochemistry Lab (BIOCHEM) (6)	B. Pharm
9.	Mr. Vamsi Krishna Yadav	Assistant Professor	Human Anatomy and Physiology- II (HAP-II) Lab (6)	B. Pharm
10.	Mrs. M. Geethanjali	Assistant Professor	Computer Applications (CA) Lab (6)	B. Pharm
11.	Mrs. B. Poornima	Associate Professor	Pharmaceutical Organic Chemistry-I (POC-I)Tutorial (1)	B. Pharm
12.	Mr. Vamsi Krishna Yadav	Assistant Professor	Human Anatomy and Physiology- II (HAP-II) Tutorial (1)	B. Pharm
13.	Mr. R. Ramana	Librarian	Library (1)	B. Pharm
14.	Mr. Koteshwar Rao	Physical Director	Sports (1)	B. Pharm

B. Bhagyasri
Time Table Incharge

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162
Principal

ESTD : 2005

AVANTHI INSTITUTE OF PHARMACEUTICAL SCIENCES

(Approved by A.I.C.T.E, P.C.I, New Delhi,Recognized by the Govt. of A.P. & Affiliated to JNTUK, Kakinada)
Cherukupally (Village), Chittivalasa (SO), Bhogapuram (Mandal),Vizianagaram (Dist)-531162.
www.avanthipharma.ac.in, principal@avanthipharma.ac.in

CLASS TIME TABLE AY: 2021-22

CLASS:IB.PharmIISem (PCI Regulation) **w.e.f: 27/06/2022**
SECTION– B (2021 Admitted Batch)

CLASS TEACHER: Mrs. B. MeherJyotiBatch C:Roll 56-80 Batch D : Roll- 81-A7								
DAY/ TIME	**9:30- 10:30**	**10:30– 11:20**	**11:2– 12:10**	**12:10 1:00**	**1:00 – 01:50**	**1:50– 2:40**	**2:40– 3:30**	**3:30 – 4:20**
MON	POC-1	HAP-II	BIOCHEM	LUNCH	PATHO	BATCH C-HAP-II LAB BATCH D –CA LAB		
TUE	CA	PATHO	POC-1		HAP-II	BATCH C-CA LAB BATCH D-HAP-II LAB		
WED	PATHO	CA	HAP-II		BIOCHEM	BATCH C-POC1 LAB BATCH D-BIOCHEM LAB		
THU	POC1	BIOCHEM	ES		CA	BATCH C- BIOCHEM LAB BATCH D-POC1 LAB		
FRI	BIOCHEM	POC-1	PATHO		TUTORIAL (HAP)	POC1	ES	(L/S)
SAT	HAP-II	PATHO	BIOCHEM		ES	CA	HAP-II	TUTORIAL (OC)

S. No	NAME OF THE FACULTY	DESIGNATION	NAME OF THE SUBJECT (Hrs)	PROGRAMME
1.	Mr. A. Naga Srinivas	Associate Professor	Pharmaceutical Organic Chemistry-I (POC-I) (5)	B. Pharm
2.	Mrs. B. Rama Madhuri	Assistant Professor	Pharmaceutical Biochemistry(BIOCHEM) (5)	B. Pharm
3.	Mr. B. Yerni Kumar	Assistant Professor	Human Anatomy and Physiology-II (HAP-II)(5)	B. Pharm
4.	Mrs.I. Adi Lakshmi	Assistant Professor	Pathophysiology (PATHO) (5)	B. Pharm
5.	Mr. Vinay Ramji	Assistant Professor	Environmental Sciences (ES) (3)	B. Pharm
6.	Mrs. B. Aruna	Assistant Professor	Computer Applications (CA) (4)	B. Pharm
7.	Mr. A. Naga Srinivas	Associate Professor	Pharmaceutical Organic Chemistry-I (POC-I) Lab (6)	B. Pharm
8.	Mrs. B. Rama Madhuri	Assistant Professor	Pharmaceutical Biochemistry (BIOCHEM) Lab (6)	B. Pharm
9.	Mr. B. Yerni Kumar	Assistant Professor	Human Anatomy and Physiology-II (HAP-II) Lab (6)	B. Pharm
10.	Mrs. B. Aruna	Assistant Professor	Computer Applications (CA) Lab (6)	B. Pharm
11.	Mr. A. Naga Srinivas	Associate Professor	Pharmaceutical Organic Chemistry-I (POC-I)(Tutorial (1)	B. Pharm
12.	Mr. B. Yerni Kumar	Assistant Professor	Human Anatomy and Physiology-II (HAP-II)Tutorial (1)	B. Pharm
13.	Mr. R. Ramana	Librarian	Library (1)	B. Pharm
14.	Mr. Koteshwar Rao	Physical Director	Sports(1)	B. Pharm

B. Bhagyasri
Time Table Incharge

PRINCIPAL Principal
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

ESTD : 2005

AVANTHI INSTITUTE OF PHARMACEUTICAL SCIENCES

(Approved by A.I.C.T.E, P.C.I, New Delhi,Recognized by the Govt. of A.P. & Affiliated to JNTUK, Kakinada)
Cherukupally (Village), Chittivalasa (SO), Bhogapuram (Mandal),Vizianagaram (Dist)-531162.
www.avanthipharma.ac.in, principal@avanthipharma.ac.in

CLASS TIME TABLE AY: 2021-22

CLASS:IIB.Pharm I Sem (PCI Regulation) **w.e.f:01/10/2021**
SECTION– A (2020 Admitted Batch)

CLASS TEACHER - Mr.M.Rajeswara Rao Batch A:Roll 01-25 Batch B: Roll 26-50								
DAY/ TIME	9:30-10:30	10:30–11:20	11:20–12:10	12:10 1:00	1:00 – 01:50	1:50 – 2:40	2:40 – 3:30	3:30 – 4:20
MON	PE	POC-II	PP-I	LUNCH	MB	BATCH A - POC-II LAB BATCH B - PP-I LAB		
TUE	PP-I	PE	MB		POC-II	BATCH A - PP-I LAB BATCH B - POC-II LAB		
WED	MB	PP-I	PE		TUTORIAL (PP-I)	BATCH A –MB LAB BATCH B –PE LAB		
THU	POC-II	MB	PP-I		PE	BATCH A – MB LAB BATCH B – PE LAB		
FRI	MB	PE	POC-II		TUTORIAL (PE)	PP-I	TUTORIAL (POC-II)	LIBRARY/ SPORTS
SAT	PP-I	POC-II	MB		PE	STI	TUTORIAL (MB)	LIBRARY/ SPORTS

S. No	NAME OF THE FACULTY	DESIGNATION	NAME OF THE SUBJECT(Hrs)	PROGRAMME
1.	Mr. G. Durga Rao	Assistant Professor	Pharmaceutical Organic Chemistry- II (POC-II) (5)	B. Pharm
2.	Mr.M. Rajeswara Rao	Assistant Professor	Physical Pharmaceutics – I (PP-I) (5)	B. Pharm
3.	Mr. S. Rama Krishna	Associate Professor	Pharmaceutical Microbiology (MB)(5)	B. Pharm
4.	Mrs.M. Venkata Naga Deepika	Associate Professor	Pharmaceutical Engineering (PE)(5)	B. Pharm
5.	Mr. G. Durga Rao	Assistant Professor	Pharmaceutical Organic Chemistry- II (POC-II) lab (6)	B. Pharm
6.	Mr M. Rajeswararao	Assistant Professor	Physical Pharmaceutics – I (PP-I) Lab (6)	B. Pharm
7.	Mr. S. Rama Krishna	Associate Professor	Pharmaceutical Microbiology (MB) Lab (6)	B. Pharm
8.	Mrs. M. V.Naga Deepika	Associate Professor	Pharmaceutical Engineering (PE) Lab (6)	B. Pharm
9.	Mr. G. Durga Rao	Assistant Professor	Pharmaceutical Organic Chemistry- II (POC-II) Tutorial (1)	B. Pharm
10.	Mr.M. Rajeswararao	Assistant Professor	Physical Pharmaceutics – I (PP-I) Tutorial (1)	B. Pharm
11.	Mr. S. Rama Krishna	Associate Professor	Pharmaceutical Microbiology (MB) Tutorial (1)	B. Pharm
12.	Mrs. M. Venkata Naga Deepika	Associate Professor	Pharmaceutical Engineering (PE) Tutorial (1)	B. Pharm
13	Mr. M. Rajeswara Rao	Assistant Professor	Student Teacher Interaction (STI) (1)	B. Pharm
14	Mr. R. Ramana	Librarian	Library (1)	B. Pharm
15	Mr. D. Koteswara Rao	Physical Director	Sports (1)	B. Pharm

B. Bhagyasri
Time Table Incharge

PRINCIPAL Principal
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

ESTD : 2005

AVANTHI INSTITUTE OF PHARMACEUTICAL SCIENCES

(Approved by A.I.C.T.E, P.C.I, New Delhi.Recognized by the Govt. of A.P. & Affiliated to JNTUK, Kakinada)
Cherukupally (Village), Chittivalasa (SO), Bhogapuram (Mandal),Vizianagaram (Dist)-531162.
www.avanthipharma.ac.in, principal@avanthipharma.ac.in

CLASS TIME TABLE AY: 2021-22

CLASS: II B.Pharm I Sem (PCI Regulation)
SECTION– B (2020 Admitted Batch) **w.e.f: 01/10/2021**

CLASS TEACHER :Mr.V.H.S REDDY	Batch C:Roll 51-75				Batch D: Roll 76-A0			
DAY/ TIME	**9:30 - 10:30**	**10:30 – 11:20**	**11:20– 12:10**	**12:10 -1:00**	**1:00 – 01:50**	**1:5– 2:40**	**2:40– 3:30**	**3:30 – 4:20**
MON	PP-I	MB	PE	**LUNCH**	POC-II	BATCH C – MB LAB BATCH D – PE LAB		
TUE	MB	POC-II	PP-I		PE	BATCH C – PE LAB BATCH D – MB LAB		
WED	PE	POC-II	PP-I		TUTORIAL (MB)	BATCH C - POC-II LAB BATCH D - PP-II LAB		
THU	PP-I	PE	POC-II		MB	BATCH C - PP-II LAB BATCH D - POC-II LAB		
FRI	POC-II	PP-I	MB		TUTORIAL (POC-II)	STI	TUTORIAL (PE)	LIBRARY/ SPORTS
SAT	MB	PE	PP-I		POC-II	MB	TUTORIAL (PP-I)	LIBRARY/ SPORTS

S.No	NAME OF THE FACULTY	DESIGNATION	NAME OF THE SUBJECT (Hrs)	PROGRAMME
1.	Mr. A. Srinivas	Associate Professor	Pharmaceutical Organic Chemistry-II (POC-II) (6)	B. Pharm
2.	Mr. V.H.S.Reddy	Assistant Professor	Physical Pharmaceutics – I (PP-I) (5)	B. Pharm
3.	Mr. S. Chandrasekhar	Associate Professor	Pharmaceutical Microbiology (MB) (6)	B. Pharm
4.	Ms.D.Purnima	Associate Professor	Pharmaceutical Engineering (PE) (5)	B. Pharm
5.	Mr. A. Srinivas	Associate Professor	Pharmaceutical Organic Chemistry-II (POC-II) Lab (5)	B. Pharm
6.	Mr.V.H.S.Reddy	Assistant Professor	Physical Pharmaceutics – I (PP-I) Lab (6)	B. Pharm
7.	Mr. S. Chandrasekhar	Associate Professor	Pharmaceutical Microbiology (MB) Lab (5)	B. Pharm
8.	Ms.D.Purnima	Associate Professor	Pharmaceutical Engineering (PE) Lab (5)	B. Pharm
9.	Mr. A. Srinivas	Associate Professor	Pharmaceutical Organic Chemistry-II (POC-II) Tutorial (1)	B. Pharm
10.	Mr.V.H.S.Reddy	Assistant Professor	Physical Pharmaceutics – I (PP-I) Tutorial (1)	B. Pharm
11.	Mr. S. Chandrasekhar	Associate Professor	Pharmaceutical Microbiology Tutorial(MB) (1)	B. Pharm
12.	Ms. D.Purnima	Associate Professor	Pharmaceutical Engineering (PE) Tutorial (1)	B. Pharm
13	Mr. V.H.S.Reddy	Assistant Professor	Student Teacher Interaction (STI) (1)	B. Pharm
14	Mr. R.Ramana	Librarian	Library (1)	B. Pharm
15	Mr. D.Koteswara Rao	Physical Director	Sports (1)	B. Pharm

B Bhagya Sri
Time Table Incharge

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162
Principal

ESTD : 2005

AVANTHI INSTITUTE OF PHARMACEUTICAL SCIENCES

(Approved by A.I.C.T.E, P.C.I, New Delhi,Recognized by the Govt. of A.P. & Affiliated to JNTU K, Kakinada)
Cherukupally (Village), Chittivalasa (SO), Bhogapuram (Mandal),Vizianagaram (Dist)-531162.
www.avanthipharma.ac.in, principal@avanthipharma.ac.in

CLASS TIME TABLE AY: 2021-22

CLASS: III B.Pharm I Sem (PCI Regulation)
SECTION – B (2019 Admitted Batch) **w.e.f: 15/09/2021**

Class Teacher – Mrs. L. Divya SriBatch C: Roll 51-75					Batch D:Roll 76-A3			
DAY/ TIME	9:30 – 10:30	10:30 – 11:20	11:20 – 12:10	12:10 -1:00	1:00 – 01:50	1:50– 2:40	2:40 – 3:30	3:30 – 4:20
MON	IP-I	COGNOSY - II	MC-II	LUNCH	COLOGY-II	BATCH C – COGNOSY - II LAB BATCH D – LIBRARY/SPORTS		
TUE	COLOGY-II	COGNOSY - II	PJ		MC-II	BATCH C – LIBRARY/SPORTS BATCH D – COGNOSY - II LAB		
WED	MC-II	COLOGY-II	IP-I		TUTORIAL (COLOGY)	BATCH C - IP-I LAB BATCH D - COLOGY LAB		
THU	COGNOSY - II	MC-II	IP-I		PJ	BATCH C - COLOGY LAB BATCH D - IP-I LAB		
FRI	PJ	MC-II	COLOGY-II		COGNOSY - II	IP-I	TUTORIAL (IP-I)	LIBRARY/ SPORTS
SAT	PJ	IP-I	COGNOSY - II		COLOGY-II	PJ	STI	TUTORIAL (MC-II)

S. No	NAME OF THE FACULTY	DESIGNATION	NAME OF THE SUBJECT (Hrs)	DEPARTMENT
1.	Dr. M. Sowmya	Associate Professor	Medicinal Chemistry – II (MC-II) (5)	B. Pharm
2.	Mr. Vinay Ramji	Assistant Professor	Pharmacology-II (COLOGY-II) (5)	B. Pharm
3.	Mrs. L. Divya Sri	Associate Professor	Industrial Pharmacy – I (IP-I) (5)	B. Pharm
4.	Mrs. B. Poornima	Associate Professor	Pharmacognosy – II (COGNOSY-II) (5)	B. Pharm
5.	Mrs. K. Venkata Radhika	Associate Professor	Pharmaceutical Jurisprudence (PJ) (5)	B. Pharm
6.	Mr. Vinay Ramji	Assistant Professor	Pharmacology (COLOGY-II) Lab (6)	B. Pharm
7.	Mrs. L. Divya Sri	Associate Professor	Industrial Pharmacy – I (IP-I) Lab (6)	B. Pharm
8.	Mrs. B. Poornima	Associate Professor	Pharmacognosy – II (COGNOSY-II) Lab (6)	B. Pharm
9.	Mrs. M. Sowmya	Associate Professor	Medicinal Chemistry – II (MC-II) Tutorial(1)	B. Pharm
10.	Mr. Vinay Ramji	Assistant Professor	Pharmacology Tutorial (1)	B. Pharm
11.	Mrs. L. Divya Sri	Associate Professor	Industrial Pharmacy – I (IP-I) Tutorial (1)	B. Pharm
12	Mrs. L. Divya Sri	Associate Professor	Student Teacher Interaction (STI) (1)	B. Pharm
13	Mr. R. Ramana	Librarian	Library (1)	B. Pharm
14	Mr.D.Koteswara Rao	Physical Director	Sports (1)	B. Pharm

B. Bhagya Sri
Time Table Incharge

Principal

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

ESTD : 2005

AVANTHI INSTITUTE OF PHARMACEUTICAL SCIENCES

(Approved by A.I.C.T.E, P.C.I, New Delhi.Recognized by the Govt. of A.P. & Affiliated to JNTUK, Kakinada)
Cherukupally (Village), Chittivalasa (SO), Bhogapuram (Mandal),Vizianagaram (Dist)-531162.
www.avanthipharma.ac.in, principal@avanthipharma.ac.in

CLASS TIME TABLE AY: 2021-22

CLASS: III B.Pharm I Sem (PCI Regulation)
SECTION – A (2019 Admitted Batch) **w.e.f: 15/09/2021**

CLASS TEACHER – Dr.M.Sowmya				Batch A: Roll 01-25		Batch B:Roll 26 - 50		
DAY/ TIME	9:30 - 10:30	10:30 – 11:20	11:20 – 12:10	12:10 -1:00	1:00 – 01:50	1:50 2:40	2:40 – 3:30	3:30 – 4:20
MON	MC-II	COLOGY-II	IP-I	LUNCH	COGNOSY - II	BATCH A - IP-I LAB BATCH B - COLOGY-II LAB		
TUE	PJ	MC-II	COLOGY-II		TUTORIAL (IP-I)	BATCH A - COLOGY-IILAB BATCH B - IP-I LAB		
WED	IP-I	COGNOSY - II	MC-II		COLOGY-II	BATCH A – LIBRARY/SPORTS BATCH B – COGNOSY - IILAB		
THU	PJ	COLOGY-II	COGNOSY - II		IP-I	BATCH A – COGNOSY - IILAB BATCH B – LIBRARY/SPORTS		
FRI	COLOGY-II	COGNOSY - II	PJ		MC-II	PJ	TUTORIAL (MC-II)	LIBRARY/ SPORTS
SAT	COGNOSY - II	MC-II	PJ		IP-I	STI	TUTORIAL (COL)	LIBRARY /SPORTS

S. No	NAME OF THE FACULTY	DESIGNATION	NAME OF THE SUBJECT(Hrs)	PROGRAMME
1.	Dr. M.Sowmya	Associate Professor	Medicinal Chemistry – II (MC-II) (5)	B. Pharm
2.	Mrs. Y. Anveshi Dhananjaya	Assistant Professor	Pharmacology(COLOGY-II) (5)	B. Pharm
3.	Mr.K.B.K.Raju	Assistant Professor	Industrial Pharmacy – I (IP-I) (4)	B. Pharm
4.	Mr. A. Nanaji	Associate Professor	Pharmacognosy – II (5)	B. Pharm
5.	Mrs. M. Geethanjali	Assistant Professor	Pharmaceutical Jurisprudence (PJ) (5)	B. Pharm
6.	Mrs. Y. Anveshi Dhananjaya	Assistant Professor	Pharmacology Lab (6)	B. Pharm
7.	Mr.K.B.K.Raju	Assistant Professor	Industrial Pharmacy – I Lab (6)	B. Pharm
8.	Mr. A. Nanaji	Associate Professor	Pharmacognosy – II(COGNOSY-II) Lab (6)	B. Pharm
10.	Mrs. Y. Anveshi Dhananjaya	Assistant Professor	Pharmacology(COLOGY-II) Tutorial (1)	B. Pharm
11.	Mr.K.B.K.Raju	Assistant Professor	Industrial Pharmacy – I (IP-I) Tutorial (1)	B. Pharm
12	Dr. M.Sowmya	Associate Professor	Student Teacher Interaction (STI) (1)	B. Pharm
13	Mr. R.Ramana	Librarian	Library (2)	B. Pharm
14	Mr. D.Koteswara Rao	Physical Director	Sports (2)	B. Pharm

B. Bhaggasri
Time Table Incharge

Principal

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

ESTD : 2005

AVANTHI INSTITUTE OF PHARMACEUTICAL SCIENCES

(Approved by A.I.C.T.E, P.C.I, New Delhi.Recognized by the Govt. of A.P. & Affiliated to JNTU K, Kakinada)
Cherukupally (Village), Chittivalasa (SO), Bhogapuram (Mandal),Vizianagaram (Dist)-531162.
www.avanthipharma.ac.in, principal@avanthipharma.ac.in

CLASS TIME TABLE AY:2021-22

CLASS: IV B.PHARM I SEM (PCI REGULATION)
(2018 Admitted Batch) **w.e.f: 01/09/2021**

Class Teacher: Mrs.B.ArunaBatchA: Roll 01-25 Batch B:Roll 26-50

DAY/ TIME	9:30-10:30	10:30–11:20	11:20–12:10	12:10 1:00	1:00 – 01:50	1:50 – 2:40	2:40 – 3:30	3:30–4:20
MON	IMA	IP-II	GPAT	LUNCH	NDDS	Batch-A- IMA LAB Batch-B– PROJECT Batch- C- LIB/SPORTS		
TUE	NDDS	IMA	IP-II		GPAT	Batch-A- LIB/SPORTS Batch-B–IMA LAB Batch-C- PROJECT		
WED	IP-II	PP	IMA		GPAT	Batch-A- PROJECT Batch-B– LIB/SPORTS Batch-C- IMA LAB		
THU	NDDS	IP-II	PP		TUTORIAL (IMA)	GPAT	PROJECT	
FRI	PP	IMA	NDDS		PP	GPAT	PROJECT	
SAT	IP-II	NDDS	PP		IMA	GPAT	PROJECT	

S. No	NAME OF THE FACULTY	DESIGNATION	NAME OF THE SUBJECT (Hrs)	PROGRAMME
1.	Mrs. B.Aruna	Assistant Professor	Instrumental Methods of Analysis (IMA) (5)	B. Pharm
2.	Mr. M.Suresh Kumar	Associate Professor	Industrial Pharmacy – II (IP-II) (5)	B. Pharm
3.	Mr. M.Vasu	Assistant Professor	Pharmacy Practice (PP) (5)	B. Pharm
4.	Mrs. I. Adi Lakshmi	Assistant Professor	Novel Drug Delivery Systems(NDDS) (5)	B. Pharm
5.		Associate Professor	GPAT (6)	B. Pharm
6.	Mrs. B.Aruna	Assistant Professor	Instrumental Methods of Analysis (IMA) Lab (6)	B. Pharm
7	Mrs. B.Aruna	Assistant Professor	Instrumental Methods of Analysis (IMA)Tutorial (1)	B. Pharm
8	Mrs. B.Aruna	Assistant Professor	Student Teacher Interaction(STI)(1)	B. Pharm
9	Mr. R.Ramana	Librarian	Library (1)	B. Pharm
10	Mr. D.Koteswara Rao	Physical Director	Sports (1)	B. Pharm

B.Bhaggyasri
Time Table Incharge

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

CLASS TIME TABLE AY: 2021-22

CLASS: II B.PHARM II SEM (PCI REGULATION)
SECTION – A (2020 Admitted Batch) **w.e.f: 28/02/2022**

Class Teacher: Mr. M. RajeswararaoBatch A: Roll 01-25 Batch B:Roll 26-55

DAY/ TIME	9:30 - 10:30	10:30 – 11:20	11:20 – 12:10	12:10 -1:00	1:00 – 01:50	1:50 – 2:40	2:40 – 3:30	3:30– 4:20
MON	COLOGY-I	COGNOSY-I	MC-I	LUNCH	POC-III	BATCH A - COLOGY-I LAB BATCH B - COGNOSY-I LAB		
TUE	PP-II	COLOGY-I	COGNOSY-I		TUTORIAL (PP-II)	BATCH A - COGNOSY-I LAB BATCH B - COLOGY-I LAB		
WED	MC-I	PP-II	COLOGY-I		COGNOSY-I	BATCH A - MC-I LAB BATCH B - PP-II LAB		
THU	PP-II	MC-I	POC-III		COLOGY-I	BATCH A- - PP-II LAB BATCH B - MC-I LAB		
FRI	COGNOSY-I	POC-III	MC-I		TUTORIAL (COLOGY)	TUTORIAL (POC-III)	PP-I	POC-III
SAT	POC-III	MC-I	PP-II		TUTORIAL (MC-I)	COGNOSY-I	COLOGY-I	LIBRARY/ SPORTS

S. No	NAME OF THE FACULTY	DESIGNATION	NAME OF THE SUBJECT (Hrs)	PROGRAMME
1.	Mr. G. Durga Rao	Assistant Professor	Pharmaceutical Organic Chemistry-III(POC-III) (5)	B. Pharm
2.	Dr. N. Neelima	Professor	Medicinal Chemistry-I (MC-I) (4)	B. Pharm
3.	Mr. M.Rajeswararao	Assistant Professor	Physical Pharmaceutics-II (PP-II)(5)	B. Pharm
4.	Mr. S. Rama Krishna	Associate Professor	Pharmacology-I (COLOGY-I)(5)	B. Pharm
5.	Mr.A.Nanaji	Associate Professor	Pharmacognosy&Phytochemistry-I(COGNOSY-I) (5)	B. Pharm
6	Dr. N. Neelima	Professor	Medicinal Chemistry-I Lab (MC-I) (6)	B. Pharm
7	Mr. M.Rajeswararao	Assistant Professor	Physical Pharmaceutics-II (PP-II) Lab (6)	B. Pharm
8	Mr. S. Rama Krishna	Assistant Professor	Pharmacology-I (COLOGY-I)Lab (6)	B. Pharm
9	Mr.A.Nanaji	Associate Professor	Pharmacognosy&Phytochemistry-I(COGNOSY-I) Lab (6)	B. Pharm
10	Mr. R.Ramana	Librarian	Library(1)	B. Pharm
11	Mr. D.Koteswara Rao	Physical Director	Sports (1)	B. Pharm

B. Bhagyasri
Time Table Incharge

PRINCIPAL
Principal
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

CLASS TIME TABLE AY: 2021-22

CLASS: II B.PHARM II SEM (PCI REGULATION) **w.e.f: 28/02/2022**
SECTION – B (2020 Admitted Batch)

Class Teacher :Mr. V. H. S Reddy Batch C: Roll 56-75 Batch D : Roll76-A0

DAY/ TIME	9:30-10:30	10:30–11:20	11:20–12:10	12:10 1:00	1:00 – 01:50	1:50 – 2:40	2:40 – 3:30	3:30-4:20
MON	MC-I	PP-II	COLOGY-I	LUNCH	STI	BATCH C - PP-II LAB BATCH D - MC-I LAB		
TUE	COGNOSY-I	MC-I	PP-II		TUTORIAL (COLOGY-I)	BATCH C - MC-I LAB BATCH D - PP-II LAB		
WED	COLOGY-I	COGNOSY-I	MC-I		TUTORIAL (POC-III)	BATCH C – COLOGY-I LAB BATCH D – COGNOSY-I LAB		
THU	POC-III	COLOGY-I	COGNOSY-I		TUTORIAL (PP-II)	BATCH C – COGNOSY-I LAB BATCH D – COLOGY-I LAB		
FRI	MC-I	PP-II	COLOGY-I		TUTORIAL COGNOSY-I	POC-III	MC-I	CLASS TEST
SAT	PP-II	POC-III	COGNOSY-I		TUTORIAL (MC-I)	POC-III	CLASS TEST	LIBRARY/SPORTS

S. No	NAME OF THE FACULTY	DESIGNATION	NAME OF THE SUBJECT (Hrs)	PROGRAMME
1.	Mr. G. Durga Rao	Assistant Professor	Pharmaceutical Organic Chemistry-III (POC-III) (4)	B. Pharm
2.	Mrs. M. Geethanjali	Assistant Professor	Medicinal Chemistry-I (MC-I) (5)	B. Pharm
3.	Mr. V. H. S Reddy	Assistant Professor	Physical Pharmaceutics-II (PP-II) (4)	B. Pharm
4.	Mrs. M. Venkata Naga Deepika	Associate Professor	Pharmacology-I (COLOGY-I) (4)	B. Pharm
5.	Mrs. M. Divya	Assistant Professor	Pharmacognosy&Phytochemistry-I (4)	B. Pharm
6	Mrs. M. Geethanjali	Assistant Professor	Medicinal Chemistry-I (MC-I) Lab (6)	B. Pharm
7	Mr. V. H. S Reddy	Assistant Professor	Physical Pharmaceutics-II Lab (PP-II) (6)	B. Pharm
8	Mrs. M. Venkata Naga Deepika	Associate Professor	Pharmacology-I (COLOGY-I) Lab (6)	B. Pharm
9	Mrs. M. Divya	Assistant Professor	Pharmacognosy&Phytochemistry-I(COGNOSY-I)Lab (6)	B. Pharm
10	Mr. V. H. S Reddy	Assistant Professor	Student Teacher Interaction (STI) (1)	B. Pharm
11	Mr. R. Ramana	Librarian	Library (1)	B. Pharm
12	Mr. D. Koteswara Rao	Physical Director	Sports (1)	B. Pharm

B.Bhagyasri
Time-Table Incharge

Principal

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

ESTD : 2008

AVANTHI INSTITUTE OF PHARMACEUTICAL SCIENCES

(Approved by A.I.C.T.E, P.C.I, New Delhi.Recognized by the Govt. of A.P. & Affiliated to JNTU K, Kakinada)
Cherukupally (Village), Chittivalasa (SO), Bhogapuram (Mandal),Vizianagaram (Dist)-531162.
www.avanthipharma.ac.in, principal@avanthipharma.ac.in

CLASS TIME TABLE AY: 2021-22

CLASS: III B.PHARM II SEM (PCI REGULATION)
SECTION -- A (2019 Admitted Batch) **w.e.f: 31/01/2022**

Class Teacher :Dr. M. Sowmya			Batch A: Roll 01-25		Batch B: Roll 26 - 50			
DAY/ TIME	9:30 - 10:30	10:30 – 11:20	11:20 – 12:10	12:10 -1:00	1:00 – 01:50	1:50 – 2:40	2:40 – 3:30	3:30 – 4:20
MON	QA	COLOGY-III	MC-III	LUNCH	BPPK	BATCH A - HDT LAB BATCH B – COLOGY-III LAB		
TUE	BIOTECH	QA	COLOGY-III		MC-III	BATCH A - COLOGY-III LAB BATCH B - HDT LAB		
WED	HDT	BIOTECH	BPPK		COLOGY-III	BATCH A -- MC-III LAB BATCH B – LIBRARY/SPORTS		
THU	MC-III	BPPK	HDT		QA	BATCH A – LIBRARY/SPORTS BATCH B – MC-III LAB		
FRI	COLOGY-III	HDT	BPPK		BIOTECH	QA	TUTORIAL (HDT)	TUTORIAL (MC-III)
SAT	BIOTECH	MC-III	HDT		TUTORIAL (COLOGY-III)	BIOTECH	QA	TUTORIAL (BPPK)

S. No	NAME OF THE FACULTY	DESIGNATION	NAME OF THE SUBJECT (Hrs)	PROGRAMME
1.	Dr. M. Sowmya	Associate Professor	Medicinal Chemistry-III (4)	B. Pharm
2.	Mrs. Y. Anveshi Dhananjaya	Assistant Professor	Pharmacology-III (4)	B. Pharm
3.	Mrs. L. Divya Sri	Associate Professor	Herbal Drug Technology (4)	B. Pharm
4.	Mr. K.B.K. Raju	Assistant Professor	Biopharmaceutics & Pharmacokinetics (4)	B. Pharm
5.	Mr. S. Chandra Sekhar	Associate Professor	Pharmaceutical Biotechnology (5)	B. Pharm
6.	Mrs. K. Venkata Radhika	Associate Professor	Quality Assurance (5)	B. Pharm
7.	Dr. M. Sowmya	Associate Professor	Medicinal Chemistry-III Lab (6)	B. Pharm
8.	Mrs. Y. Anveshi Dhananjaya	Assistant Professor	Pharmacology-III Lab (6)	B. Pharm
9	Mrs. L. Divya Sri	Associate Professor	Herbal Drug Technology Lab (6)	B. Pharm
10	Dr. M. Sowmya	Associate Professor	Medicinal Chemistry-III(1)	B. Pharm
11	Mrs. Y. Anveshi Dhananjaya	Assistant Professor	Pharmacology-III (1)	B. Pharm
12	Mrs. L. Divya Sri	Associate Professor	Herbal Drug Technology (HDT) (1)	B. Pharm
13	Mr. K.B.K. Raju	Assistant Professor	Biopharmaceutics & Pharmacokinetics (BPPK) (1)	B. Pharm
14	Mr .R. Ramana	Librarian	Library (1)	B. Pharm
15	Mr. D. Koteswara Rao	Physical Director	Sports (1)	B. Pharm

B. Bhagyasri
Time-Table Incharge

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162
Principal

CLASS TIME TABLE AY: 2021-22

CLASS: III B.PHARM II SEM (PCI REGULATION)
SECTION – B (2019 Admitted Batch) **w.e.f: 31/01/2022**

Class Teacher: Mr.D. Vinay Ramji				Batch C: Roll 51-75			Batch D: Roll 76-A3	
DAY/ TIME	9:30-10:30	10:30–11:20	11:20–12:10	12:10 1:00	1:00 – 01:50	1:50 – 2:40	2:40 – 3:30	3:30–4:20
MON	BIOTECH	BPPK	COLOGY-III	LUNCH	HDT	BATCH C - MC-III LAB BATCH D - LIBRARY/SPORTS		
TUE	COLOGY-III	MC-III	BPPK		QA	BATCH C - LIBRARY/SPORTS BATCH D - MC-III LAB		
WED	QA	HDT	MC-III		BIOTECH	BATCH C – COLOGY-III LAB BATCH D - HDT LAB		
THU	QA	HDT	BIOTECH		TUTORIAL MC-III	BATCH C- HDT LAB BATCH D- COLOGY-III LAB		
FRI	BPPK	QA	HDT		TUTORIAL (COLOGY-III)	MC-III	BIOTECH	TUTORIAL (BPPK)
SAT	COLOGY-III	BPPK	QA		MC-III	TUTORIAL (HDT)	COLOGY-III	BIOTECH

S. No	NAME OF THE FACULTY	DESIGNATION	NAME OF THE SUBJECT (Hrs)	PROGRAMME
1.	Mrs. B. Meher Jyothi	Assistant Professor	Medicinal Chemistry-III (MC-III)(4)	B. Pharm
2.	Mr. D. Vinay Ramji	Assistant Professor	Pharmacology-III (COLOGY-III) (4)	B. Pharm
3.	Ms. D. Purnima	Associate Professor	Herbal Drug Technology (4)	B. Pharm
4.	Mr.K.BhargavKrishnaRaju	Assistant Professor	Biopharmaceutics & Pharmacokinetics (4)	B. Pharm
5.	Mr. M. Vasu	Assistant Professor	Pharmaceutical Biotechnology (5)	B. Pharm
6.	Mrs. K. Venkata Radhika	Associate Professor	Quality Assurance (5)	B. Pharm
7.	Mrs. B. Meher Jyothi	Assistant Professor	Medicinal Chemistry-III Lab (6)	B. Pharm
8.	Mr. D. Vinay Ramji	Assistant Professor	Pharmacology-III Lab (6)	B. Pharm
9.	Ms. D. Purnima	Associate Professor	Herbal Drug Technology Lab (6)	B. Pharm
10	Mrs. B. Meher Jyothi	Assistant Professor	Medicinal Chemistry-III Tutorial (1)	B. Pharm
11	Mr. D. Vinay Ramji	Assistant Professor	Pharmacology-III Tutorial (1)	B. Pharm
12	Ms. D. Purnima	Associate Professor	Herbal Drug Technology Tutorial (1)	B. Pharm
13	Mr. K. Bhargav Krishna Raju	Assistant Professor	Biopharmaceutics & Pharmacokinetics Tutorial (1)	B. Pharm
14	R. Ramana	Librarian	Library (1)	B. Pharm
15	D. Koteswara Rao	Physical Director	Sports (1)	B. Pharm

B. Bhagyasri
Time-Table Incharge

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

Principal

ESTD : 2005

AVANTHI INSTITUTE OF PHARMACEUTICAL SCIENCES

(Approved by A.I.C.T.E, P.C.I, New Delhi,Recognized by the Govt. of A.P. & Affiliated to JNTUK, Kakinada)
Cherukupally (Village), Chittivalasa (SO), Bhogapuram (Mandal),Vizianagaram (Dist) -531162.
www.avanthipharma.ac.in, principal@avanthipharma.ac.in

DEPARTMENT OF PHARMACY PRACTICE
CLASS TIME TABLE AY: 2021-2022

CLASS: PHARM.D IVYEAR (2018 ADMITTED BATCH) **W.e.f-16/08/2021**
CLASS TEACHER:Dr.B.TEJA SREE

DAY/ TIME	9:30-10:30	10:3 – 11:20	11:20– 12:10	12:10-1:00	1:00– 01:50	1:50– 2:40	2:40-3:30	3:30-4:20
MON	CP	BRM	CT	LUNCH	PT- III	CP LAB		
TUE	BPPK	CP	BRM		BPPK	HP LAB		
WED	PT-III	BPPK	HP		CP	BPPK LAB		
THU	BRM	PT- III	CT		HP	PT- III LAB		
FRI	HOSPITAL ROSTER							
SAT	HOSPITAL ROSTER							

S. No	NAME OF THE FACULTY	DESIGNATION	NAME OF THE SUBJECT(Hrs)	DEPARTMENT
1.	Mrs.Ch. Geetha	Assistant Professor	Biostatistics and Research Methodology-(BRM) (4)	Pharm. D
2.	Dr.V C Randeep Raj	Associate Professor	Clinical Pharmacy-(CP) (3)	Pharm. D
3.	Mr.V Uma Sankar	Associate Professor	Hospital Pharmacy-(HP) (2)	Pharm. D
4.	Dr.B. TejaSree	Assistant Professor	Clinical Toxicology-(CT) (2)	Pharm. D
5.	Mr.P. Sandeep	Assistant Professor	Biopharmaceutics and Pharmacokinetics-(BPPK) (3)	Pharm. D
6.	Dr.T. Rushi	Assistant Professor	Pharmacotherapeutics – III-(PT-III) (3)	Pharm. D
7.	Dr.V C Randeep Raj	Associate Professor	Clinical Pharmacy Lab-(CP) (3)	Pharm. D
8.	Mr.V Uma Sankar	Associate Professor	Hospital Pharmacy Lab-(HP) (3)	Pharm. D
9.	Mr.P. Sandeep	Assistant Professor	Biopharmaceutics and Pharmacokinetics Lab-(BPPK) (3)	Pharm. D
10.	Dr.T. Rushi	Assistant Professor	Pharmacotherapeutics - III – (PT-III)Lab (3)	Pharm. D

B. Bhagyasri
Time Table Incharge

Principal

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

CLASS TIME TABLE AY: 2021-22

CLASS: IV B.PHARM II SEM (PCI REGULATION)
(2018 Admitted Batch) **w.e.f: 17/01/2022**

Class Teacher: Mrs. B. ArunaBatch A: Roll 01-25 Batch B: Roll 26-50								
DAY/ TIME	9:30-10:30	10:30–11:20	11:20–12:10	12:10 1:00	1:00 – 01:50	1:50 – 2:40	2:40 – 3:30	3:30 -4:20
MON	PMM	SPP	AIT	LUNCH	GPAT	PROJECT		
TUE	BRM	PMM	SPP		GPAT	PROJECT		
WED	SPP	BRM	PMM		AIT	GPAT	PROJECT	
THU	AIT	BRM	PMM		SPP	GPAT	PROJECT	
FRI	BRM	AIT	SPP		PROJECT/ LIBRARY	GPAT	PROJECT	
SAT	AIT	PMM	BRM		PROJECT/ LIBRARY	GPAT	PROJECT	LIBRARY/ SPORTS

S. No	NAME OF THE FACULTY	DESIGNATION	NAME OF THE SUBJECT (Hrs)	PROGRAMME
1.	Mr.M. Vasu	Assistant Professor	Biostatistics &Research Methodology (5)	B. Pharm
2.	Mrs. B. Meher Jyothi	Assistant Professor	Social & Preventive Pharmacy (5)	B. Pharm
3.	Mr. M. Suresh Kumar	Associate Professor	Pharma Marketing Management (5)	B. Pharm
4.	Mrs. B. Aruna	Assistant Professor	Advanced Instrumentation Techniques (5)	B. Pharm
5.			GPAT (6)	B. Pharm
6.			PROJECT (7)	B. Pharm``
7.	Mr.R.Ramana	Librarian	Library (1)	B. Pharm
8.	Mr.D.Koteswara Rao	Physical Director	Sports (1)	B. Pharm

B. Bhagyashri
Time-Table Incharge

Principal

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., 531162

ESTD : 2005

AVANTHI INSTITUTE OF PHARMACEUTICAL SCIENCE

(Approved by A.I.C.T.E, P.C.I, New Delhi, Recognized by the Govt. of A.P. & Affiliated to JNTUK, Kakinada)
Cherukupally (Village), Chittivalasa (SO), Bhogapuram (Mandal), Vizianagaram (Dist) -531162.
www.avanthipharma.ac.in, principal@avanthipharma.ac.in

DEPARTMENT OF PHARMACY
CLASS TIME TABLE AY: 2021-22

CLASS: I M. Pharm **II Sem Pharmacology** **w.e.f: 23-05-2022**

Day/Time	9.00 - 10.00.	10.00 - 11.00	11.00 - 12.00	12.00 -1.00	1.00 - 2.00	2.00 - 3.00	3.00 - 4.00
Mon	AP-II	PTSM-II	PDD	**LUNCH**	CRP	AP-II	Library/ Seminar
Tue	PDD	AP-II	PTSM-II		AP-II	CRP	PTSM-II
Wed	PTSM-II	PDD	CRP		Library / Seminar	PDD	CRP
Thu	**Seminar/Assignments**						
Fri	**Practical-III**						
Sat	**Practical-IV**						

S. NO	NAME OF THE FACULTY	DESIGNATION	NAME OF THE SUBJECT(Hrs)	DEPARTMENT
1.	Dr. K. Murali Krishna	Professor	Pharmacological and Toxicological Screening Method-II -(PTSM-II) (4)	M. Pharm
2.	Mr.Ch.Madhu	Associate Professor	Cellular and Molecular Pharmacology-(CMP) (4)	M. Pharm
3.	Mrs.B.Ramavathi	Associate Professor	Principles of Drug Discovery-(PDD) (4)	M. Pharm
4.	Mrs.M.Madhavi Kumari	Associate Professor	Advanced Pharmacology-II (AP-II) (4)	M. Pharm
5.	Ms.M.Divya	Assistant Professor	Assignments (1)	M. Pharm
6	Mrs.M.Madhavi Kumari	Associate Professor	Practical-III (6)	M. Pharm
7	Mr.Ch.Madhu	Associate Professor	Practical-IV (6)	M. Pharm
8	Dr. K. Murali Krishna	Professor	Seminars (6)	M. Pharm
9.	Mr.R.Ramana	Librarian	Library (2)	M. Pharm

B. Bhagyasri

Principal

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

ESTD : 2005

AVANTHI INSTITUTE OF PHARMACEUTICAL SCIENCE

(Approved by A.I.C.T.E, P.C.I, New Delhi, Recognized by the Govt. of A.P. & Affiliated to JNTUK, Kakinada)
Cherukupally (Village), Chittivalasa (SO), Bhogapuram (Mandal), Vizianagaram (Dist) -531162.
www.avanthipharma.ac.in, principal@avanthipharma.ac.in

DEPARTMENT OF PHARMACY
CLASS TIME TABLE AY: 2021-22

CLASS: I M. Pharm **II Sem Pharmaceutical Analysis** **w.e.f: 23-05-2022**

Day/Time	9.00 - 10.00.	10.00 - 11.00	11.00 -12.00	12.00-1.00	1.00 - 2.00	2.00 - 3.00	3.00 - 4.00
Mon	AIA	QCQA	MBAT	**LUNCH**	AIA	HCA	Library/Seminar
Tue	MBAT	AIA	QCQA		HCA	MBAT	QCQA
Wed	QCQA	HCA	AIA		Library/ Seminar	HCA	MBAT
Thu	**Seminar/Assignments**						
Fri	**Practical-III**						
Sat	**Practical-IV**						

S. NO	NAME OF THE FACULTY	DESIGNATION	NAME OF THE SUBJECT(Hrs)	DEPARTMENT
1.	Dr. M. B. V. Raju	Professor	Quality Control and Quality Assurance-(QCQA) (4)	M. Pharm
2.	Mrs. B. Chaitanya	Associate Professor	Advanced Instrumental Analysis-(AIA) (4)	M. Pharm
3.	Mrs. A. H. V. Santhoshi	Associate Professor	Modern Bioanalytical Techniques-(MBT) (4)	M. Pharm
4.	Mr. A. N. Srinivas	Associate Professor	Herbal and Cosmetic Analysis-(HCA) (4)	M. Pharm
5.	B. Poornima	Associate Professor	Assignments (1)	M. Pharm
6	Mrs. B. Chaitanya	Associate Professor	Practical-III (6)	M. Pharm
7	Dr. M. B. V. Raju	Professor	Practical-IV (6)	M. Pharm
8	Mrs. A. H. V. Santhoshi	Associate Professor	Seminars (6)	M. Pharm
9.	Mr. R. Ramana	Librarian	Library (2)	M. Pharm

B. Bhagyasri

Principal

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

ESTD : 2005

AVANTHI INSTITUTE OF PHARMACEUTICAL SCIENCE

(Approved by A.I.C.T.E, P.C.I, New Delhi, Recognized by the Govt. of A.P. & Affiliated to JNTUK, Kakinada)
Cherukupally (Village), Chittivalasa (SO), Bhogapuram (Mandal), Vizianagaram (Dist) -531162.
www.avanthipharma.ac.in, principal@avanthipharma.ac.in

DEPARTMENT OF PHARMACY
CLASS TIME TABLE AY: 2021-22

CLASS: I M. Pharm **II Sem Pharmaceutics** **w.e.f: 23-05-2022**

Day/Time	9.00 - 10.00.	10.00 - 11.00	11.00 - 12.00	12.00-1.00	1.00 - 2.00	2.00 - 3.00	3.00 - 4.00.
Mon	MP	FD	CADD	**LUNCH**	MP	BPPK	Library/Seminar
Tue	CADD	MP	BPPK		CADD	FD	BPPK
Wed	FD	BPPK	CADD		Library/ Seminar	FD	MP
Thu	**Seminar/Assignments**						
Fri	**Practical-III**						
Sat	**Practical-IV**						

S. NO	NAME OF THE FACULTY	DESIGNATION	NAME OF THE SUBJECT (Hrs	DEPARTMENT
1.	Dr. G. Prasanthi	Professor	Computer Aided Drug Delivery System-(CADD) (4)	M. Pharm
2.	Ms. Y. VishnuVandana	Associate Professor	Molecular Pharmaceutics-(MP) (4)	M. Pharm
3.	Mr. M.Suresh Kumar	Associate Professor	Formulation Development-(FD) (4)	M. Pharm
4.	Mrs. B. Bhagyasri	Associate Professor	Advanced Biopharmaceutics and Pharmacokinetics-(BPPK) (4)	M. Pharm
5.	Mr.P.Sandeep	Associate Professor	Assignments (1)	M. Pharm
6	Ms. Y. VishnuVandana	Associate Professor	Practical-III (6)	M. Pharm
7	Dr. G. Prasanthi	Professor	Practical-IV	M. Pharm
8	Mrs. B. Bhagyasri	Associate Professor	Seminars (6)	M. Pharm
9.	Mr. R. Ramana	Librarian	Library (2)	M. Pharm

B.Bhagyasri

Principal

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

ESTD : 2005

AVANTHI INSTITUTE OF PHARMACEUTICAL SCIENCE

(Approved by A.I.C.T.E, P.C.I, New Delhi, Recognized by the Govt. of A.P. & Affiliated to JNTUK, Kakinada)
Cherukupally (Village), Chittivalasa (SO), Bhogapuram (Mandal), Vizianagaram (Dist) -531162.
www.avanthipharma.ac.in, principal@avanthipharma.ac.in

DEPARTMENT OF PHARMACY
CLASS TIME TABLE AY: 2021-22

CLASS: I M. Pharm **I Sem Pharmaceutics** **w.e.f: 03-01-2022**

Day/Time	9.00 - 10.00.	10.00-11.00	11.00 - 12.00	12.00-1.00	1.00 - 2.00	2.00 - 3.00	3.00 -4.00.
Mon	MPAT	DDS	RA	**LUNCH**	MP	DDS	Library/Seminar
Tue	RA	MP	MPAT		DDS	MPAT	Library/Seminar
Wed	MPAT	MP	RA		MP	DDS	RA
Thu	**Seminar/Assignments**						
Fri	**Practical-I**						
Sat	**Practical-II**						

S. NO	NAME OF THE FACULTY	DESIGNATION	NAME OF THE SUBJECT (Hrs)	DEPARTMENT
1.	Dr. G. Prasanthi	Professor	Modern Pharmaceutical Analytical Techniques (4)	M. Pharm
2.	Ms. Y. VishnuVandana	Associate Professor	Drug Delivery Systems (4)	M. Pharm
3.	Mr. M. Suresh Kumar	Associate Professor	Modern Pharmaceutics (4)	M.Pharm
4.	Mrs. B. Bhagyasri	Associate Professor	Regulatory Affairs (4)	M. Pharm
5.	Mr. P. Sandeep	Associate Professor	Assignments (1)	M. Pharm
6	Dr. G. Prasanthi	Professor	Practical-I (6)	M. Pharm
7	Ms. Y. VishnuVandana	Associate Professor	Practical-II (6)	M. Pharm
8	Mrs. B. Bhagyasri	Associate Professor	Seminars (6)	M. Pharm
9.	Mr. R. Ramana	Librarian	Library (2)	M. Pharm

B. Bhagyasri

Principal

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

ESTD : 2005

AVANTHI INSTITUTE OF PHARMACEUTICAL SCIENCE

(Approved by A.I.C.T.E, P.C.I, New Delhi, Recognized by the Govt. of A.P. & Affiliated to JNTUK, Kakinada)
Cherukupally (Village), Chittivalasa (SO), Bhogapuram (Mandal), Vizianagaram (Dist) -531162.
www.avanthipharma.ac.in, principal@avanthipharma.ac.in

DEPARTMENT OF PHARMACY
CLASS TIME TABLE AY: 2021-22

CLASS: I M. Pharm **I Sem Pharmaceutical Technology** **w.e.f: 03-01-2022**

Day/Time	9.00 - 10.00.	10.00- 11.00	11.00 - 12.00	12.00- 1.00	1.00 - 2.00	2.00 - 3.00	3.00 - 4.00.
Mon	MPAT	DDS	RA	**LUNCH**	MP	DDS	Library/Seminar
Tue	RA	MP	MPAT		DDS	MPAT	Library/Seminar
Wed	MPAT	MP	RA		MP	DDS	RA
Thu	**Seminar/Assignments**						
Fri	**Practical-I**						
Sat	**Practical-II**						

S. NO	NAME OF THE FACULTY	DESIGNATION	NAME OF THE SUBJECT (Hrs)	DEPARTMENT
1.	Dr. S. Vijay Srinivas	Professor	Modern Pharmaceutical Analytical Techniques-(MPAT) (4)	M. Pharm
2.	Mrs. M. K. Rekha	Associate Professor	Drug Delivery Systems-(DDS)(4)	M. Pharm
3.	Mrs. B. Sravani	Associate Professor	Regulatory Affairs-(RA) (4)	M. Pharm
4.	Mr. S. Ramakrishna	Associate Professor	Modern Pharmaceutics-(MP) (4)	M. Pharm
5.	Mr. S. Chandra Sekhar	Associate Professor	Assignments (1)	M. Pharm
6	Dr. S. Vijay Srinivas	Professor	Practical-I (6)	M. Pharm
7	Mrs. M. K. Rekha	Associate Professor	Practical-II (6)	M. Pharm
8	Mrs. B. Sravani	Associate Professor	Seminars (6)	M. Pharm
9.	Mr. R. Ramana	Librarian	Library (2)	M. Pharm

B. Bhagyasri

Principal

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

ESTD : 2005

AVANTHI INSTITUTE OF PHARMACEUTICAL SCIENCE

(Approved by A.I.C.T.E, P.C.I, New Delhi, Recognized by the Govt. of A.P. & Affiliated to JNTUK, Kakinada)
Cherukupally (Village), Chittivalasa (SO), Bhogapuram (Mandal), Vizianagaram (Dist) -531162.
www.avanthipharma.ac.in, principal@avanthipharma.ac.in

DEPARTMENT OF PHARMACY
CLASS TIME TABLE AY: 2021-22

CLASS: I M. Pharm **I Sem Pharmaceutical Analysis** **w.e.f: 03-01-2022**

Day/Time	9.00 - 10.00.	10.00- 11.00	11.00 - 12.00	12.00- 1.00	1.00 - 2.00	2.00 - 3.00	3.00 - 4.00
Mon	MPAT	FA	APA	**LUNCH**	PV	Library/Seminars	FA
Tue	APA	PV	MPAT		FA	MPAT	Library/Seminars
Wed	MPAT	PV	APA		FA	APA	PV
Thu	**Seminar/Assignments**						
Fri	**Practical-I**						
Sat	**Practical-II**						

S. NO	NAME OF THE FACULTY	DESIGNATION	NAME OF THE SUBJECT (Hrs)	DEPARTMENT
1.	Dr. M. B. V. Raju	Professor	Modern Pharmaceutical Analytical Techniques-(MPAT) (4)	M. Pharm
2.	Mrs. B. Chaitanya	Associate Professor	Advanced Pharmaceutial Analysis-(APA) (4)	M. Pharm
3.	Mrs. A. H. V. Santhoshi	Associate Professor	Pharmaceutical Validation-(PV) (4)	M. Pharm
4.	Mr. A. N. Srinivas	Associate Professor	Food Analysis-(FA) (4)	M. Pharm
5.	B. Poornima	Associate Professor	Assignments (1)	M. Pharm
6	Dr. M. B. V. Raju	Professor	Practical-I (6)	M. Pharm
7	Mrs. B. Chaitanya	Associate Professor	Practical-II (6)	M. Pharm
8	Mrs. A. H. V. Santhoshi	Associate Professor	Seminars (6)	M. Pharm
9.	Mr. R. Ramana	Librarian	Library (2)	M. Pharm

B. Bhagyasri

Principal

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Manda
Vizianagaram Dt., - 531162

ESTD : 2005

AVANTHI INSTITUTE OF PHARMACEUTICAL SCIENCE

(Approved by A.I.C.T.E, P.C.I, New Delhi, Recognized by the Govt. of A.P. & Affiliated to JNTUK, Kakinada)
Cherukupally (Village), Chittivalasa (SO), Bhogapuram (Mandal), Vizianagaram (Dist) -531162.
www.avanthipharma.ac.in, principal@avanthipharma.ac.in

DEPARTMENT OF PHARMACY

CLASS TIME TABLE AY: 2022-23

CLASS: I M. Pharm **I Sem Pharmacology** **w.e.f: 03-01-2022**

Day/Time	9.00 - 10.00.	10.00 - 11.00	11.00 - 12.00	12.00 -1.00	1.00 - 2.00	2.00 - 3.00	3.00 - 4.00.
Mon	MPAT	AP-I	CMP-I	LUNCH	PTSM-I	MPAT	Library/Seminar
Tue	CMP-I	PTSM-I	AP-I		AP-II	PTSM-I	Library/Seminar
Wed	MPAT	CMP-I	AP-I		CMP-I	AP-I	PTSM-I
Thu	Seminar/Assignments						
Fri	Practical-I						
Sat	Practical-II						

S. NO	NAME OF THE FACULTY	DESIGNATION	NAME OF THE SUBJECT (Hrs)	DEPARTMENT
1.	Dr.K.Murali Krishna	Professor	Modern Pharmaceutical Analytical Techniques-(MPAT)(4)	M. Pharm
2.	Mr.Ch.Madhu	Associate Professor	Cellular and Molecular Pharmacocology-I - (CMP-I) (4)	M. Pharm
3.	Mrs.B.Ramavathi	Associate Professor	Pharmacological and Toxicological Screening Method-I – (PTSM-I) (4)	M. Pharm
4.	Mrs.M.Madhavi Kumari	Associate Professor	Advanced Pharmacology-(AP) (4)	M. Pharm
5.	Ms.M.Divya	Assistant Professor	Assignments (1)	M. Pharm
6	Mrs.M.Madhavi Kumari	Associate Professor	Practical-III (6)	M. Pharm
7	Mr.Ch.Madhu	Associate Professor	Practical-IV (6)	M. Pharm
8	Mr.Ch.Madhu	Professor	Seminars (6)	M. Pharm
9.	Mr.R.Ramana	Librarian	Library (2)	M. Pharm

Principal

B. Bhagyasri

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

DEPARTMENT OF PHARMACY PRACTICE
CLASS TIME TABLE AY: 2021-2022

CLASS:PHARM.D IYEAR (2021 ADMITTED BATCH) **W.e.f- 14/02/2022**

CLASS TEACHER – Dr.D.Subhasri

DAY/TIME	9:30 - 10:30	10:30 – 11:20	11:20 – 12:10	12:10-1:00	1:00 – 01:50	1:50–2:40	2:40-3:30	3:30-4:20
MON	PIC	MBC	POC	LUNCH	HAP	LIBRARY/ SPORTS		
TUE	CEUTICS	POC	PIC		CEUTICS	CEUTICS LAB		
WED	POC	PIC	HAP		RM/RB	POC LAB		
THU	CEUTICS	POC	MBC		PIC	PIC LAB		
FRI	MBC	RM/RB	HAP		RM/RB	HAP LAB		
SAT	HAP	RM/RB	CEUTICS		MBC	MBC LAB		

S. No	NAME OF THE FACULTY	DESIGNATION	NAME OF THE SUBJECT(Hrs)	DEPARTMENT
1.	Dr.D. Subha Sri	Assistant Professor	Pharmaceutical Inorganic Chemistry-(PIC) (4)	Pharm. D
2.	Dr.A. Jyotsna	Assistant Professor	Pharmaceutical Organic Chemistry-(POC) (4)	Pharm. D
3.	Dr.M.S.V. Sudeep	Assistant Professor	Pharmaceutics (4)	Pharm. D
4.	Dr.S.Sravani Girija	Assistant Professor	Human Anatomy and Physiology-(HAP) (4)	Pharm. D
5.	Dr.S. Dhana Lakshmi	Assistant Professor	Medicinal Biochemistry-(MBC) (4)	Pharm. D
6.	Mr.A.Seshu	Assistant Professor	Remedial Mathematics-(RM) (4)	Pharm. D
7.	Mr.V.UmaSankar	Associate Professor	Remedial Biology-(RB) (4)	Pharm. D
8.	Dr.D. Subha Sri	Assistant Professor	Pharmaceutical Inorganic Chemistry Lab-(PIC) (3)	Pharm. D
9.	Dr.A. Jyotsna	Assistant Professor	Pharmaceutical Organic Chemistry Lab-(POC) (3)	Pharm. D
10.	Dr.M.S.V. Sudeep	Assistant Professor	Pharmaceutics Lab (3)	Pharm. D
11.	Dr.S.Sravani Girija	Assistant Professor	Human Anatomy and Physiology Lab-(HAP) (3)	Pharm. D
12.	Dr.S. Dhana Lakshmi	Assistant Professor	Medicinal Biochemistry Lab-(MCB) (1)	Pharm. D
13.	Mr.V.UmaSankar	Associate Professor	Remedial Biology –(RB) (4)	Pharm. D

B. Bhagyasri
Time Table Incharge

Principal

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

DEPARTMENT OF PHARMACY PRACTICE
CLASS TIME TABLE AY: 2021-2022

CLASS: PHARM.D IIYEAR (2020 ADMITTED BATCH) **W.e.f- 16/08/2021**
CLASS TEACHER – Dr. A. JYOTSNA

DAY/ TIME	9:30 - 10:30	10:30 11:20	11:20 – 12:10	12:10-1:00	1:00 – 01:50	1:50– 2:40	2:40- 3:30	3:30-4:20
MON	COG	PT-1.	MB	LUNCH	COL -I	PT- 1 LAB		
TUE	MB	COL-I	PP		PT-1	COL-1	CP	TUTORIAL
WED	PT-1	PP	COG		CP	MB	PT-1	LIB/ SPORTS
THU	VISIT TO HOSPITAL							
FRI	COL -I	PP	CP	LUNCH	COG	COG LAB		
SAT	CP	COG	PP		MB	MB LAB		

S. No	NAME OF THE FACULTY	DESIGNATION	NAME OF THE SUBJECT(Hrs)	DEPARTMENT
1.	Dr.A.Jyotsna	Assistant Professor	Pharmacognosy-(COG) (4)	Pharm. D
2.	Dr.S.Sravani Girija	Assistant Professor	Pathophysiology-(PP) (4)	Pharm. D
3.	Dr.S. Dhana Lakshmi	Assistant Professor	Community Pharmacy-(CP) (4)	Pharm. D
4.	Dr.D. Subha Sri	Assistant Professor	Pharmaceutical Microbiology-(MB) (4)	Pharm. D
5.	Dr.B. Manoj Kumar	Associate Professor	Pharmacotherapeutics-I-(PT-I) (4)	Pharm. D
6.	Dr.B.Tejasree	Assistant Professor	Pharmacology-I-(COL-I) (4)	Pharm. D
7.	Dr.A.Jyotsna	Assistant Professor	Pharmacognosy Lab-(COG) (3)	Pharm. D
8.	Dr.D. Subha Sri	Assistant Professor	Pharmaceutical MicrobiologyLab-(MB) (3)	Pharm. D
9.	Dr.B. Manoj Kumar	Associate Professor	Pharmacotherapeutics- I –Lab(PT-I) (3)	Pharm. D

B. Bhagyasri
Time Table Incharge

Principal

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

ESTD : 2005

AVANTHI INSTITUTE OF PHARMACEUTICAL SCIENCES

(Approved by A.I.C.T.E, P.C.I, New Delhi,Recognized by the Govt. of A.P. & Affiliated to JNTUK, Kakinada)
Cherukupally (Village), Chittivalasa (SO), Bhogapuram (Mandal),Vizianagaram (Dist) -531162.
www.avanthipharma.ac.in, principal@avanthipharma.ac.in

DEPARTMENT OF PHARMACY PRACTICE

CLASS TIME TABLE AY: 2021-2022

CLASS: PHARM.D IIIYEAR (2019 ADMITTED BATCH) **W.e.f-04/10/2021**
CLASS TEACHER:Mrs.CH.GEETHA

DAY/ TIME	9:30 – 10:30	10:30– 11:20	11:20 - 12:10	12:10 -1:00	1:00– 01:50	1:50– 2:40	2:40-3:30	3:30-4:20
MON	COL-II	PF	MC	LUNCH	PJ	MC LAB		
TUE	MC	PJ	COL-II		PT- II	PT- II LAB		
WED	MC	PT-II	PF		PA	PA LAB		
THU	PF	MC	PA		COL- II	PF LAB		
FRI	HOSPITAL VISIT							
SAT	PJ	PA	PT-II	LUNCH	PF	COL-II LAB		

S. No	NAME OF THE FACULTY	DESIGNATION	NAME OF THE SUBJECT(Hrs)	DEPARTMENT
1.	Dr.S. ArunSatya Dev	Professor	Medicinal chemistry-(MC) (4)	Pharm. D
2.	Mrs.Ch.Geetha	Assistant Professor	Pharmaceutical Analysis-(PA) (3)	Pharm. D
3.	Dr.V.C.Randeep Raj	Associate Professor	Pharmacotherapy –II-(PT-II) (3)	Pharm. D
4.	Dr.S. Dhana Lakshmi	Assistant Professor	Pharmaceutical Jurisprudence-(PJ) (3)	Pharm. D
5.	Mrs.B.Ramavathi	Associate Professor	Pharmacology-II (COL-II) (3)	Pharm. D
6.	Dr.B.Tejasree	Assistant Professor	Pharmaceutical Formulation-(PF) (3)	Pharm. D
7.	Dr.S. ArunSatya Dev	Professor	Medicinal chemistry Lab-(MC) (3)	Pharm. D
8.	Mrs.Ch.Geetha	Assistant Professor	Pharmaceutical Analysis Lab-(PA) (3)	Pharm. D
9.	Dr.V.C.Randeep Raj	Associate Professor	Pharmacotherapy -II Lab-(PT-II) (3)	Pharm. D
10.	Mrs.B.Ramavathi	Associate Professor	Pharmacology-II Lab-(COL-II) (3)	Pharm. D
11.	Dr.B.Tejasree	Assistant Professor	Formulation Lab-(PF) (3)	Pharm. D

B. Bhagyasri

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

ESTD : 2005

AVANTHI INSTITUTE OF PHARMACEUTICAL SCIENCES

(Approved by A.I.C.T.E, P.C.I, New Delhi,Recognized by the Govt. of A.P. & Affiliated to JNTUK, Kakinada)
Cherukupally (Village), Chittivalasa (SO), Bhogapuram (Mandal),Vizianagaram (Dist) -531162.
www.avanthipharma.ac.in, principal@avanthipharma.ac.in

DEPARTMENT OF PHARMACY PRACTICE
CLASS TIME TABLE AY: 2021-2022

CLASS: PHARM.D IVYEAR (2018 ADMITTED BATCH) **W.e.f-16/08/2021**
CLASS TEACHER:Dr.B.TEJA SREE

DAY/ TIME	9:30-10:30	10:3 – 11:20	11:20– 12:10	12:10-1:00	1:00– 01:50	1:50– 2:40	2:40-3:30	3:30-4:20
MON	CP	BRM	CT	LUNCH	PT- III	CP LAB		
TUE	BPPK	CP	BRM		BPPK	HP LAB		
WED	PT-III	BPPK	HP		CP	BPPK LAB		
THU	BRM	PT- III	CT		HP	PT- III LAB		
FRI	HOSPITAL ROSTER							
SAT	HOSPITAL ROSTER							

S. No	NAME OF THE FACULTY	DESIGNATION	NAME OF THE SUBJECT(Hrs)	DEPARTMENT
1.	Mrs.Ch. Geetha	Assistant Professor	Biostatistics and Research Methodology-(BRM) (4)	Pharm. D
2.	Dr.V C Randeep Raj	Associate Professor	Clinical Pharmacy-(CP) (3)	Pharm. D
3.	Mr.V Uma Sankar	Associate Professor	Hospital Pharmacy-(HP) (2)	Pharm. D
4.	Dr.B. TejaSree	Assistant Professor	Clinical Toxicology-(CT) (2)	Pharm. D
5.	Mr.P. Sandeep	Assistant Professor	Biopharmaceutics and Pharmacokinetics-(BPPK) (3)	Pharm. D
6.	Dr.T. Rushi	Assistant Professor	Pharmacotherapeutics – III-(PT-III) (3)	Pharm. D
7.	Dr.V C Randeep Raj	Associate Professor	Clinical Pharmacy Lab-(CP) (3)	Pharm. D
8.	Mr.V Uma Sankar	Associate Professor	Hospital Pharmacy Lab-(HP) (3)	Pharm. D
9.	Mr.P. Sandeep	Assistant Professor	Biopharmaceutics and Pharmacokinetics Lab-(BPPK) (3)	Pharm. D
10.	Dr.T. Rushi	Assistant Professor	Pharmacotherapeutics - III – (PT-III)Lab (3)	Pharm. D

B. Bhagyasri
Time Table Incharge

Principal

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

ESTD : 2005

AVANTHI INSTITUTE OF PHARMACEUTICAL SCIENCES

(Approved by A.I.C.T.E, P.C.I, New Delhi,Recognized by the Govt. of A.P. & Affiliated to JNTUK, Kakinada)
Cherukupally (Village), Chittivalasa (SO), Bhogapuram (Mandal),Vizianagaram (Dist) -531162.
www.avanthipharma.ac.in, principal@avanthipharma.ac.in

DEPARTMENT OF PHARMACY PRACTICE
CLASS TIME TABLE AY: 2021-2022

CLASS: PHARM.D VYEAR (2017 ADMITTED BATCH) **W.e.f -16/08/2021**
CLASS TEACHER:Dr.B.MANOJ KUMAR

DAY/TIME	9:30 - 10:30	10:30 – 11:20	11:20 – 12:10	12:10 1:00	1:00 – 01:50	1:50– 2:40	2:40- 3:30	3:30- 4:20
MON	HOSPITAL ROSTER							
TUE	HOSPITAL ROSTER							
WED	HOSPITAL ROSTER							
THU	PROJECT	CR	PKTDM	LUNCH	PKTDM	CR	CLERKSHIP	
FRI	CR	PKTDM	EM		EM	PKTDM	CLERKSHIP	
SAT	EM	CR	EM		CR	PROJECT	CLERKSHIP	

S. No	NAME OF THE FACULTY	DESIGNATION	NAME OF THE SUBJECT (Hrs)	DEPARTMENT
1.	Dr.M.S.V. Sudeep	Assistant Professor	Clinical Research–(CR) (5)	Pharm. D
2.	Dr.T. Rushi	Assistant Professor	Pharmacokinetics and Therapeutic Drug Monitoring(PKTDM) (4)	Pharm. D
3.	Dr.B. Manoj Kumar	Associate Professor	Pharmacoepidemiology (EM) (4)	Pharm. D
4.	Mr.V. Uma Sankar	Associate Professor	Clerkship (3)	Pharm. D
5.			Project (2)	Pharm. D

B. Bhagyasri
Time Table Incharge

Principal
PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

ESTD : 2005

AVANTHI INSTITUTE OF PHARMACEUTICAL SCIENCES

(Approved by A.I.C.T.E, PCI, New Delhi, Recognized by the Govt. of A.P. & Affiliated to JNTU-kakinada)
Cherukupally (Village), Chittivalasa (SO), Bhogapuram (Mandal), Vizianagaram (Dist) -531162.
www.avanthipharma.ac.in, principal@avanthipharma.ac.in

MASTER TIME TABLE AY: 2021-2022
B.PHARM (SEMESTER-I)

DAY/TIME	CLASS	9:30-10:30	10:30-11:20	11:20-12:10	12:10-1:00	1:00-1:50	1:50-2:40	2:40-3:30	3:30-4:20
MONDAY	I BPHARM:A	HAP	CEUTICS	PA-I	LUNCH	CS	A: HAP LAB B: PA-I LAB		
	I BPHARM:B	CEUTICS	HAP	PIC		PA-I	C: RB LAB D: CS LAB		
	II BPHARM:A	PE	POC-II	PP-I		MB	A: POC-II LAB B: PP-I LAB		
	II BPHARM:B	PP-I	MB	PE		POC-II	C: MB LAB D: PE LAB		
	III BPHARM:A	MC-II	COLOGY-II	IP-I		COGNOSY-II	A: IP -I LAB B: COLOGY LAB		
	III BPHARM:B	IP-I	COGNOSY-II	MC II		COLOGY	C: COGNOSY-II D:SPORTS\LIBRARY		
	IV BPHARM:A	IMA	IP-II	GPAT		NDDS	A: IMA LAB B: PROJECT		
	IV BPHARM:B	IP-II	IMA	PP		GPAT	PROJECT		
TUESDAY	I BPHARM:A	PA-I	HAP	CEUTICS	LUNCH	PIC	A: PA-I LAB B: HAP LAB		
	I BPHARM:B	PA-I	RM/RB	CEUTICS		HAP	C: TUTORIAL LAB D: CS LAB		
	II BPHARM:A	PP-I	PE	MB		POC-II	A: PP-I LAB B: POC-II LAB		
	II BPHARM:B	MB	POC-II	PP-I		PE	C: PE LAB D: MB LAB		
	III BPHARM:A	PJ	MC-II	IP-I		TUTORIAL (IP -I)	A: COLOGY LAB B: IP -I LAB		
	III BPHARM:B	COLOGY-II	COGNOSY - II	PJ		MC-II	C: LIB/SPORTS D: COGNOSY-II LAB		
	IV BPHARM:A	NDDS	IMA	IP-II		GPAT	A: PROJECT B: IMA LAB		
	IV BPHARM:B	PP	IMA	IMA		NDDS	PROJECT AND GPAT		

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

AVANTHI INSTITUTE OF PHARMACEUTICAL SCIENCES

(Approved by A.I.C.TE, PCI, New Delhi Recognized by the Govt. of A.P. & Affiliated to JNTU-Kakinada)
Cherukupally (Village), Chittivalasa (SO), Bhogapuram (Mandal), Vizianagaram (Dist) -531162.
www.avanthipharma.ac.in, principal@avanthipharma.ac.in

ESTD : 2005

WEDNESDAY	**I BPHARM:A**	HAP	CA	PATHO	**LUNCH**	POC-I	A: HAP LAB B: CA LAB		
	I BPHARM:B	PATHO	BIOCHEM	HAP		CA	C:POC-I LAB D: BIOCHEM LAB		
	II BPHARM:A	MC-I	PP-II	COLOGY-I		COGNOSY-I	A: MC-I LAB B: PP-II LAB		
	II BPHARM:B	COLOGY-I	COGNOSY-I	MC-I		OC-III	C: COLOGY –I LAB D: COGNOSY LAB		
	III BPHARM:A	HDT	BIOTECH	BPPK		COLOGY –III	A: MC-III LAB B: COLOGY LAB		
	III BPHARM:B	QA	HDT	MC-III		BIOTECH	C: HDT LAB D:LIB/SPORTS		
	IV BPHARM:A	SPP	BRM	PMM		CS	GPAT AND PROJECT		
	IV BPHARM:B	PMM	ES	SPP		PMM	GPAT AND PROJECT		
THURSDAY	**I BPHARM:A**	BIOCHEM	PATHO	CA	**LUNCH**	TUTO[OC]	A: CA LAB B; HAP LAB		
	I BPHARM:B	POC-I	BIOCHEM	ES		CA	C: BIOCHEM LAB D: POC-I LAB		
	II BPHARM:A	PP-II	MC-I	OC-III		COLOGY-I	A: PP-II LAB B: MC-I LAB		
	II BPHARM:B	OC-III	COLOGY-I	COGNOSY-I		PP-II	C: COGNOSY-I LAB D: COLOGY-I LAB		
	III BPHARM:A	MC-III	BPPK	HDT		QA	A: COLOGY- I LAB B; MC-III LAB		
	III BPHARM:B	QA	HDT	HDT		MC-III	C: LIB / SPORTS D: HDT LAB		
	IV BPHARM:A	CS	BRM	PMM		SPP	GPAT	PROJECT	
	IV BPHARM:B	BRM	SPP	CS		PROJECT	GPAT	PROJECT	
FRIDAY	**I BPHARM:A**	PATHO	POC-I	CA	**LUNCH**	BIOCHEM	ES	HAP	TUTORIAL
	I BPHARM:B	BIOCHEM	POC-I	PATHO		TUTORIAL	POC-I	ES	LIB/SPORTS
	II BPHARM:A	COGNOSY-I	OC-III	MC-I		TUTORIAL [COLOGY]	OC-III LAB	PP-II LAB	OC-III LAB
	II BPHARM:B	MC-I	PP-II	COLOGY-I		COGNOSY-I	OC-III LAB	TUTORIAL	CLASS TEST

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

	III BPHARM:A	COLOGY-III	HDT	BPPK		BIOTECH	QA LAB	HDT LAB	MC-III LAB
	III BPHARM:B	BPPK	QA	HDT		COLOGY-III	MC-III LAB	BIOTECH LAB	BPPK LAB
	IV BPHARM:A	BRM	CS	SPP		PROJECT	GPAT		
	IV BPHARM:B	SPP	PMM	BRM		CS	GPAT PROJECT		
SATURDAY	I BPHARM:A	CA	BIOCHEM	HAP	L U N C H	PATHO	POC-I	ES	LIB/SPORTS
	I BPHARM:B	HAP	PATHO	BIOCHEM		POC-I	CA	HAP	TUTO[OC]
	II BPHARM:A	OC-III	MC-I	PP-II		TUTORIAL [MC-I]	COGNOSY-I	COLOGY-I	LIB/SPORTS
	II BPHARM:B	PP-II	OC-III	COGNOSY-I		MC-I	OC-III	TUTORIAL	LIB/SPORTS
	III BPHARM:A	BIOTECH	MC-III	HDT		COLOGY-III	BIOTECH	QA	BPPK
	III BPHARM:B	COLOGY –III	BPPK	QA		MC-III	HDT	COLOGY-III	BIOTECH
	IV BPHARM:A	CS	PMM	BRM		PROJECT /LIB	GPAT/ PROJECT		LIB/SPORTS
	IV BPHARM:B	BRM	SPP	PMM		PROJECT /LIB	GPAT/ PROJECT		LIB/SPORTS

Principal

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

ESTD : 2005

AVANTHI INSTITUTE OF PHARMACEUTICAL SCIENCES

(Approved by A.I.C.TE, PCI, New Delhi Recognized by the Govt. of A.P. & Affiliated to JNTU-Kakinada)
Cherukupally (Village), Chittivalasa (SO), Bhogapuram (Mandal), Vizianagaram (Dist) -531162.
www.avanthipharma.ac.in, principal@avanthipharma.ac.in

MASTER TIME TABLE AY: 2021-2022
B.PHARM SEMESTER-II

DAY/ TIME	CLASS	9:30-10:30	10:30-11:20	11:20-12:10	12:10-1:00	1:00-1:50	1:50-2:40	2:40-3:30	3:30-4:20
MONDAY	I BPHARM:A	POC-I	PATHO	BIOCHEM	LUNCH	HAP	A: POC-I LAB B: BIOCHEM LAB		
	I BPHARM:B	POC-I	HAP	BIOCHEM		PATHO	C:HAP LAB D: CA LAB		
	II BPHARM:A	COLOGY	COGNOSY	MC-I		OC-II	A : COLOGY –I LAB B:COGNOSY-I LAB		
	II BPHARM:B	MC-I	PP-2	COLOGY-I		CLASS TEST	C: PP-II LAB D: MC-I LAB		
	III BPHARM:A	QA	COLOGY-III	MC-III		BPPK	A: HDT LAB B: LIB / SPORTS		
	III BPHARM:B	BIOTEC	BPPK	COLOGY		HDT	C : MC-III LAB D: COLOGY LAB		
	IV BPHARM:A	PMM	SPP	CS		GPAT	PROJECT		
	IV BPHARM:B	CS	BRM	PMM		GPAT	PROJECT		
TUESDAY	I BPHARM:A	BIOCHEM	HAP	POC-I	LUNCH	ES	A: BIOCHEM LAB B:POC-I LAB		
	I BPHARM:B	CA	PATHO	POC-I		HAP	C:CA D:HAP		
	II BPHARM:A	PP-II	COLOGY-I	COGNOSY-I		TUTORIAL [PP-II]	A:COGNOSY-I LAB B: COLOGY-I LAB		
	II BPHARM:B	COGNOSY-I	MC –I	PP-II		COLOGY-I	C:MC –I LAB D: PP –II LAB		
	III BPHARM:A	BIOTECH	QA	COLOGY-III		MC-III	A: LIB/ SPORTS B: HDT LAB		
	III BPHARM:B	COLOGY-III	MC-III	BPPK		QA	C: COLOGY LAB D :MC-III LAB		
	IV BPHARM:A	BRM	PMM	SPP		GPAT	PROJECT		
	IV BPHARM:B	SPP	CS	BRM		GPAT	PROJECT		

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

WEDNESDAY	I BPHARM:A	RM/RB	PA -I	HAP	LUNCH	PIC	A: PIC LAB B: CEUTICS LAB
	I BPHARM:B	PIC	PA -I	CS		HAP	C: HAP LAB D: PA -I LAB
	II BPHARM:A	MB	PP -I	PE		TUTORIAL (PP1)	A: MB LAB B: PE LAB
	II BPHARM:B	PE	POC -II	MB		TUTORIAL (MB)	C: PP-II LAB D: POC-II LAB
	III BPHARM:A	IP-1	COGNOSY - II	MC -II		COLOGY	A: LIB/SPORTS B: COGNOSY-II LAB
	III BPHARM:B	MC -II	COLOGY-II	IP -I		TUTORIAL (COLOGY)	C: IP-I LAB D: COLOGY-II LAB
	IV BPHARM:A	IP -I	PP	IMA		GPAT	PROJECT
	IV BPHARM:B	IMA	NDDS	GPAT		IP -I	C: PROJECT D: IMA LAB
THURSDAY	I BPHARM:A	CEUTICS	HAP	PIC	LUNCH	RM/RB	A: CEUTICS LAB B: PIC LAB
	I BPHARM:B	CS	CEUTICS	PA-I		PIC	C: PA-I LAB D: HAP LAB
	II BPHARM:A	POC-II	MB	PP-I		PE	A: MB LAB B: PE LAB
	II BPHARM:B	PP-I	PE	POC- II		MB	C: PP-II LAB D: POC-II LAB
	III BPHARM:A	PJ	COLOGY-II	COGNOSY-II		IP -I	A: COGNOSY-II LAB B: LIB/SPORTS
	III BPHARM:B	COGNOSY 2	MC-II	IP -I		PJ	C: COLOGY LAB D: IP-I LAB
	IV BPHARM:A	NDDS	IP-II	PP		TUTORIAL (IMA)	GPAT AND PROJECT
	IV BPHARM:B	IP -II	IMA	GPAT		PP	C: PROJECT D: IMA LAB
FRIDAY	I BPHARM:A	CEUTICS	PIC	PA -I	LUNCH	HAP	A: RM/RB B: CS
	I BPHARM:B	CEUTICS	PIC	HAP		CEUTICS	C: PIC LAB D: CEUTICS LAB
	II BPHARM:A	MB	PE	POC -II		TUTORIAL (PE)	TUTORIAL (PP-I) / TUTORIAL (POC -II) / INDISPORT

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

	II BPHARM:B	POC -II	PP-I	MB		TUTORIAL (POC 2)	STI	TUTORIAL (PE)	LIB/SPORTS
	III BPHARM:A	COLOGY-II	COGNOSY –II	PJ		MC-II	PJ	TUTORIAL (COLOGY	LIB /SPORTS
	III BPHARM:B	PJ	MC-II	COLOGY		COGNOSY - II	IP-I	TUTORIAL (IP 1)	LIB/SPORTS
	IV BPHARM:A	PP	IMA	NDDS		PP	GPAT PROJECT		
	IV BPHARM:B	NDDS	PP	IP-II		PP	GPAT	PROJECT	STI
SATURDAY	**I BPHARM:A**	CS	PA-I	CEUTICS	**L U N C H**	PIC	A: CS LAB B: RM/RB LAB		
	I BPHARM:B	HAP	RM/RB	PA-I		PIC	C: CEUTICS LAB D: PIC LAB		
	II BPHARM:A	PP-I	POC-II	MB		PE	STI	TUTORIAL (MB)	LIB/ SPORTS
	II BPHARM:B	MB	PE	PP-I		POC-II	TUTORIAL (MB)	TUTORIAL (PP1)	LIB/ SPORTS
	III BPHARM:A	COGNOSY - II	MC-II	PJ		IP 1	COLOGY-II	TUTORIAL (MC)	LIB/ SPORTS
	III BPHARM:B	PJ	IP-I	COGNOSY -II		COLOGY-II	PJ	STI	TUTORIAL (MC-II)
	IV BPHARM:A	IP-II	NDDS	PP		IMA	GPAT	PROJECT	
	IV BPHARM:B	PP	IP-II	NDDS		IMA	GPAT	PROJECT	LIB/ SPORTS

Principal

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

ESTD : 2005

AVANTHI INSTITUTE OF PHARMACEUTICAL SCIENCES

(Approved by A.I.C.T.E, PCI, New Delhi, Recognized by the Govt. of A.P. & Affiliated to JNTUKakinada)
Cherukupally (Village), Chittivalasa (SO), Bhogapuram (Mandal), Vizianagaram (Dist) -531162.
www.avanthipharma.ac.in, principal@avanthipharma.ac.in

MASTER TIME TABLE AY: 2021-2022
M PHARM SEMESTER-I

DAY/TIME	BRANCH	9:00-10:00	10:00-11:00	11:00-12:00	12:00-1:00	1:00-2:00	2:00-3:00	3:00-4:00
MONDAY	CEUTICS	MPAT	DDS	RA		MP	DDS	LIB/ SEMINAR
	TECH	MPAT	DDS	RA		MP	DDS	LIB/ SEMINAR
	ANALYSIS	MPAT	FA	APA		PV	LIB/ SEMINAR	FA
	COLOGY	MPAT	AP-I	CMB-I		PTSM-I	MPAT	LIB/ SEMINAR
TUESDAY	CEUTICS	RA	MP	MPAT		DDS	MPAT	LIB/ SEMINAR
	TECH	RA	MP	MPAT		DDS	MPAT	LIB/ SEMINAR
	ANALYSIS	APA	PV	MPAT		FA	MPAT	LIB/ SEMINAR
	COLOGY	CMB-I	PTSM-I	AP-I		MPAT	PTSM-I	LIB/ SEMINAR
WEDNESDAY	CEUTICS	MPAT	MP	RA		MP	DDS	RA
	TECH	MPAT	MP	RA		MP	DDS	RA
	ANALYSIS	MPAT	PV	APA		CMB-I	AP-I	PTSM-I
	COLOGY	MPAT	CMB-I	AP-I		FA	APA	PV
THURSDAY	CEUTICS	SEMINAR/ASSIGNMENTS				SEMINAR/ASSIGNMENTS		
	TECH							
	ANALYSIS							
	COLOGY							
FRIDAY	CEUTICS	PRACTICAL-I				PRACTICAL-I		
	TECH							
	ANALYSIS							
	COLOGY							
SATURDAY	CEUTICS	PRACTICAL-II				PRACTICAL-II		
	TECH							
	ANALYSIS							
	COLOGY							

LUNCH

Principal

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

ESTD : 2005

AVANTHI INSTITUTE OF PHARMACEUTICAL SCIENCES

(Approved by A.I.C.T.E, PCI, New Delhi, Recognized by the Govt. of A.P. & Affiliated to JNTU-Kakinada)
Cherukupally (Village), Chittivalasa (SO), Bhogapuram (Mandal), Vizianagaram (Dist) -531162.
www.avanthipharma.ac.in, principal@avanthipharma.ac.in

MASTER TIME TABLE AY: 2021-2022

MPHARM SEMESTER-II

DAY/TIME	BRANCH	9:00-10:00	10:00-11:00	11:00-12:00	12:00-1:00	1:00-2:00	2:00-3:00	3:00-4:00
MONDAY	CEUTICS	MP	FD	CADD		MP	BPPK	LIB/ SEMINAR
	TECH	MP	CADD	FD		MP	BPPK	LIB/ SEMINAR
	ANALYSIS	AIA	QCQA	MBAT		AIA	HCA	LIB/ SEMINAR
	COLOGY	AP-II	PTSM-II	PDD		CMB-II	AP-II	LIB/ SEMINAR
TUESDAY	CEUTICS	CADD	MP	BPPK		CADD	FD	BPPK
	TECH	CADD	FD	BPPK		CADD	FD	BPPK
	ANALYSIS	MBAT	AIA	QCQA		HCA	MBAT	QCQA
	COLOGY	PDD	AP-II	PTSM-II		AP-II	CMB-II	PTSM-II
WEDNESDAY	CEUTICS	FD	BPPK	CADD		LIB/ SEMINAR	FD	MP
	TECH	MP	BPPK	CADD		LIB/ SEMINAR	FD	MP
	ANALYSIS	QCQA	HCA	AIA		LIB/ SEMINAR	HCA	MBAT
	COLOGY	PTSM-II	PDD	CMB-I		LIB/SE MINAR	PDD	CMB-II
THURSDAY	CEUTICS	SEMINAR/ASSIGNMENTS				SEMINAR/ASSIGNMENTS		
	TECH							
	ANALYSIS							
	COLOGY							
FRIDAY	CEUTICS	PRACTICAL-III				PRACTICAL-III		
	TECH							
	ANALYSIS							
	COLOGY							
SATURDAY	CEUTICS	PRACTICAL-IV				PRACTICAL-IV		
	TECH							
	ANALYSIS							
	COLOGY							

LUNCH

Principal

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

AVANTHI INSTITUTE OF PHARMACEUTICAL SCIENCES

(Approved by A.I.C.T.E, PCI, New Delhi, Recognized by the Govt. of A.P. & Affiliated to JNTU-Kakinada)
Cherukupally (Village), Chittivalasa (SO), Bhogapuram (Mandal), Vizianagaram (Dist) -531162.
www.avanthipharma.ac.in, principal@avanthipharma.ac.in

ESTD : 2005

PHARM.D MASTER TIME TABLE AY: 2021-2022

DAY/ TIME	CLASS	9:30-10:30	10:30-11:20	11:20-12:10	12:10-1:00	1:00-1:50	1:50-2:40	2:40-3:30	3:30-4:10
MONDAY	I	PIC	MBC	POC	LUNCH	HAP	RB LAB/ LIB/ SPORTS		
	II	COG	PT-I	MB		COL-I	PT-1 LAB		
	III	COL-II	PF	BC		PJ	MC LAB		
	IV	CP	BRM	CT		PT-III	CP LAB		
	V	HOSPITAL				ROSTER			
TUESDAY	I	CEUTICS	POC	PIC	LUNCH	CEUTICS	CEUTICS LAB		
	II	MB	COL-1	PP		PT-I	COL-1	COP	TUTORIAL
	III	MC	PJ	COL-II		PT-II	PT-II LAB		
	IV	BPPK	CP	BRM		BPPK	HP LAB		
	V	HOSPITAL				ROSTER			
WEDNESDAY	I	POC	PIC	HAP	LUNCH	RM/RB	POC LAB		
	II	PT-I	PP	COG		COP	MB	PT-I	LIB/SPORTS
	III	MC	PT-II	PF		PA	PA LAB		
	IV	PT-III	BPPK	HP		CP	BPPK LAB		
	V	HOSPITAL				ROSTER			
THURSDAY	I	CEUTICS	POC	MBC		PIC	PIC LAB		
	II	HOSPITAL				ROSTER			

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

	III	PF	MC	PA	LUNCH	COL-II	PF LAB	
	IV	BPPK	PT-III	CT		HP	PT-III LAB	
	V	PROJECT	CR(TUTORIAL)	PKTDM		CR	PROJECT	CLERKSHIP
FRIDAY	I	MBC	RM/RB	HAP	LUNCH	RM/RB	HAP LAB	
	II	COL-I	PP	COP		COG	COG LAB	
	III	HOSPITAL				ROSTER		
	IV	HOSPITAL				ROSTER		
	V	CR	PKTDM	EM		CR	PKTDM (TUTORIAL)	CLERKSHIP
SATURDAY	I	HAP	RM/RB	CEUTICS	LUNCH	MBC	MBC LAB	
	II	COP	COG	PP		MB	MB LAB	
	III	PJ	PA	PT-II		PF	COL-II	
	IV	HOSPITAL				ROSTER		
	V	EM	CR	EM		PROJECT		CLERKSHIP

Principal
PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

PHARMACEUTICAL FORMULATIONS

COURSE FILE

Prepared by:

Dr. B.Tejasree,

Assistant Professor

Department of Pharmacy Practice

(2021-2022)

ESTD : 2005

AVANTHI INSTITUTE OF PHARMACEUTICAL SCIENCES

DEPARTMENT OF PHARMACY PRACTICE

(APPROVEDBY**A.I.C.T.E, P.C.I,** New Delhi, **RECOGNIZED BY THE GOVT. OF A.P. & AFFILIATED TO JNTUK,KAKINADA)**

Cherukupally (Village), Chittivalasa (SO), Bhogapuram (Mandal),Vizianagaram (Dist) -531162.

PRINCIPAL

Avanthi Institute of Pharmaceutical Sciences

Cherukupally (V), Bhogapuram Mandal

Vizianagaram Dt., - 531162

COURSE FILE CONTENTS

1. Vision, Mission of the Institute
2. Program Educational Outcomes (PEOs)
3. Program Outcomes (POs)
4. Syllabus Copy
5. Roll list
6. Class Time tables and Individual Time tables
7. Lesson plan.
8. Teaching notes
9. Mid I Question paper, Scheme of evaluation and answer scripts
10. Mid II Question paper, Scheme of evaluation and answer scripts
11. Mid III Question paper, Scheme of evaluation and answer scripts
12. Internal and External marks
13. Result analysis
14. CO and PO attainment sheets
15. CO-PO-PSO mapping

AVANTHI INSTITUTE OF PHARMACEUTICAL SCIENCES AVANTHI EDUCATIONAL SOCIETY HYDERABAD VIZIANAGARAM

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

VISION AND MISSION

VISION:

To develop highly skilled professionals with ethics and human values.

MISSION:

1. To impart quality education with exposure to real world training.
2. To produce competent and highly knowledgeable biostats and analysts with positive approach.
3. To build self confidence among students which is an imperative prerequisite to face the challenges in future.

Quality Policy:

Avanthi institute of pharmaceutical sciences emphasizes the ethical ideals to innovateadvanced training by creating the best possible infrastructure through an engaging, activity-oriented teaching. It also uses the most updated information and biostatical knowledge toenhance a biostatical approach among the students, aiming for an effective and ambitiousadministration which is responsive in all the aspects.

Program Educational Objectives (PEOs):

PEO 1: Graduates with knowledge in the fundamentals of basic science, English, biostaticaland experimental research procedures.

PEO 2: Graduates with professional attitude towards the diverse community.

PEO 3: Graduates with ability to purse advanced education, biostatical research knowledgefor **successful career.**

PEO 4: Graduates are trained in all biostatical aspects to show the professional and workingabilities to the company development

Program Outcomes (Pos)

PO1 Statistics knowledge: Apply the knowledge of biostatistics and research specialization tothe solution of complex analytical problems.

PO 2. Statistical Analysis: Identify, research literature, and statistics the complex dosingproblems reaching substantiated conclusions using the complex data.

PO3: Design/development of report: Design solutions for complex data problems andexperimental design system components or processes that meet the specified needs withappropriate consideration for public health and safety, and the environmental consideration.

PO4. Conduct investigation of complex data: Use research-based knowledge and researchmethods including complex systems and experiments procedures to simplify data reportsand provide valid conclusions.

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

PO 5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, andmodern analytical tools

PO 6. Environment and Sustainability: Understand the impact of the professional analysisreport solutions in societal and environmental contexts, and demonstrate the knowledge of,and need for sustainable development.

PO 7. Awareness of statistical tools: To enable the learner to know and understand the basics ofstatistics, usage and reporting.

PO 8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities andnorms of statistical practice

PO 9. Individual and Team Work: Functions effectively as individual and as a member or leaderin diverse teams and in multi-disciplinary setting.

PO 10. Communication: Communicate effectively on complex dosing activities with thepharmaceutical community and with society.

PO 11: Project Management and Finance: Demonstrate knowledge and understanding of thestatistics and research principles and applying those to one's own work, as a member andleader in a team, to manage experiments in multidisciplinary environments.

PO 12. Life-Long Learning: Recognize the need for, and have the preparation and ability toengage in independent and life-long learning in the broadest context of technologicalchange.

Principal
PRINCIPAL
Avanthi Institute of Pharmaceutical Science
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

Syllabus Copy

Unit 1: Pharmaceutical dosage form- concept and classification

Unit 2. Tablets: Formulation of different types of tablets, tablet excipients, granulation techniques quality control and evaluation of tablets. Tablet coating, Type of coating, quality control tests for coated tablet.

Unit 3. Capsules: Production and filling of hard gelatin capsules, Raw material for shell, finishing, quality control tests for capsules. Production and filling of soft gelatin capsules, quality control tests for soft gelatin capsules.

Unit 4. Liquid orals: Formulation and evaluation of suspensions, emulsions and solutions. Stability of these preparations.

Unit 5. Parenterals: Introduction Containers used for Parenterals (including official tests) Formulation of large and small volume Parenterals, Sterilization.

Unit 6. Ophthalmic preparations (Semi – Solids): Introduction and classification Factors affecting absorption and anatomy of skin Packaging storage and labeling, Ointments Types of Ointment Base Preparation of ointment, Jellies Types of jellies Formulation of jellies Suppositories, Method of preparation, Types Packaging

Unit 7. Definition and concept of Controlled and novel Drug delivery systems with available examples, viz. parentral, trans dermal, buccal, rectal, nasal, implants, ocular drug delivery systems.

Text books

1. Pharmaceutical dosage forms, Vol, I,II and III by lachmann.
2. Rowlings Text book of Pharmaceutics.
3. Tutorial Pharmacy – Cooper &Gun.
4. Remington's Pharmaceutical Sciences.
5. USP/BP/IP.

AVANTHI INSTITUTE OF PHARMACEUTICAL SCIENCES AVANTHI EDUCATIONAL SOCIETY HYDERABAD VIZIANAGARAM

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

Students Roll List

S No	Roll No	Student Name
1.	19T51T0001	Alajingi Susmita
2.	19T51T0002	Boddepalli Rakesh
3.	19T51T0003	Boni Tabitha Smily
4.	19T51T0004	Chadaram Pragnatha
5.	19T51T0005	Chappa Ramya
6.	19T51T0006	Cherukuri Tanuja Lakshmi
7.	19T51T0007	Chitiki Reddi Bhagyasri
8.	19T51T0008	Doll Glenda Annette
9.	19T51T0009	Karukola Anusha
10.	19T51T0010	Kosuru Chandini
11.	19T51T0011	Margana Gasruthi
12.	19T51T0012	Ushasri Kanumula
13.	19T51T0013	Pathivada Divya
14.	19T51T0014	Pentakota Prasanna
15.	19T51T0015	Anwesh Deep Padhy
16.	19T51T0016	Rupiti Harshavardhini
17.	19T51T0017	Sonika Shruti Sripathi
18.	19T51T0018	Killo Ramakrishna
19.	19T51T0019	Sripada Venkata Sri Alekhya
20.	19T51T0020	Tentu Sharmila
21.	19T51T0021	Vaddadi Madhuri Smith
22.	19T51T0022	Vanapalli Sandhya Rani
23.	19T51T0023	Vantaku Syam Kumar
24.	19T51T0024	Pilla Sai Sushmitha
25.	19T51T0025	Kada Priyanka Gowthami Purna Ardhini
26.	19T51T0026	Dussi Shakina
27.	19T51T0027	Karrothu Syamala
28.	18T51T0001	Alugolu Venkata Siva
29.	17T51T0012	Kelvin Paul Medapati

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

ESTD : 2005

AVANTHI INSTITUTE OF PHARMACEUTICAL SCIENCES

(Approved by A.I.C.T.E, P.C.I, New Delhi,Recognized by the Govt. of A.P. & Affiliated to JNTUK, Kakinada)
Cherukupally (Village), Chittivalasa (SO), Bhogapuram (Mandal),Vizianagaram (Dist)-531162.
www.avanthipharma.ac.in, principal@avanthipharma.ac.in

DEPARTMENT OF PHARMACY PRACTICE

CLASS TIME TABLE AY: 2021-2022

CLASS: PHARM.D IIIYEAR (2019 ADMITTED BATCH) **W.e.f-04/10/2021**
CLASS TEACHER:Dr. B Tejasree

DAY/ TIME	9:30 – 10:30	10:30– 11:20	11:20 - 12:10	12:10 -1:00	1:00-- 01:50	1:50– 2:40	2:40-3:30	3:30-4:20
MON	COL-II	PF	MC	LUNCH	PJ	MC LAB		
TUE	MC	PJ	COL-II		PT- II	PT- II LAB		
WED	MC	PT-II	PF		PA	PA LAB		
THU	PF	MC	PA		COL- II	PF LAB		
FRI	HOSPITAL VISIT							
SAT	PJ	PA	PT-II	LUNCH	PF	COL-II LAB		

S. No	NAME OF THE FACULTY	DESIGNATION	NAME OF THE SUBJECT(Hrs)	DEPARTMENT
1.	Dr.S. ArunSatya Dev	Professor	Medicinal chemistry-(MC) (4)	Pharm. D
2.	Mrs.Ch.Geetha	Assistant Professor	Pharmaceutical Analysis-(PA) (3)	Pharm. D
3.	Dr.V.C.Randeep Raj	Associate Professor	Pharmacotherapy –II-(PT-II) (3)	Pharm. D
4.	Dr.S. Dhana Lakshmi	Assistant Professor	Pharmaceutical Jurisprudence-(PJ) (3)	Pharm. D
5.	Mrs.B.Ramavathi	Associate Professor	Pharmacology-II (COL-II) (3)	Pharm. D
6.	Dr.B.Tejasree	Assistant Professor	Pharmaceutical Formulation-(PF) (3)	Pharm. D
7.	Dr.S. ArunSatya Dev	Professor	Medicinal chemistry Lab-(MC) (3)	Pharm. D
8.	Mrs.Ch.Geetha	Assistant Professor	Pharmaceutical Analysis Lab-(PA) (3)	Pharm. D
9.	Dr.V.C.Randeep Raj	Associate Professor	Pharmacotherapy -II Lab-(PT-II) (3)	Pharm. D
10.	Mrs.B.Ramavathi	Associate Professor	Pharmacology-II Lab-(COL-II) (3)	Pharm. D
11.	Dr.B.Tejasree	Assistant Professor	Formulation Lab-(PF) (3)	Pharm. D

Time Table Incharge

Principal

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

ESTD : 2005

AVANTHI INSTITUTE OF PHARMACEUTICALSCIENCES

(Approved by A.I.C.T.E, PCI, Recognized by the Govt. of A.P. & Affiliated to JNTUK,Kakinada)
Cherukupally (Village), Chittivalasa (SO), Bhogapuram (Mandal), Vizianagaram (Dist.) -531162.
www.avanthipharma.ac.in, principal@avanthipharma.ac.in

PHARM D 3rd YEAR PHARMACEUTICAL FORMULATIONS

S.No	DATE	NO.OF CLASSES	NO.OF CUMULATIVE CLASSES	TOPIC
1	17-08-2021	1	1	Scope and Objectives of the pharmaceutical formulations.
2	18-08-2021	1	2	Pharmaceutical dosage form- Introduction
3	20-08-2021	1	3	concept and classification of Pharmaceutical dosage form
4	23-08-2021	1	4	concept and classification of Pharmaceutical dosage form
5	24-08-2021	1	5	Tablets:Introduction
6	25-08-2021	1	6	Formulation of different types of tablets
7	27-08-2021	1	7	Formulation of different types of tablets
8	30-08-2021	1	8	tablet excipients
9	31-08-2021	1	9	tablet excipients
10	01-09-2021	1	10	granulation techniques quality control and evaluation of tablets
11	03-09-2021	1	11	granulation techniques quality control and evaluation of tablets
12	06-09-2021	1	12	Tablet coating
13	07-09-2021	1	13	Type of coating
14	08-09-2021	1	14	Type of coating
15	10-09-2021	1	15	quality control tests for coated tablet
16	13-09-2021	1	16	quality control tests for coated tablet
17	14-09-2021	1	17	quality control tests for coated tablet
18	15-09-2021	1	18	Capsules:Introduction
19	17-09-2021	1	19	Production and filling of hard gelatin capsules
20	20-09-2021	1	20	Production and filling of hard gelatin capsules
21	21-09-2021	1	21	Raw material for shell,finishing
22	22-09-2021	1	22	quality control tests for capsules
23	24-09-2021	1	23	quality control tests for capsules
24	27-09-2021	1	24	Production and filling of soft gelatin capsules
25	28-09-2021	1	25	Production and filling of soft gelatin capsules

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

26	29-09-2021	1	26	Production and filling of soft gelatin capsules
27	08-10-2021	1	27	quality control tests for soft gelatin capsules
28	11`-10-2021	1	28	quality control tests for soft gelatin capsules
29	12-10-2021	1	29	Liquid orals: Introduction
30	13-10-2021	1	30	Formulation of suspensions
31	15-10-2021	1	31	Formulation of suspensions
32	18-10-2021	1	32	Evaluation of suspensions
33	19-10-2021	1	33	Evaluation of suspensions
34	20-10-2021	1	34	stability of suspensions
35	22-10-2021	1	35	stability of suspensions
36	26-10-2021	1	36	Formulation of emulsions
37	27-10-2021	1	37	Formulation of emulsions
38	29-10-2021	1	38	Evaluation of emulsions
39	31-10-2021	1	39	Evaluation of emulsions
40	05-11-2021	1	40	stability of emulsions
41	09-11-2021	1	41	stability of emulsions
42	10-11-2021	1	42	Formulation of solutions.
43	12-11-2021	1	43	Formulation of solutions.
44	15-11-2021	1	44	Evaluation of solutions.
45	16-11-2021	1	45	Evaluation of solutions.
46	17-11-2021	1	46	stability of solutions.
47	19-11-2021	1	47	stability of solutions.
48	22-11-2021	1	48	Parenterals: Introduction
49	23-11-2021	1	49	Containers used for Parenterals
50	24-11-2021	1	50	Containers used for Parenterals
51	26-11-2021	1	51	official tests of Containers used for Parenterals
52	29-11-2021	1	52	official tests of Containers used for Parenterals
53	30-11-2021	1	53	Formulation of large volume Parenterals
54	01-12-2021	1	54	Formulation of large volume Parenterals
55	03-12-2021	1	55	Formulation of large volume Parenterals
56	06-12-2021	1	56	small volume Parenterals Sterilization
57	07-12-2021	1	57	small volume Parenterals Sterilization
58	08-12-2021	1	58	small volume Parenterals Sterilization
59	10-12-2021	1	59	Ophthalmic preparations : Introduction

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

60	13-12-2021	1	60	classification Factors affecting absorption
61	14-12-2021	1	61	classification Factors affecting absorption
62	15-12-2021	1	62	classification Factors affecting absorption
63	17-12-2021	1	63	anatomy of skin
64	20-12-2021	1	64	anatomy of skin
65	21-12-2021	1	65	anatomy of skin
66	22-12-2021	1	66	Packaging storage and labeling
67	24-12-2021	1	67	Packaging storage and labeling
68	27-12-2021	1	68	Packaging storage and labeling
69	28-12-2021	1	69	Ointment : Introduction
70	29-12-2021	1	70	Types of Ointment Base
71	31-12-2021	1	71	Types of Ointment Base
72	02-01-2022	1	72	Preparation of ointment
73	04-01-2022	1	73	Preparation of ointment
74	05-01-2022	1	74	Preparation of Jellies
75	07-01-2022	1	75	Preparation of Jellies
76	10-01-2022	1	76	Types of jellies
77	11-01-2022	1	77	Types of jellies
78	18-01-2022	1	78	Formulation of jellies Suppositories
79	19-01-2022	1	79	Formulation of jellies Suppositories
80	21-01-2022	1	80	Method of preparation
81	31-01-2022	1	81	Method of preparation
82	01-02-2022	1	82	Types Packaging
83	02-02-2022	1	83	Types Packaging
84	04-02-2022	1	84	Revision on Formulation of different types of tablets
85	07-02-2022	1	85	Revision on Formulation of different types of tablets
86	08-02-2022	1	86	Revision on tablet excipients
87	09-02-2022	1	87	Revision on granulation techniques quality control and evaluation of tablets
88	11-02-2022	1	88	Revision on granulation techniques quality control and evaluation of tablets
89	14-02-2022	1	89	Revision on Capsules
90	15-02-2022	1	90	Revision on Production and filling of hard gelatin capsules,Raw material for shell,finishing
91	16-02-2022	1	91	Revision on Liquid orals
92	21-02-2022	1	92	Revision on suspensions
93	22-02-2022	1	93	Revision on suspensions

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

94	23-02-2022	1	94	Revision on emulsions
95	25-02-2022	1	95	Revision on emulsions
96	28-02-2022	1	96	Revision on solutions
97	01-03-2022	1	97	Revision on solutions
98	02-03-2022	1	98	Revision on Parenterals
99	04-03-2022	1	99	Revision on Parenterals
100	07-03-2022	1	100	Revision on Ophthalmic preparations
101	09-03-2022	1	101	Revision on Ophthalmic preparations
102	11-03-2022	1	102	Revision on Ointment
103	14-03-2022	1	103	Revision on Ointment
104	15-03-2022	1	104	Revision on Jellies,Suppositories
105	16-03-2022	1	105	Revision on Jellies,Suppositories

B. Tejasree
Signature of the Faculty

Principal

AVANTHI INSTITUTE OF PHARMACEUTICAL SCIENCES * AVANTHI EDUCATIONAL SOCIETY * HYDERABAD * VIZIANAGARAM *

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

UNIT-1
CLASSIFICATION OF DOSAGE FORMS

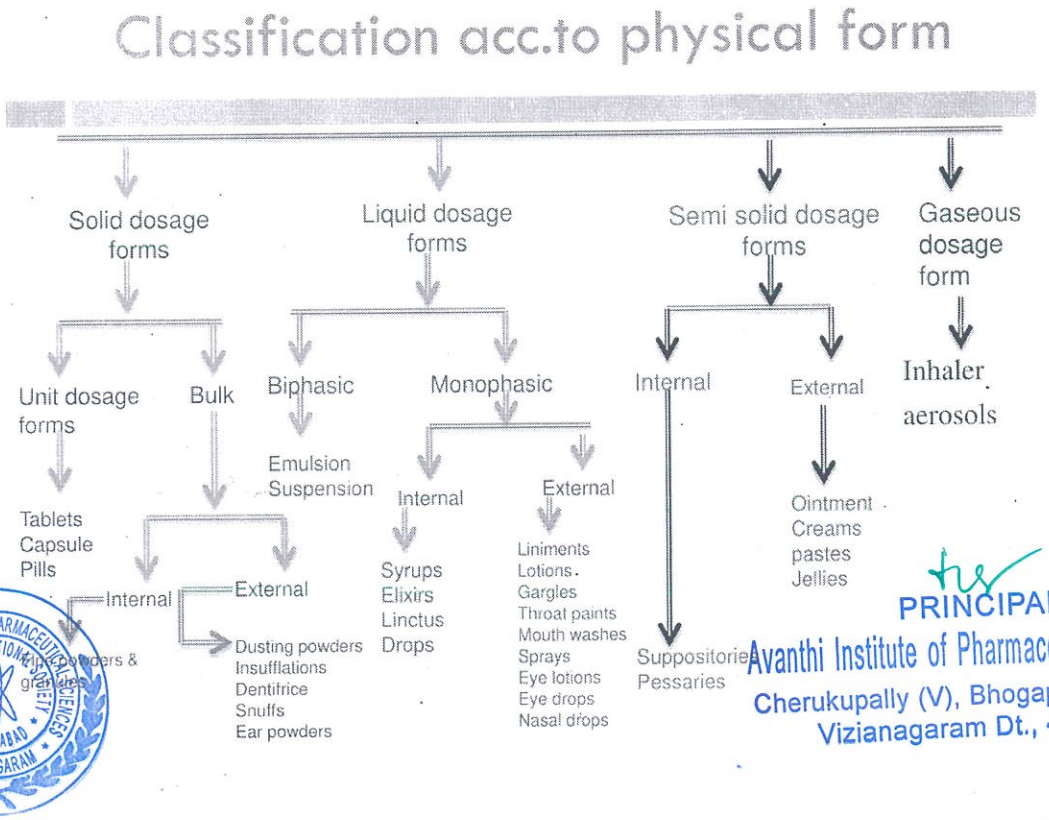
Dosage forms refer to the safe, stable, and effective way medication is delivered into the body. Dosage forms, which are basically pharmaceutical products, are often marketed to patients. They typically contain a mix of active drug components (drug components) and excipients (nondrug components).

Importance of Dosage Form: There are many important points behind the Dosage Form. All points are discussed below.

To provide safe and convenient delivery of accurate dose

- Many dosage forms can be easily identified from their distinct color, shape, or identifying markings.
- To protect the drug substance from hydrolysis, oxidation, and reduction
- To protect the drug from the destructive effect of gastric juice on the stomach after oral administration..
- To hide the bitter, salty, and obnoxious smell or taste of a drug substance.
- To provide for the insertion of the drug into one of the body cavities.
- To provide for the optimum drug action through inhalation therapy.
- To provide the maximum drug action from topical administration sites.
- To provide sustained release action through a controlled release mechanism.
- To provide liquid dosage form of the drugs soluble in a suitable vehicle.
- To provide the drugs within the body tissue.

Classification of Dosage Forms



PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

Unit-2
TABLETS

Introduction-

- According to USP, Tablet is defined as a compressed solid dosage form containing medicaments with or without Excipients.
- According to the Indian Pharmacopoeia, Pharmaceutical tablets are solid, flat or biconvex dishes, unit dosage form, prepared by compressing a drug or a mixture of drugs, with or without diluents

Advantages of tablet dosage form over other oral drug delivery systems

From patients stand point:

- They are easy to carry, easy to swallow and they are attractive in appearance.
- Unpleasant taste can be masked by sugar coating and they do not require any measurement of dose.
- Some of the tablets are divided into halves and quarters by drawing lines during manufacturing to facilitate breakage whenever a fractional dose is required.

From the standpoint of manufacturer:

- An accurate amount of medicament, even if very small, can be incorporated.
- Tablets provide best combined properties of chemical, mechanical and microbiological stability of all the oral dosage forms.
- Since they are generally produced on a large scale, therefore, their cost of production is relatively low, hence economical.
- They are in general the easiest and cheapest to package and ship among all oral dosage forms.
- Some specialized tablets may be prepared for modified release profile of the drug.
- Product identification is potentially the simplest and cheapest requiring no additional processing steps when employing an embossed or monogrammed punch face.

Disadvantages of tablet dosage form

- Difficult to swallow in case of children and unconscious patients.
- Drugs with poor wetting, slow dissolution properties, optimum absorption high in GIT may be difficult to formulate or manufacture as a tablet that will still provide adequate or full drug bioavailability.
- Bitter testing drugs, drugs with an objectionable odor or drugs that are sensitive to oxygen may require encapsulation or coating. In such cases, capsule may offer the best and lowest cost.
- Some drugs resist compression into dense compacts, owing to amorphous nature, low density character.

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mand
Vizianagaram Dt., - 531162

Buccal Tablets

- Sublingual tablets
- Lozenges
- Dental cones

(b) Tablets administered by other routes:

- Implantation tablets
- Vaginal tablets

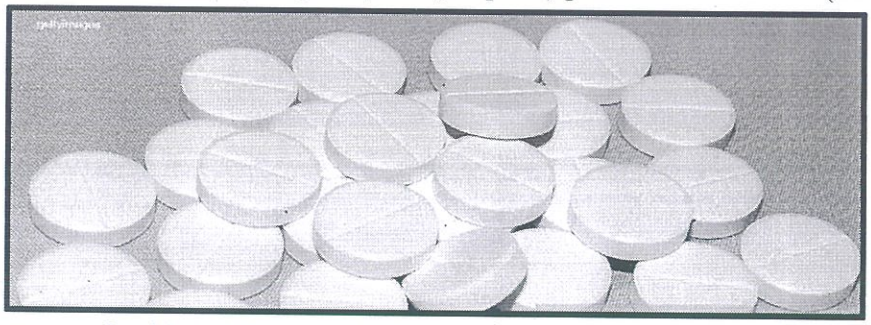
(c) Tablets used to prepare solutions:

- Effervescent tablets
- Dispensing tablets
- Hypodermic tablets
- Tablet triturates

(a) Tablets ingested orally-

(1) Compressed tablets:-

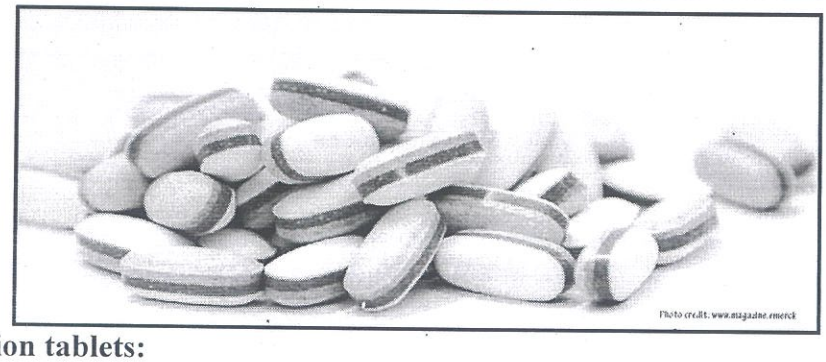
- These tablets are formed by compression and contain no special coating. They are made from powdered, crystalline or granular materials, alone or in combination with suitable excipients.
- These tablets contain water soluble drugs which after swallowing get disintegrated in the stomach and its drug contents are absorbed in the gastrointestinal tract and distributed in the whole body. e.g. Aspirin (Dispirin) paracetamol tablets (Crocin).



(2) Multiple compressed tablets / Layered tablets-

- These are compressed tablets made by more than one compression cycle. Such tablets are prepared by compressing additional tablet granulation on a previously compressed granulation. The operation may be repeated to produce multilayered tablets of two or three layers.
- To avoid incompatibility, the ingredients of the formulation except the incompatible material are compressed into a tablet and then incompatible substance along with necessary excipients are compressed over the previously compressed tablet.

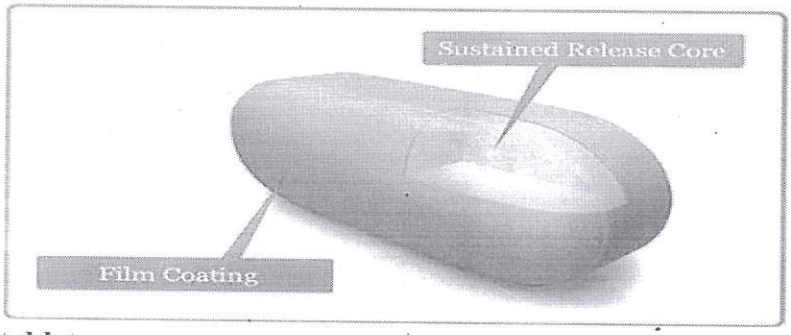
PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162



(3) Sustained action tablets:

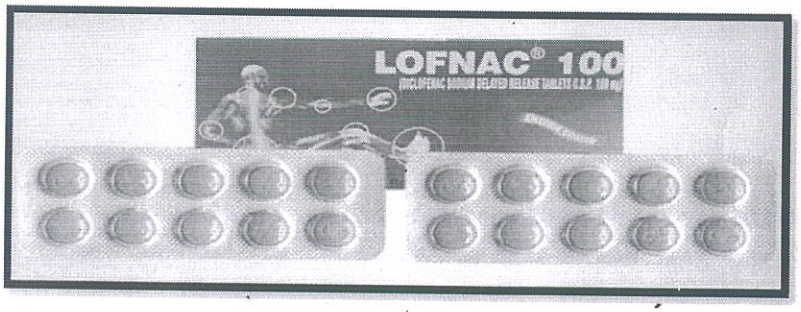
These are the tablets which after oral administration release the drug at a desired time and prolong the effect of the medicament. These tablets when taken orally release the medicament in a sufficient quantity as and when required to maintain the maximum effective concentration of the drug in the blood throughout the period of treatment.

e.g. Diclofenac SR tablets.



(4) Enteric coated tablets:

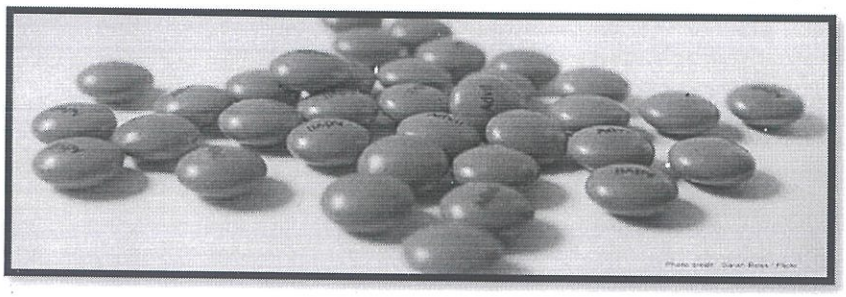
- These are compressed tablet meant for administration by swallowing and are designed to by-pass the stomach and get disintegrated in the intestine only.
- These tablets are coated with materials resistant to acidic pH (like cellulose acetate phthalate, CAP) of the gastric fluid but get disintegrated in the alkaline pH of the intestine.



(5) Sugar coated tablets:

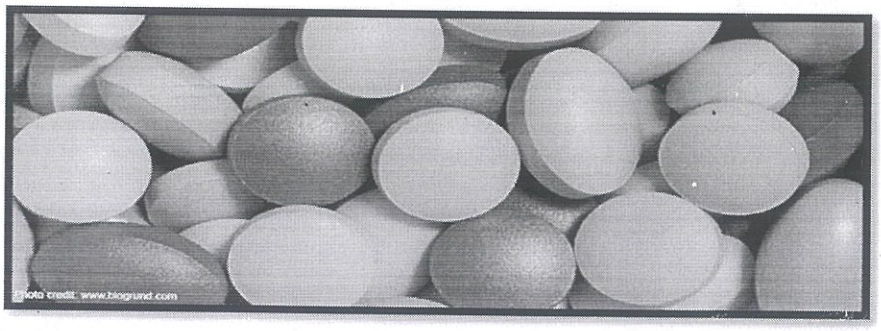
- These are compressed tablets containing a sugar coating. Such coatings are done to mask the bitter and unpleasant odour and the taste of the medicament. The sugar coating makes the tablet elegant and it also safeguard the drug from atmospheric effects.

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162



(6) Film coated tablets:

- The compressed tablets having a film coating of some polymer substance, such as hydroxy propyl cellulose, hydroxy propyl methyl cellulose and ethyl cellulose.
- The film coating protects the medicament from atmospheric effects. Film coated tablets are generally tasteless, having little increase in the tablet weight and have less elegance than that of sugar coated tablets.



(7) Chewable tablets:

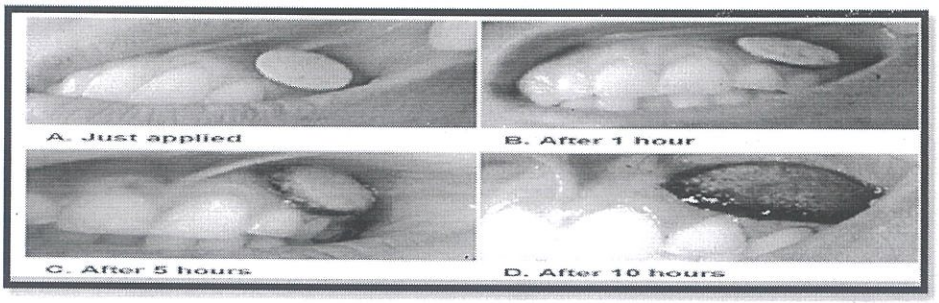
- These are the tablets which are required to be broken and chewed in between the teeth before ingestion. These tablets are given to the children who have difficulty in swallowing and to the adults who dislike swallowing.
- These tablets should have very acceptable taste and flavour. Ex- Antacid tablets (Digiene).

(b) Tablets used in oral cavity

(1) Buccal tablets:

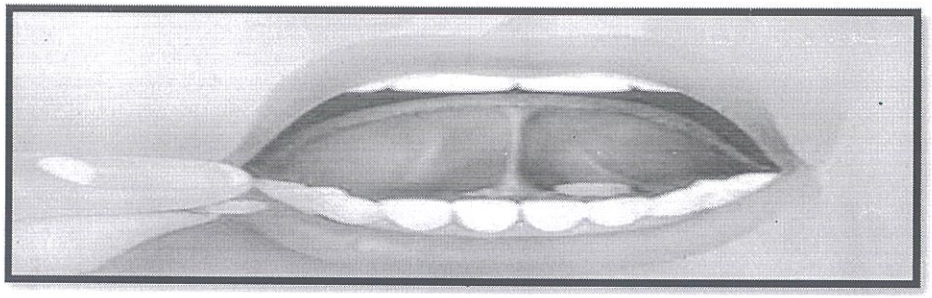
- These tablets are to be placed in the side of the cheek (buccal pouch) where they dissolve or erode slowly and are absorbed directly in the buccal cavity without passing into the alimentary canal.
- Therefore, they are formulated and compressed with sufficient pressure to give a hard tablets. e.g. Progesterone tablets.

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162



(2) Sublingual tablets:

- These tablets are to be placed under the tongue where they dissolve or disintegrate quickly and are absorbed directly without passing into GIT. e.g. tablets of nitroglycerin, isoproterenol hydrochloride or erythrityl tetranitrate.



(3) Lozenges tablets:

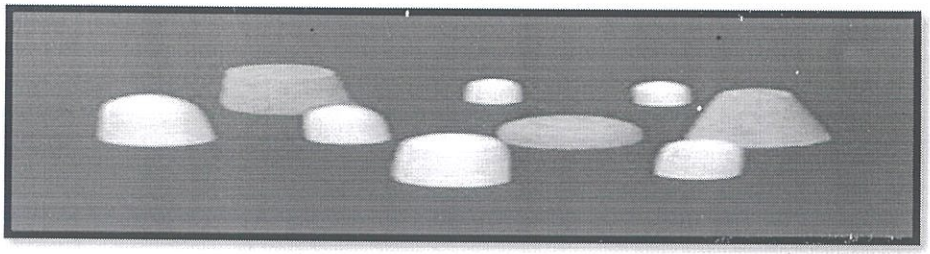
- These tablets are designed to exert a local effect in the mouth or throat. These tablets are commonly used to treat sore throat to control coughing in common cold. They may contain local anaesthetics, antiseptics, antibacterial agents and astringents.
- These are prepared by compression at a high pressure by the moulding process and generally contain a sweetening agent, flavouring agent and a substance which roduces a cooling effect. e.g. Vicks lozenges, Strepsils.

(4) Dental cones:

- These are compressed tablets meant for placement in the empty sockets after tooth extraction. They prevent the multiplication of bacteria in the socket following such extraction by using slow-releasing antibacterial compounds or to reduce bleeding by containing the astringent.

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

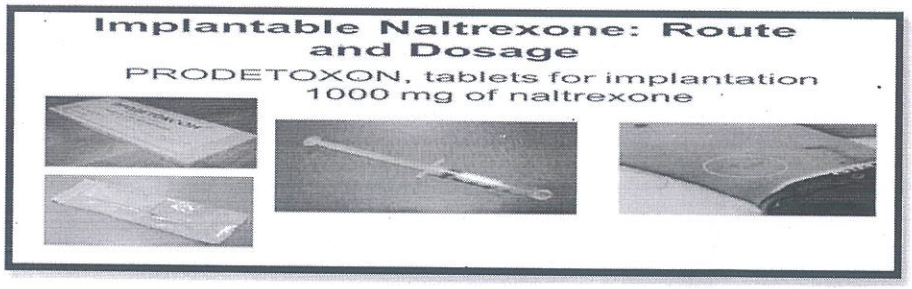
- These tablets contain an excipient like lactose, sodium bicarbonate and sodium chloride. These cones generally get dissolved in 20 to 40 minutes time.



(c) Tablets administered by other routes

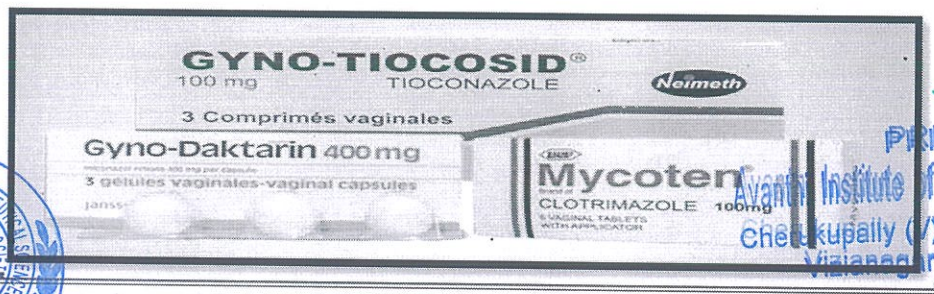
(1) Implantation Tablets:

- These tablets are placed under the skin or inserted subcutaneously by means of minor surgical operation and are slowly absorbed. These may be made by heavy compression but are normally made by fusion. The ***implants must be sterile*** and should be ***packed individually in sterile*** condition. Implants are mainly used for the administration of hormones such as testosterone steroids for contraception. These tablets are very usefully exploited for birth control purpose in human beings.
- The disadvantages of implant tablets are their administration, changing rate of release with change of surface area and possibility of tissue reactions.



(2) Vaginal tablets:

- These tablets are meant to dissolve slowly in the vaginal cavity. The tablets are typically ovoid or pear shaped for the ease of insertion. these tablets are used to release steroids or antimicrobial agents. the tablets are often buffered to promote a pH favorable to the action of a specified antimicrobial agent. The contains easily soluble components like lactose or sodium bicarbonate.

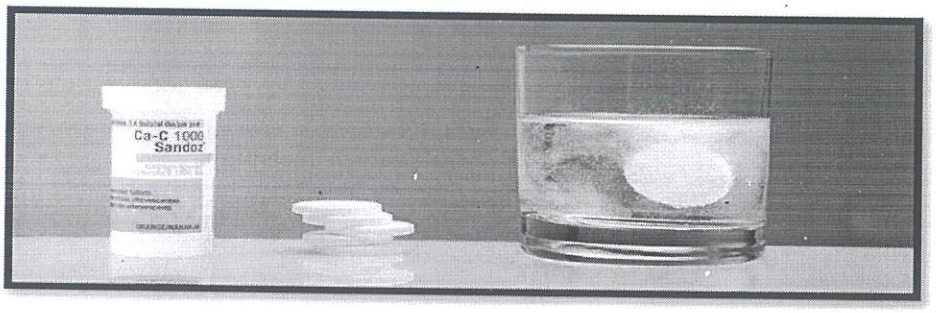


PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

(d) Tablets used to prepare solutions

(1) Effervescent tablets:

- These tablets along with the active medicament contain ingredients like sodium bicarbonate, citric acid and tartaric acid which react in the presence of water liberating carbon dioxide and producing effervescence leading to disintegration of the tablet, thus fastens solution formation and increase the palatability. Eg. Histac (Ranitidine)



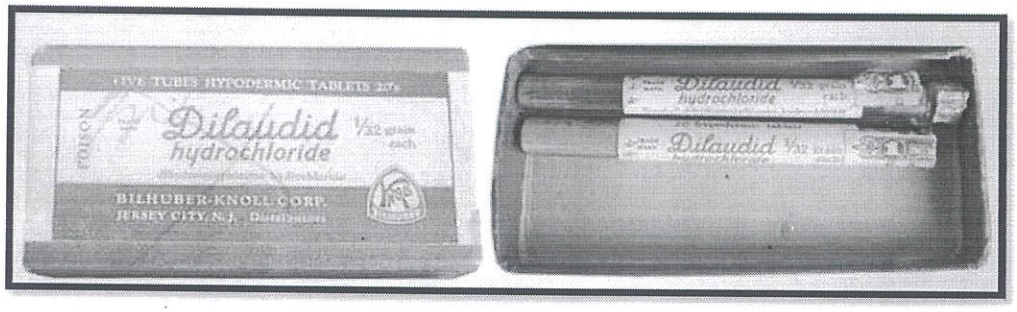
(2) Dispensing tablets:

- These tablets provide a convenient quantity of potent drug that can be readily convert into powders and incorporate into liquids, thus circumventing the necessity to weigh small quantities. these tablets are supplied primarily as a convenience for extemporaneous compounding and should never be dispensed as dosage form.
- e.g. The drugs commonly incorporated are mild silver potentiate, bichloride of mercury merbromin an quarternary ammonium compounds.

(3) Hypodermic tablets:

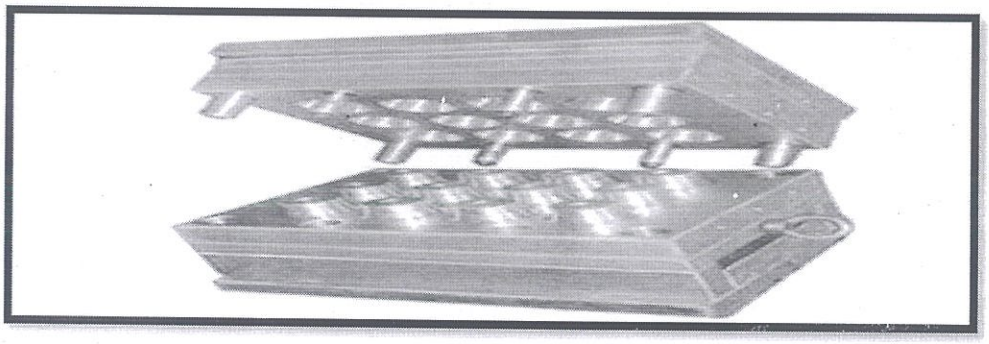
- Hypodermic tablets are soft, readily soluble tablets and originally were used for the preparation of solutions to be injected. These tablets are dissolved in sterile water or water for injection and administered by parenteral route. these tablets are not preferred now-a-days because the resulting solution is not always sterile.

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162



(4) Tablet triturates (Moulded tablets):

- These are powders moulded into tablets. They are flat, circular discs, usually containing a potent substance mixed with lactose, lactose and sucrose, dextrose, or other suitable diluent.
- Since they are intended to disintegrate very quickly in contact with moisture, water insoluble adjuncts are avoided. The name 'tablet triturate' is appropriate because they usually contain triturations (*trituration = dilution with an inert substance*).



Tablet Ingredients/ Excipients-

In addition to active ingredients, tablet contains a number of inert materials known as additives or excipients. Different excipients are:

1. Diluent / Filler
2. Binder and adhesive
3. Disintegrants
4. Lubricants and glidants
5. Colouring agents
6. Flavoring agents
7. Sweetening agents

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

Function of excipients-

- Impart weight, accuracy, & volume.

- Increase stability
- Enhance bioavailability
- Modifying drug release
- Assist product identification
- Increase patient acceptability
- Facilitate dosage form design

1. Diluents

Definition- Diluents are fillers used to make required bulk of the tablet when the drug dosage itself is inadequate to produce the bulk.

Secondary reason is to provide better tablet properties such as improve cohesion, to permit use of direct compression manufacturing or to promote flow.

A diluent should have following properties:

1. They must be non-toxic and low cost.
2. They must be commercially available in acceptable grade
3. They must be physiologically inert, physically & chemically stable by themselves & in combination with the drugs.
4. They must be free from all microbial contamination.
5. They do not alter the bioavailability of drug.
6. They must be color compatible.

Characteristics of an ideal diluents

- They must be nontoxic and acceptable to the regulatory agencies in all countries where the product is to be marketed.
- They must be commercially available in an acceptable grade in all countries where the product is to be manufactured.
- They must be cheap compared to the active ingredients and must be physiologically inert.
- They must be chemically stable alone and/or in combination with the drug(s) and/or other tablet components.
- They must be color-compatible (should not produce any off-color appearance).
- They must have no negative effects on the bioavailability of the drug(s) in the product

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

Commonly used tablet diluents-

1. Lactose anhydrous and spray dried lactose

2. Hydrolyzed starch-Emdex and Celutab

3. Microcrystalline cellulose-Avicel (PH 101and PH 102)

4. Dibasic calcium phosphate dehydrate

5. Calcium sulphate dihydrate

6. Mannitol and Sorbitol

7. Sucrose- Sugartab, DiPac, Nutab

8. Dextrose

Lactose

- Lactose is the most widely used diluent for tablet formulation. It is obtained in hydrous and anhydrous form. The anhydrous form, picks up moisture when exposed to elevated humidity. Such tablets should be packed in moisture proof packets or containers. When a wet granulation method is employed, the hydrous form of lactose should generally be used.
- Two grades of lactoses are commercially available:

  (i) A 60 to 80 mesh – coarse

  (ii) a 80 to 100 mesh – regular grade

Advantages:

- Lactose has no reaction with most of the drugs, whether in hydrous or anhydrous form.
- Lactose formulations show good release rates. Their granulations are readily dried, and the tablet disintegration times of lactose tablets are not strongly sensitive to variations in tablet hardness.
- It is a low cost diluent.

Disadvantages:

- Lactose reacts with amine drug bases in presence of alkaline lubricants e.g. metal stearates (e.g. magnesium stearate) and gradually discolours (dark brown) with time due to the formation of furaldehyde. This reaction is called Maillard reaction.

Calcium salts ((DCP/TCP)

Dibasic calcium phosphate dihydrate (or dicalcium orthophosphate) (DCP) [$CaHPO_4$, 2 H_2O], Calcium sulfate dihydrate ($CaSO_4$, $2H_2O$).

Advantages:

- Diluents that exist in their common salt form as hydrates, containing appreciable bound

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

salts are excellent diluents for water-sensitive drugs. It is superior to anhydrous diluent, which has a moderate to high moisture demand.

Disadvantages:

- Tetracycline products made with calcium phosphate diluent had less than half the bioavailability of the standard product. Divalent cation (Ca^{++}) form insoluble complexes and salts with number of amphoteric or acidic functionality antibiotics, which generally reduces their absorption (*which is also why milk should not be co-administered with these drug*).

Spray dried lactose

Advantages:

- It is used for direct compression (containing drug + diluent + disintegrant + lubricant). In addition to the direct compression properties, spray dried lactose also has good flow characteristics. It can usually be combined with as much as 20 to 25% of active ingredients without losing these advantageous features.

Disadvantages:

- If spray dried lactose is allowed to dry out and the moisture content falls below the usual 3% level, the material loses some of its direct compressional characteristics.
- Spray-dried lactose is especially prone to darkening in the presence of excess moisture, amines, and other compounds owing to Maillard reactions. Hence, a neutral or acid lubricant should be used.

Starch

- Starch may be obtained from corn, wheat or potatoes and rice. It is occasionally used as a tablet diluent. USP grade of starch is usually possesses moisture content between 11 to 14%.
- Specially dried types of starch that have a standard moisture level of 2-4% are available, but are costly. Use of such starches in wet granulation is wasteful since their moisture level increase to 6-8% following moisture exposure.

Directly compressible starches

- **Sta–Rx 1500**– free flowing, directly compressible starch. It is used as diluent, binder, disintegrant.
- **Emdex and Celutab** – are two hydrolyzed starches – contains dextrose 90–92% and maltose 3–5%
- free flowing and directly compressible and may be used in place or mannitol in chewable tablets because of their sweetness and smooth feeling in the mouth.

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

- Available in two forms: as hydrates and anhydrous forms.
- Dextrose may sometimes be combined in formulation to replace some of the spray-dried lactose, which may reduce the tendency of the resulting tablets to darken.

Mannitol

Advantages

- Because of the negative heat of solution (cooling sensation in the mouth) its slow solubility, and its pleasant feeling in the mouth, it is widely used in chewable tablets.
- It is relatively non-hygroscopic and can be used in vitamin formulations.
- Low calorie content and non-carcinogenic.

Disadvantages

- Costly and has poor flow characteristics and usually require fairly high lubricant level.

Sorbitol

- It is an optical isomer of mannitol and is sometimes combined with mannitol formulations to reduce the diluent cost.
- Disadvantages:- It is hygroscopic at humidities above 65%.

Sucrose

- Some sucrose based diluents are:
- **Sugar tab**– 90 to 93% sucrose + 7 to 10% invert sugar
- **Di Pac** – 97% sucrose + 3% modified dextrins
- **Nu Tab**– 95% sucrose + 4% invert sugar + small amount of corn starch + Mg-stearate

Advantages: They are all used for direct compression.

Disadvantages: All are hygroscopic when exposed to elevated humidity.

Microcrystalline cellulose (MCC)

- Trade Name : Avicel – is a directly compression material
- Two grades are available PH 101 → powder

  PH 102→ granules
- Advantages: It acts as diluent and disintegrating agents.

2. Binders and Adhesive

Definition: Agents used to impart cohesive qualities to the powdered material are referred to

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

Objective of incorporating binders

- They impart a cohesiveness to the tablet formulation (both direct compression and wet–granulation method) which insures the tablet remaining intact after compression.
- They improves the free-flowing qualities by the formation of granules of desired size and hardness.

Characteristics of binder

Method-I

- Binders are used in dry form in the powder and then moistened with a solvent (of the binder) to form wet lumps.

Method-II

- Binders are often added in solution form. It requires lower concentration of binder.
- By Method-I the binder is not as effective in reaching and wetting each of the particles within the mass of the powder. Each of the particle in a powder blend has a coating of adsorbed air on its surface, and it is this film of air which must be penetrated before the powder can be wetted by the binder solution.

Method-III

- In direct compression method MCC, microcrystalline dextrose, amylose and PVP are used – those have good flow property and cohesiveness as well.
- It has been postulated that MCC is a special form of cellulose fibril in which individual crystallites are held together largely by hydrogen bonding. The disintegration of tablets containing the cellulose occurs by breaking intercrystallite bonds by the disintegrating medium.

Starch paste

Corn starch is often used in the concentration of 10–20%.

Method of preparation:- Corn starch is dispersed in cold purified water to make a 5 to 10% w/w suspension and then warming in water both with continuous stirring until a translucent paste is formed.. (Actually hydrolysis of starch takes place.)

Liquid glucose:- 50% solution in water is fairly common binding agent.

Sucrose solution:- 50% to 74% sugar solution is used as binder. They produce hard but brittle granules. Their cost is low.

Gelatin solution

- Concentration 10–20% aqueous solution

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., 531162

Method of preparation

- The gelatin is dispersed in cold water and allowed to stand until hydrated. The hydrated mass is warmed in water bath to dissolve.

Cellulosic solutions

- HPMC (Hydroxy propyl methyl cellulose) Soluble in cold water.

Method of preparation: HPMC is dispersed in hot water, under agitation. The mixture is cooled as quickly as possible and as low as possible

- HEC (Hydroxy ethyl cellulose), HPC (Hydroxy propyl cellulose) are other successful binders.
- PVP (Polyvinylpyrollidone) Used as an aqueous or alcoholic solution. Concentration 2% and may vary.

3. Disintegrants

Definition:- A disintegrant is a substance to a mixture of substances, added to tablet to facilitate its breakup or disintegration after administration in the GIT. The active ingredients must be released from the tablet matrix as efficiently as possible to allow for its rapid dissolution.

Disintegrants can be classified chemically as: Starches, clays, celluloses, alginates, gums and cross-linked polymers.

Starch

- Corn starch, potato starch.
- For their disintegrating effect starches are added to the powder blends in dry state.

Mode of action:

- Starch has a great affinity for water and swells when moistened, thus facilitating the rupture of the tablet matrix.
- Others have suggested that the spherical shape of the starch grains increases the porosity of the tablet, thus promoting capillary action.
- Normally 5% w/w is suggested and for rapid disintegration 10 – 15% w/w may be taken.

Superdisintegrants

Super disintegrants like Croscarmelose - cross linked cellulose, Crospovidone - cross linked polyvinyl pyrrolidone and Sodium starch glycolate- cross linked starch

Mode of action

- Croscarmelose swells 4 to 8 fold in less than 10 seconds

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

- Sodium starch glycolate swells 7 to 12 folds in less than 30 seconds.

Other materials

- Methyl cellulose, Agar, Bentonite, Cellulose, Alginic acid, Guargum, and Carboxymethyl cellulose.
- Sodium lauryl sulfate is a surfactant. It increases the rate of wetting of the tablet, thus decreases the disintegrating time.

4. Lubricant and Glidants

Objectives:

- Prevents adhesion of the tablet material to the surface of dies and punches.
- Reduce inter-particular friction, improve the rate of flow of tablet granulation.
- Facilitate ejection of the tablets from the die cavity.

Lubricants are intended to prevent adhesion of the tablet materials to the surface of dies and punches, reduce inter particle friction and may improve the rate of flow of the tablet granulation.

Example: Stearic acid, Stearic acid salt - Stearic acid, Magnesium stearate, Talc, PEG (Polyethylene glycols), Surfactants.

Glidants are intended to promote flow of granules or powder material by reducing the friction between the particles.

Example: Corn Starch – 5-10% conc., Talc-5% conc., Silica derivative - Colloidal silicas such as Cab-O- Sil, Syloid, Aerosil in 0.25-3% conc.

Antiadherents are used for the purpose of reducing the sticking or adhesion of any of the tablet ingredients or powder to the faces of the punches or to the die wall.

5. Coloring agent

Objectives of using colors that (i) It makes the tablet more esthetic in appearance and (ii) Colour helps the manufacturer to identify the product during its preparation. Colorants are obtained in two forms dyes and lakes.

Dyes are dissolved in the binding solution prior to the granulating process. However, during drying their color may migrate to the surface and may produce mottling of the tablet. So another approach is to adsorb the dye on starch or calcium sulfate from its aqueous solution; the resultant powder is dried and blended with other ingredients.

Color lakes are dyes which are adsorbed onto a hydrous oxide of a heavy metal (like aluminium) resulting in an insoluble form of the dye.

6. Flavours and Sweeteners

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

Flavours are usually limited to chewable tablets or other tablets intended to dissolve in the mouth. Flavor oils are added to tablet granulations in solvents, are dispersed on clays and other adsorbents or are emulsified in aqueous granulating agents (i.e. binder).

The use of sweeteners is primarily limited to chewable tablets. E.g. Sugar

- **Mannitol**– 72% as sweet as sugar, cooling & mouth filling effect
- **Saccharin**– Artificial sweetener, 500 times sweeter than sucrose

  Disadvantages (i) it has a bitter after taste and (ii) carcinogenic
- **Cyclamate**– either alone or with saccharin– it is banned
- **Aspartame (Searle)** – widely replacing saccharin

  Disadvantage – lack of stability in presence of moisture

Manufacturing of Tablets

Manufacture of tablets involves certain well defined *steps*: namely:-

- ❖ Pulverization and mixing.
- ❖ Granulation.
- ❖ Compression.
- ❖ Coating (if required)

Pulverization and mixing-

- In this step the different solid / powder ingredients are reduced to the same particle size since particles of different sizes will segregate while mixing.
- Various equipments like Cutter mill, Hammer mill, Roller mill and Fluid energy mill is required to reduce the large lumps.

Granulation Technology-

Granulation: It is the process in which primary powder particles are made to adhere to form large multi-particle entities.

Range of size: 0.2 mm to 4 mm. (0.2 mm to 0.5 mm)

Objectives:-

- ➢ To enhance the flow of powder.
- ➢ To produce dust free formulations and produce uniform mixtures.
- ➢ To improve compaction characteristics.
- ➢ To eliminate poor content uniformity of mix.

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

Percolation Segregation:- air void Ex- Tea & Coffee jar.

Trajectory Segregation:- kinetic energy Ex- powder heap

(a) Wet Granulation-

Step-I Milling of the drug and excipients

- Milling of the active ingredients, excipients etc. are milled to obtain a homogeneity in the final granulation.
- If the drug is given in solution then during drying it will come up to the surface. To avoid this problem drug is mixed with other excipients in fine state.

Step-II Weighing

- Weighing should be done in clean area with provision of air flow system.
- In the weighing area all the ingredients must not be brought at a time to avoid cross-contamination.

Step-III Mixing Commonly used blenders are:

(a) Double cone blender

(b) V – blender

(c) Ribbon blender

(d) Planetary mixer

Any one of the blender may be used to mix dry powder mass.

Step-IV Wet Massing

- Wet granulation forms the granules by binding the powders together with an adhesive.
- Binder solutions can be added in two methods:

Method-I

Drug + Diluent

↓

Dry binder is added

↓

Blended uniformly

↓

Suitable solvent is added to activate the dry binder

↓

Blended in a Sigma - mixer or Planetary mixer till properly wet mass is formed

Therefore, when

Method-II

Drug + Diluent

↓

Binder Solution is added

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

- (ii) a large quantity of solvent is required **method-II** is adopted.

However, **method-II will give more cohesiveness** than **method-I** if the amount of binder remains constant.

- If **granulation is over-wetted**, the granules will be hard, requiring considerable pressure to form the tablets, and the resultant tablets may have a mottled appearance.
- If the powder mixture is not wetted sufficiently, the resulting granules will be too soft, breaking down during lubrication and causing difficulty during compression.

Step-V -Wet Screening

Wet screening process involves converting the moist mass into coarse, granular aggregates by

- (i) passage through a **hand screen** (in small scale production) or,
- (ii) passage through an **oscillatory granulator** of **hammer mill** equipped with **screens** having large perforations (# 6 – 8 mesh screen).
- **Purpose** (i) Increase particle contact point

  (ii) Increase surface area to facilitate drying.

Step-VI Drying

- Drying is usually carried out at **60^{0}C.** Depending on the thermolabile nature of the drug the temperature can be optimized.
- Drying is required in all wet granulation procedures to remove the solvent, but is not dried absolutely because it will pose problems later on. Hence, certain amount of moisture (1 – 4 %) is left within the granules – known as the *residual moisture*.

Methods: Drying can be carried out

Tray dryers – it may take 24 hrs of drying

Truck dryers – the whole cabinet can be taken out of the dryer

Fluid-bed dryer – carry out drying in 30 mins.

Step-VII Dry Screening

After drying, the granules are make monosize by passing through **mesh screen**.

For drying granules the screen size to be selected depends on the diameters of the punch. The following sizes are suggested:

Tablet diameter upto	**Mesh Size**
3/16"	# 20
3/16" – 5/16"	# 16

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., 531162

7.0/16 or larger # 12

Step-VIII Lubrication of granules

- After dry granulation, the lubricant is added as a fine powder. It usually, is screened onto the granulation through 60 or 100 mesh nylon cloth to eliminate small lumps as well as increase the covering capacity of the lubricant.
- The lubricant is blended very gently using tumbling action to maintain the uniform granule size.
- Too much fine powder is not desirable because fine powder may not feed into the die uniformly causing variation in weight and density.
- Since, the very nature of lubricant produce hydrophobic surface on the particle hence over blending prevents the inter granule bonding that takes place during compression.

(b) **Dry Granulation**

Dry granulation is followed in situations **where** (i) the effective dose of a drug is too high for direct compaction and (ii) if the drug is sensitive to heat, moisture or both, which precludes wet granulation. e.g. many aspirin and vitamin formulations are prepared for tableting by compression granulation.

Steps of granulations

Milling→ Weighing → Screening → Blending → Slugging → Granulation (Dry) → Lubrication Compaction.

Slug:

Slug may described as poorly formed tablets or, may be described as compacted mass of powdered material.

Purpose: To impart cohesiveness to the ingredients, so as to form tablets of desired properties.

Method: It is done either by (i) high capacity heavy duty tablet press .

(ii) Chilsonator roller compactor.

Advantages of dry granulation over wet granulation

- ❖ No application of moisture (required in wet granulation) and heat (for drying). So the drugs susceptible to either moisture or heat or both can be made by dry granulation. e.g. calcium lactate cannot be used by wet granulation. (Aspirin, Vitamin C).
- ❖ Dry granulation involves less steps and hence less time is required than that of wet granulation.
- ❖ Less steps requires less working space and energy.

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

Direct Compression Method-

Milling ⟹ Weighing ⟹ Sieving⟹Blending ⟹ Compression

Advantages: (i) It is much more quicker than any of the previous process

(ii) Minimum number of steps are required.

- Modified diluents, binders etc. are available in the market which assure spherical shape of the granules to modify flow property. However, they are not used extensively.
- If active medicament is less in amount then there will be no problem but in case of high dose large amount of active ingredient is to be replaced by specially treated vehicles to improve flow property or compressibility.
- These specially treated materials are **costly**.

Tablet Compression

It can reduce the volume by apply pressure, particle in die are re-arrange, resulting a closer packing structure and reduce space and at certain lode reduced space and increase inter-particulate friction will prevent farther interparticulate friction.

Elastic deformation:- Either whole or a part can change their shape temporarily.

Plastic deformation:- Change shape permanently.

Particle fragmentation:- Fracture into a number of smaller discrete particles.

Find new position- decrease the volume of powder bed- when force increase new particle again under go deformation-particle particle bonds can formed.

Time of loading:- Deformation of particle are **time independent** process in Elastic & Plastic deformation.

Deformation is **time dependent**, when its behavior is referred to Viscoelastic & Viscous deformation.

Degree of deformation:- Some quantitive chang in shape.

Mode of deformation:- type of shape change.

Basic Component of Compression Machine

Head- Contain upper punchs, dies, lower punchs.

Body- Contain operating machinaries.

Hopper- Holding feeding granules.

Dies- Define size, shape of tablet.

Punches For compression with in dies.

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

Feed frame- Guiding the granules from hopper to dies.

Upper turret- Holds the upper punchs.

Lower turret- Hold the lower punchs.

Die table- Contain the dies.

Single station – stamping press

Multi- station- Rotary press

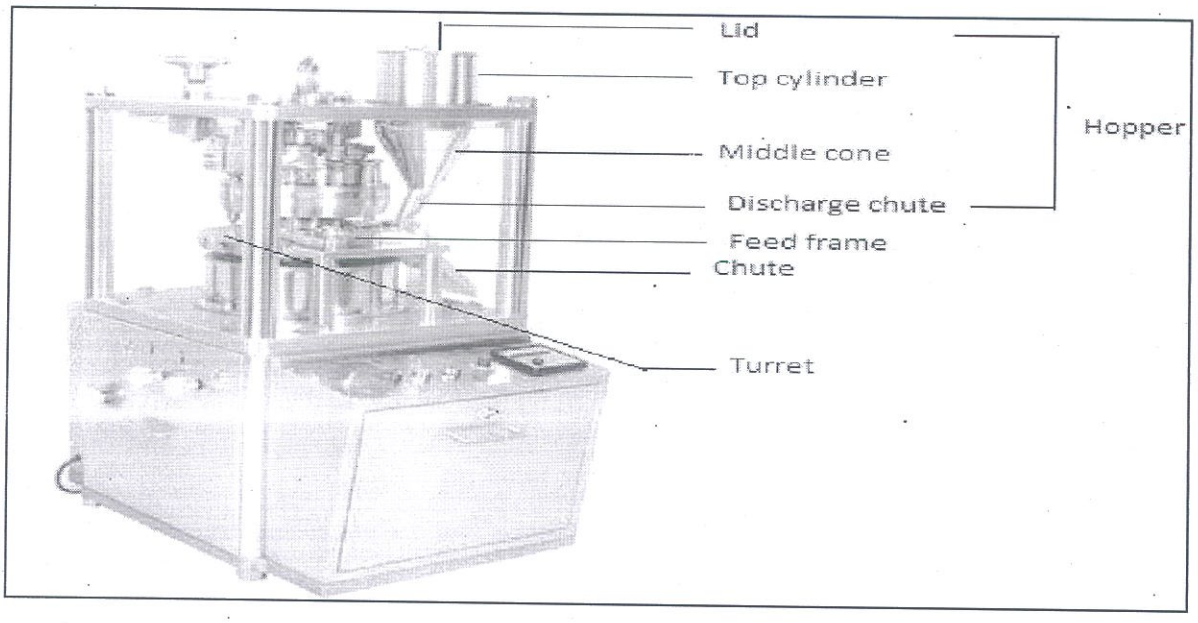


Fig. 1. Tablet Compression Machine.

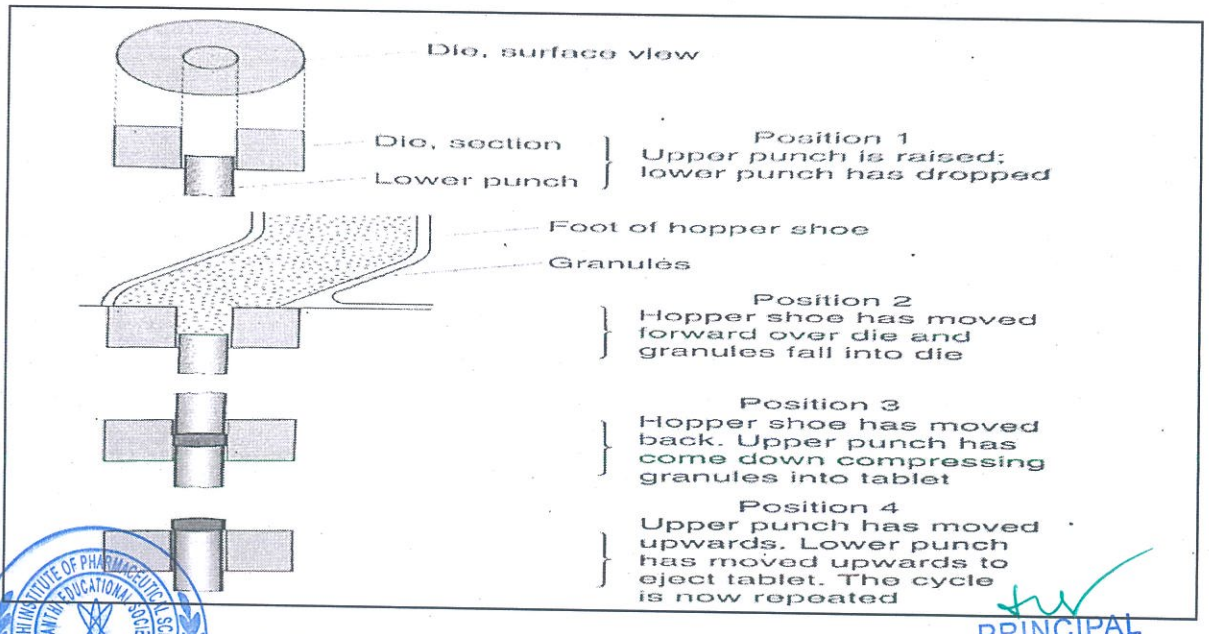


Fig.2. Sequence of events involved in the formation of tablets.

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

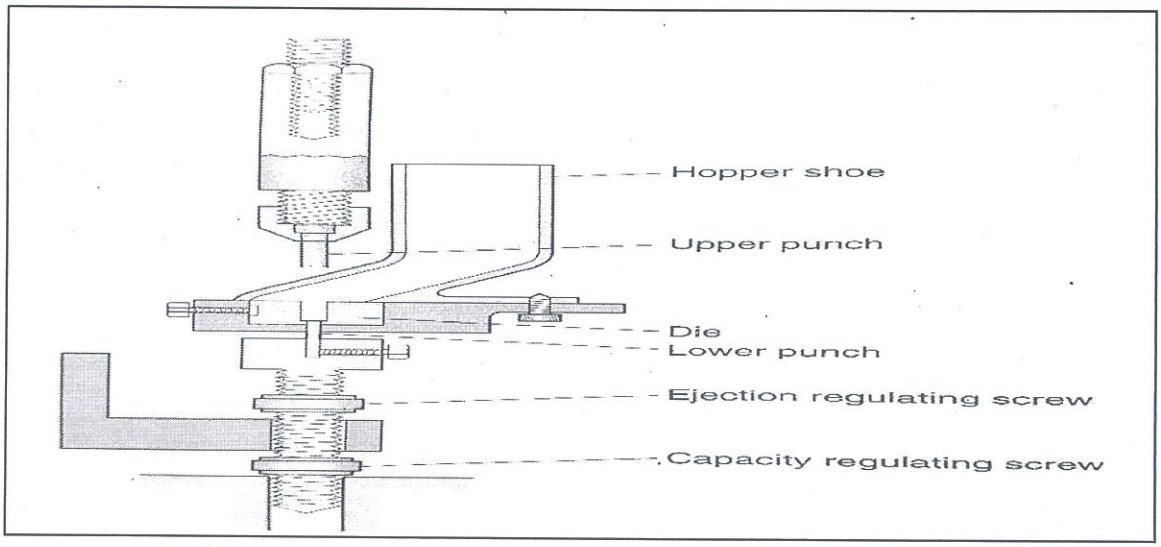


Fig.3. A single punch tablet press.

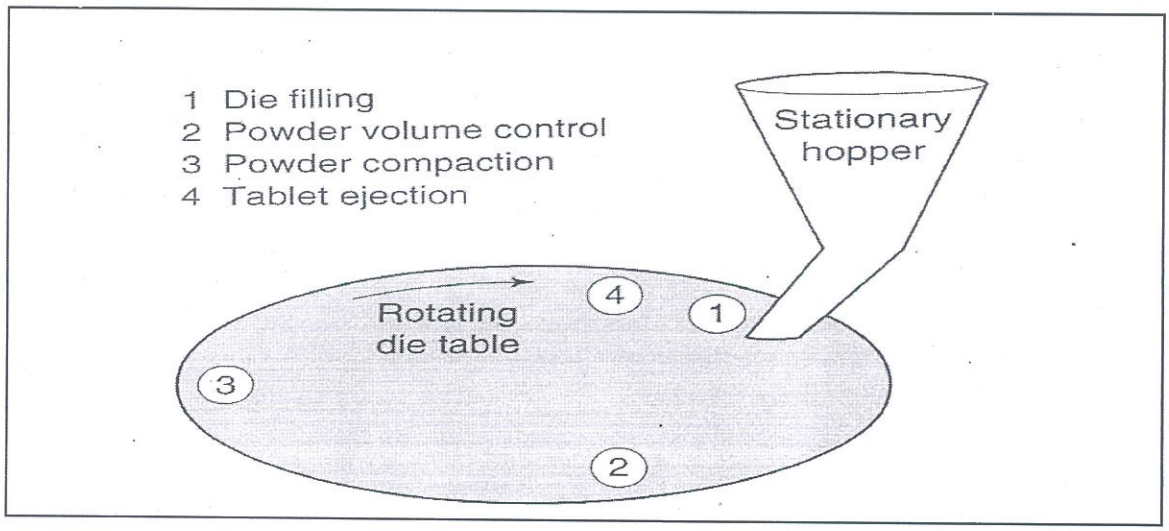
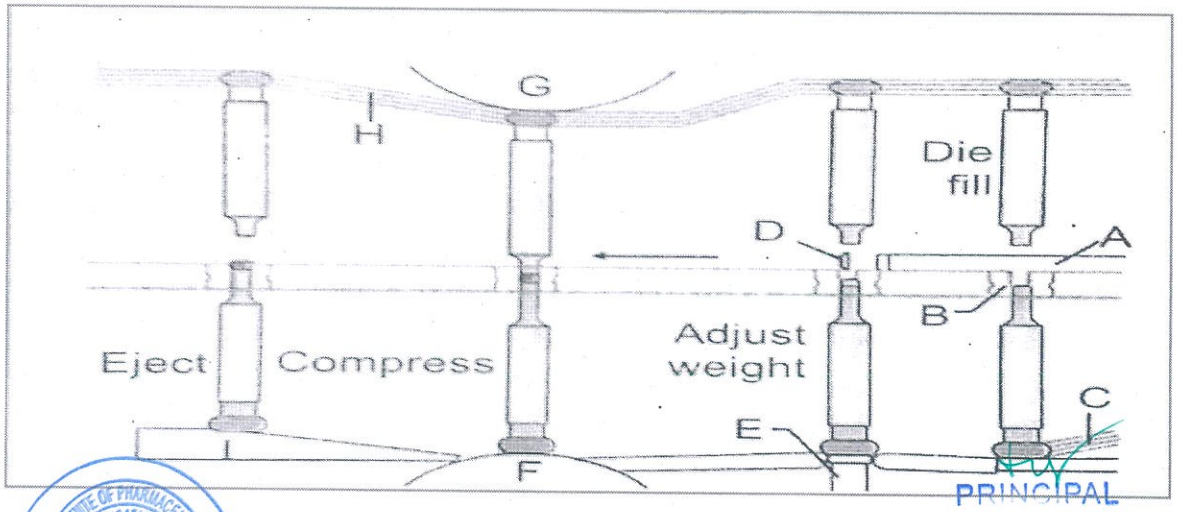
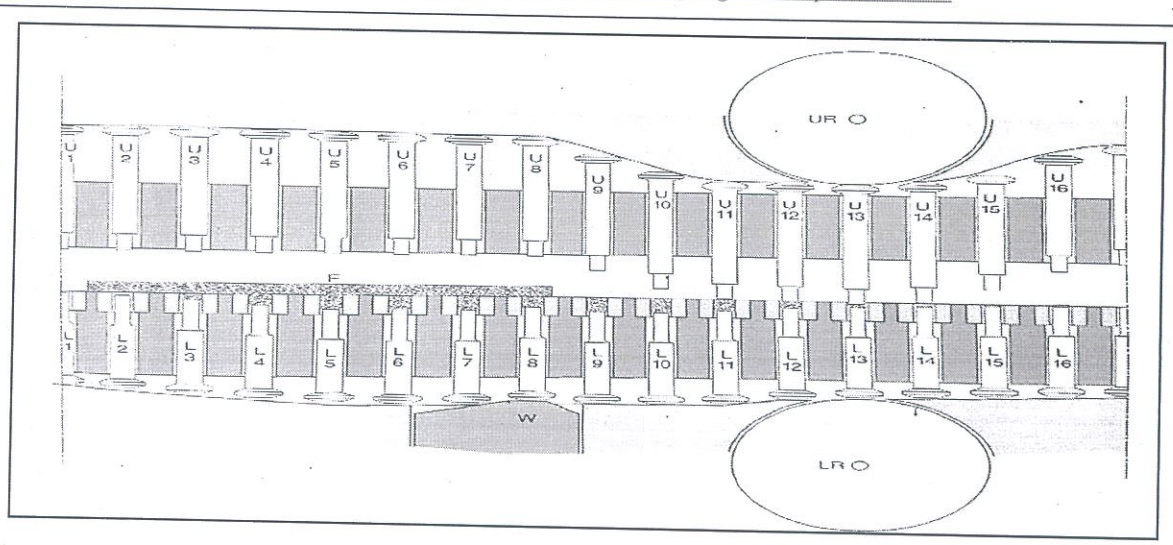


Fig.4. Schematic diagram for the formation of tablets with rotary press.



A- Feed frame, B- Die, C- Pull down cam, D- Wipe off blade, E- Weight control cam, F

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162



Tablet machine **out put** is regulated by three basic characteristic like:-

- No of tooling sets
- No of compression station
- Rotational speed of press.

Rotary presses are engineered for fast & economical production of all kind of tablet.

Ex- The monestry nova rotary tablet press.

Gradually modification made in machines by using hydraulic or pneumatic pressure to control pressure roll in place of spring for smoother pressure.

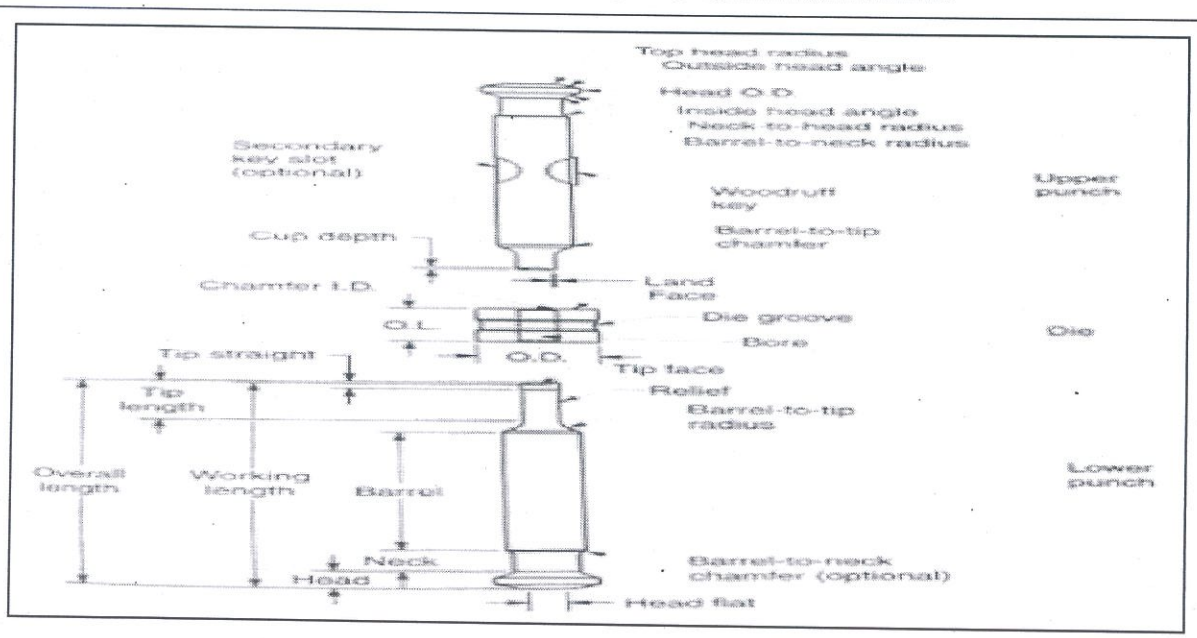
Special type machine:-

Fette machine- Chill the compression(For low MP substance like wax)

Versa press- For multi-layer tablet

Tablet Tooling Set

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162



- Its gives definite size, shape of tablet and certain identification marking.
- For this purpose different types of punches are used-

➢ Flat faced bevel edged.

➢ Shallow concave (Round / Capsule shaped)

➢ Standard concave (Round / Capsule shaped)

➢ Deep concave (Round / Capsule shaped)

➢ Extra deep.

➢ Modified ball

Auxillary Equipment-

- Mechanized feeder: Due to short D Well time (Monestry granulation feeding device)
- Mechanized hopper loading equipment:
- Bulk granulation container:
- Electronic monitoring device: To maintain fixed force

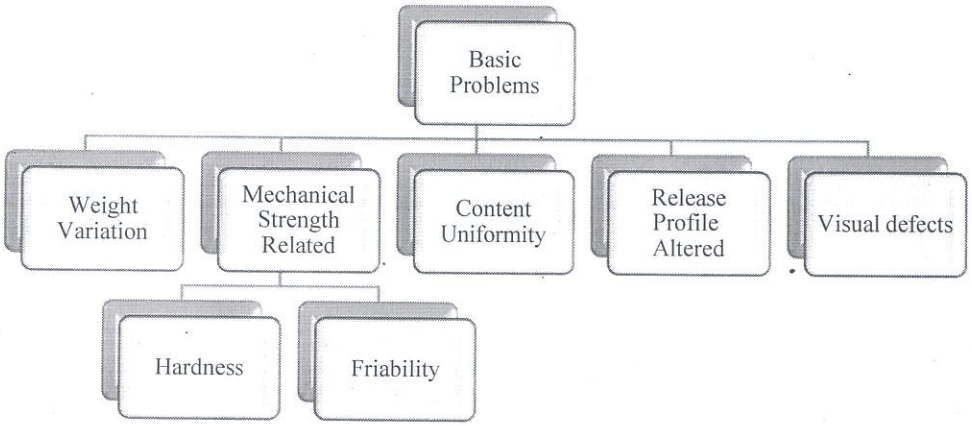
Tablet Processing Problems and its remedies-

An ideal tablet should be free from any visual defect or functional defect. With the development of technology, the production process had become more simplified and more mechanized.

But now the tablet punching machines are all mechanized, the mechanical feeding of feed from the hopper into the die, electronic monitoring of the press, but tablet process problem still persist.

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

ready for compression or due to faulty machine setting. Functional defects are due to faulty formulation.

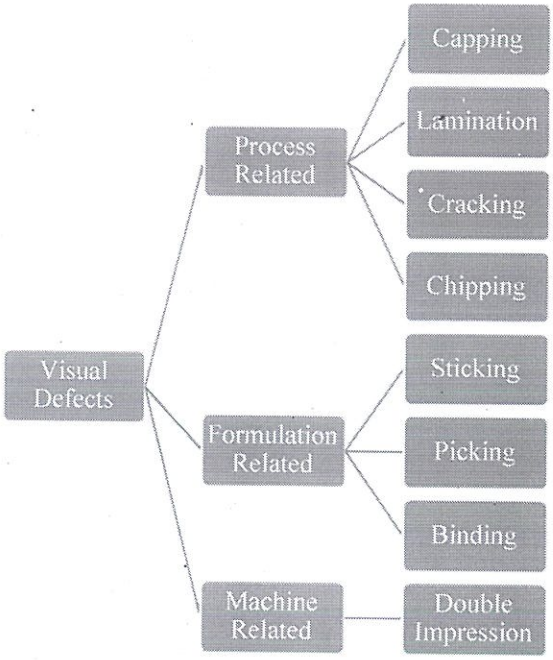


The **Imperfections** known as: 'VISUAL DEFECTS' are either related to Imperfections in any one or more of the following factors:

I. Formulation design

II. Tableting process

III. Machine



1. Capping and Lamination

Capping is the partial or complete separation of the top or bottom crowns of a tablet from the main body of the tablet.

Lamination is the separation of tablet into two or more distinct layers. Usually these problems are apparent immediately after compression, or even hour or days later.

- **Detection**: Subjecting tablets to the friability test is the quickest way to reveal such problems.

Reason and Remedies

a) **Reason:** Entrapment of excess air in the granules during compression. If the granules are light and fluffy this type of problems are encountered frequently.

Remedies: Increasing the density of granules by adding more binder or changing the solvent of binder.

(b) **Reason:** New set of punches and dies are very tightly fitted; i.e. the clearance is very negligible hence air cannot come out.

Remedy: In that case punch diameter should be reduced by 0.005" (i.e. 5 thou)

(c) **Reason:** Granules should not be completely dried. if over dried or under dried then capping may take place.

Remedy: So moisture content should be kept within 1 – 4%.

(d) **Reason:** Tooling set used for longer period of time will form claw-shaped curve on tip of the punch or wear ring in die in compression area – this form capping.

Remedy: Punches and dies are changed.

2. Picking and Sticking

- **Picking**: -When some portion of the surface of the tablet is removed – it is termed as picking.
- **Sticking:** - Sticking refers to tablet materials adhering to the die wall. Serious sticking at ejection cause chipping.

Causes and Remedies of picking

Cause: When punch tips have engraving or embossing, usually of letters B, A, O are difficult to manufacture cleanly. These may produce picking.

Remedy:

(i) Lettering should be designed as large as possible, particularly on punches of small diameter.

(ii) Plating of the punch faces with chromium produces smooth, non-adherent face.

(iii) Colloidal Silica (Cab-o-sil) is added as polishing agent that makes the punch faces smooth; so that material does not cling to them.

Causes and Remedies of Sticking

Causes: Excessive moisture may be responsible for sticking.

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

- During compression heat is generated and

(a) low m.p. lubricants e.g. **stearic acid** may produce sticking.

***Remedy*:** Low melting point lubricant are replaced with high melting point lubricants (e.g. **Poly ethylene glycol**)

(b) Low m.p. substances, either active ingredients or additives may soften sufficiently form the heat of compression to cause sticking.

***Remedies*:**

- Dilution of active ingredient with additional high m.p. diluents.
- Increase in the size of tablet.
- If a low m.p. medicament is present in high concentration then refrigeration of the granules and then compressing may be the order or using fette compression machine.

3. Mottling

Mottling is an unequal distribution of color on a tablet, with light or dark patches in an otherwise uniform surface.

***Cause*:** Migration of water soluble dyes to the surface while drying.

***Remedies*:**

- Change the solvent system and change the binder system
- Reduce the drying temperature
- Grind to a smaller particle size.
- Use lakes instead of water-soluble dyes.

Quality Control Tests for Tablets-

- **General appearance**: - Size, shape, and thickness: This is important to facilitate packaging and to decide which tablet compressing machine to use.
- **Organoleptic properties:** which include color, odor and taste of the tablets.
- **Weight uniformity and Content uniformity:** The tablet should contain the correct dose of the drug.
- **Dissolution test:** Drug should be released from tablet in a controlled and reproducible way.
- **Weight variation, thickness & diameter:** The appearance of tablet should be elegant & its weight, size & appearance should be consistent.
- **Hardness & friability:** The tablet should show sufficient mechanical strength to

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

- These factors must be controlled during production and verified after production, hence called In-process control

Official Standards as per I.P.

A) Uncoated tablet:

- Uniformity of container content and Content of active ingredient.
- Uniformity of weight and Uniformity of content.
- Disintegration test.

B) Enteric coated tablet:

- Disintegration test.

C) Dispersible tablet:

- Uniformity of dispersion.
- Disintegration test.

D) Soluble tablet:

- Disintegration test.

E) Effervescent tablet:

- Disintegration/Dissolution/Dispersion test.

1. Weight Variation

This test is based on the fact that, if the weight variation is within the limits then it can be said that the amount of medicament will uniform considerably. Conversely, if the weight variation is not in limits then it can be concluded that the active medicament will ununiform considerably.

Sources of weight variation

Weight variation is solely dependent on the poor flow property of granules and filling of die cavity. Poor flow properties arise from: (a) improper lubrication, (b) size of granules and (c) adjustment of lower punch.

Weight variation test

The U.S.P. weight variation test is run by weighing 20 tablets individually, calculating the average weight, and comparing the individual tablet weights to the average. The tablets meet the USP test if "*not more than 2 tablets are outside the percentage limit and if no tablet differs by more than 2 times the percentage limit.*"

2) Content Uniformity test

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., 531162

- In potent drug the medicament is less in amount in comparison to the other excipients. The weight variation may meet the pharmacopoeial limitation but this will not ensure the correct variation of potency. hence, in this case the weight variation test is followed by content uniformity test.
- In this test 30 tablets are randomly selected for sample, and at least 10 of them are assayed individually according to the official assay method.
- 9 of the 10 tablets must have potency within ± 15 % of the labelled drug content. Only 1 tablet may be within ± 25%.
- If this condition is not met then the tablets remaining from the 30 must be assayed individually and none may fall outside ± 15% of the labeled content.

3) Disintegration Test of Tablets

- The time a tablet takes to disintegrate is the disintegration time.
- To test the disintegration time one tablet is placed in each tube, and the basket rack assembly is positioned in a 1-litre beaker of water, simulated gastric fluid or simulated intestinal fluid, **at $37^0C \pm 2^0C$**, such that the tablet remains 2.5 cm from the bottom of the beaker.
- A standard motor moves the basket up and down through a distance of 5 to 6 cm at a frequency of **28 to 32 cpm** (cycles per minute).

Disintegration testing condition and interpretation (IP)

Sr. No	Type of tablets	Medium	Temperature	Limit
1	Uncoated	Water/buffer	37 °± 2 °C	15 min or as per individual monograph
2	Film coated	Water	37 °±2 °C	30 min or as per individual monograph
3	Sugar coated	Water/0.1 N HCl	37 °±2 °C	60 min or as per individual monograph
4	Dispersible Tablets	Water	25 °±1 °C	03 min or as per individual monograph
5	Effervescent Tablets	Water	25 °±5 °C	05 min or as per individual monograph
6	Enteric-coated Tablets	0.1 M HCl mixed phosphate buffer pH 6.8	37 °±2 °C	02 hour in HCl: no disintegration 60 min in buffer : disintegrate
7	**Soluble Tablets**	Water	20 °±5 °C	03 minutes

4) Dissolution Test

Disintegration test simply identifies the time required for the tablet to break up under the condition of the test but it does not ensure the drug release in the bulk of the fluid.

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., 531162

Apparatus-I (Basket)

- In general, a single tablet is placed in a small wire mesh basket and immersed in the dissolution medium (as specified in the monograph) contained in a **1000 ml** flask at **$37^0 \pm 0.5^0$C.** Generally it is rotated at **50 rpm** unless otherwise specified.

Apparatus-2 (Paddle)

- The same equipment is used. Instead of basket a paddle is introduced as the stirring element. The tablet is allowed to sink at the bottom of the flask before stirring.
- **Limit:** A value of $t_{90\%}$ (i.e 90% drug release) within 30 minutes is often considered satisfactory and is an excellent goal since a common dissolution tolerance in the USP/NF is not less than 75% dissolved in 45 minutes.

5) Tablet Hardness

The resistance of the tablet to chipping, abrasion or breakage under conditions of storage, transportation and handling before usage depends on its hardness.

Method:

A tablet is taken between the 2nd and 3rd finger and pressing it with the thumb as fulcrum. If the tablet breaks with a "sharp snap", yet, it does not break when it falls on the floor – is said to possess proper hardness.

Instruments used:

a) Monsanto Hardness Tester

b) Strong Cobb Hardness Tester -Manual mode.

c) Pfizer Hardness Tester.

d) Erweka Hardness tester. – Automatic.

e) Schleuniger Apparatus. – Operates without manual involvement.

Hardness of a tablet:

The hardness at which the tablet crushes is the hardness of the tablet.

- **Unit of hardness:** Kg/sq.in. or lb/ sq.in
- **Limit:** Generally maximum 5 kg/sq.in. hardness is required.

6) Friability

Tablet hardness is not an absolute indicator of strength since some formulations, when compressed into very hard tablets may produce chipping, capping and lamination problems. Therefore, another measure of tablet strength i.e. friability is often measured, i.e. the friability.

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

C. Automation of coating process.

Coating composition: - which involves polymers, color, plasticizer, solvent.

Types of Coating-

(A) Sugar Coating.

1) Sealing-

Objectives- (i) To prevent moisture penetration into the tablet core, a seal coat is applied and (ii) To strengthen the tablet core without a seal coat, the over wetted tablets would absorb excess moisture, leading to tablet softening, and may affect the physical and chemical stability.

Ingredients

- Alcoholic solutions of Shellac (10 – 30% solid) or alcoholic solution of zein,
- Alcoholic solution of cellulose acetate phthalate (CAP) or alcoholic solution of polyvinyl acetate phthalate.

2) Sub-coating-

Objectives-To round the edges and build up the tablet size. Sugar coating can increase the tablet weight by 50 to 100% at this step.

Method:- The sub-coating step consists of alternately applying a sticky binder solution to the tablets followed by a dusting of sub-coating powders and then drying. Subsequent coatings are applied in the same manner until the tablet edges have been covered and the desired thickness is achieved.

3) Smoothing (Syruping)-

Objectives-To cover and fill in the imperfections in the tablet surface caused by the sub-coating step.

Ingredients-Simple syrup solution (approximately 60–70%(w/w)). Often the smoothing syrups contain a low percentage of titanium dioxide (1–5%) as an opacifier. This gives a very bright and reflective background for the subsequent coloring step.

4) Color coating-

Objective-To impart an elegant and uniform colour.

Ingredient-Syrup (60 – 70% sucrose) containing the desired color.

Method-Syrup solutions containing the dyes are coated upto 60 individual applications until the desired color is achieved. After each application of color, the coatings are dried. In the finishing step a few clear coats of syrup may be applied.

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

Coating material is sprayed over the tablet bed from nozzles and hot air is passed through the tablet bed to dry it. The variables to be controlled is pan-spray film coating process are:

(a) Pan variables:

Uniform mixing is essential to deposit the same quantity of film on each tablet.

1. *Pan design or baffling*: Some tablet shapes mixes freely while other shapes may require a specific baffling arrangement to ensure adequate mixing.

Disadvantages: Baffles may produce chipping and breakage if not selected properly.

(b) Pan speed

- Pan speed affects mixing and the velocity at which the tablet pass under the spray.
- Too slow speed cause localized over-wetting resulting in tablets sticking to each other or to the pan.
- Too high speeds may not allow enough time for drying before the same tablets are reintroduced to the spray. This results in a rough coating appearance on the tablets.

Optimum pan speed: 10 – 15 rpm for nonaqueous film coating.

3 – 10 rpm for aqueous film coating

2) Fluidized bed process (air suspension coating)

This process have been successfully used for rapid coating of tablets, granules and capsules.

Process variables are as follows: (a) Chamber design and air flow rate controls the fluidization pattern, (b) Tablet shape, size and density, (c) Volume and rate of air flow either too high rate produce attrition and breakage of tablets or too low rate → mass does not move fast enough through the spray region → over-wetting occurs and (d) Inlet and exhaust air temperature.

Examples-

Non-enteric materials: e.g. Hydroxypropyl methylcellulose (HPMC), Methyl hydroxy ethyl cellulose (MHEC), Ethyl cellulose (EC), Polyvinyl pyrrolidone (PVP), Sodium carboxymethyl cellulose (Sod. CMC), Polyethylene glycols (PEG), Acrylate polymers e.g. Eudragit E

Enteric materials: e.g. Cellulose acetate phthalate (CAP), Acrylate polymers (Eudragit L, S), Hydroxypropyl methylcellulose phthalate (HPMCP), Polyvinyl acetate phthalate (PVAP).

(c) Spray variables

1) Rate of liquid application.
2) Spray pattern.
3) Degree of atomization

Unit-3
CAPSULES

Capsules are solid dosage form in which drug substance is enclosed in a gelatin shell. gelatin capsules shells may be hard or soft, depending on their composition. The soft gelatin capsules were invented by MOTHES, a French pharmacist, in 1833.

- During the following year DUBLANC obtained a patent for his soft gelatin capsules.
- In 1848 MURDOCK patented the two-piece hard gelatin capsules
- Although development work has been done on the preparation of capsule from methyl cellulose, starch and calcium alginate, gelatin, because of its unique properties, remains the primary composition material for the manufacture of capsules.
- The gelatin used in the manufacture of capsules is obtained from collagenous material by hydrolysis.

There are two types of gelatin.

- TYPE A: derived mainly from pork skins by acid processing.
- TYPE B: obtained from bones, animal skin by alkaline hydrolysis.

Blends are used to obtain gelatin solutions with the viscosity & bloom strength characteristics desirable for capsules manufacture.

HARD GELATIN CAPSULES

ADVANTAGES

- These are tasteless, easily administered &easily filled either extemporaneously or in large quantities commercially.
- It provides smooth, slippery, easily swallowed for drugs
- It is particularly beneficial for drugs having an unpleasant taste or odor
- They are economically produced in large quantities and in a wide range of colors &they generally provide ready availability of the contained drug
- Since minimal excipient & little pressure are required to compact the material, as is necessary in tabletting.
- In prescription practice the use of hard gelatin capsules permits the choice in prescribing a single drug or a combination of drugs at the exact dosage level considered best for the individual patient
- They have better bioavailability than tablets.
- Hard shell fitting equipment offers the possibility of mixed fills in the same capsules (small beads/granules/tab/powders/semisolids) which offers many possibilities in dosage form design to overcome incompatibilities by separating ingredients with in the same capsules or to provide control drug release.
- These allow for flexibility in clinical testing & widely used in preliminary studies of drugs
- some patients find it easier to swallow capsules than tablets, therefore preferring to take this form when possible
- This preference has prompted pharmaceutical manufacturers to market the product in capsule form, even though the product already has been produced in tablet form.
-

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

- while industry prepare approximately 75% of solid dosage form as compressed tablet, 23% of hard gelatin capsules& 2% as soft elastic capsules; market survey have indicated a consumer preference of 44.2% for soft elastic capsules, 39.6% for tablets&19.4% for hard gelatin capsule.

DIS ADVANTAGES:

- Capsules are not suitable for drugs that are deliquescent or efflorescent. Moisture can transfer b/w the shell & its contents, depending on their relative humidity. The removal of moisture from the shell could be to cause splitting or cracking
  E.g.; potassium acetate
- Highly soluble salts (e.g.: iodides, bromides, chlorides)
  Generally should not be dispensed in hard gelatin capsules.
  Their rapid release may cause gastric irritation due to the formation of a high drug concentration in localized areas.

Hard gelatin capsules, also referred as the dry filled capsules (DFC), consist of two sections (cap, body) one slippery over the other, thus completely surrounding the drug formulation.

- These capsules are filled by introducing the powder material into longer end or body of capsule & then slippering on the cap.
- hard gelatin capsule are made largely from gelatin, FD&C colorants, & some times an opacifying agent such as titanium dioxide;
- The USP permits the gelatin for this purpose to contain 0.015% sulfur dioxide to prevent decomposition during manufacture.
- It contains 12-16% water, but the water content can vary depending on the storage conditions. When humidity low, capsule become flaccid& lose their shape.
- Storage in high temperature areas also can affect the quality of hard gelatin capsule.

MANUFACTURE OF HARD GELATIN CAPSULE:

Manufacturers

Empty hard gelatin capsules are manufactured on COLTON machines, which were invented about 50 years ago. It has estimated that there are about 340 such machines worldwide; however, approximately 90% of them are owned by the three principle producers of capsules.
They are-
-Elanco qualicaps (a division of elililly&co)
-Capsugel (a division of Warner-Lambert co)
-R.P. sacher hard capsule (which has since ceased production of hard shell capsule in the US)
These companies supply empty capsule to manufacture at large who fill them with their own products.
-recently, Smith Kline &French laboratories had manufactured capsules for their own in house capsule filling or that of their subsidiaries.
-they produce about 2.5 billion capsules annually on 12 machines operating on a 24 hr , 7 day-a-week schedule.

SHELL COMPOSITION

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

Hard gelatin capsules are made largely from gelatin, FD&C colorants and some times an opacifying agents are used

a. GELATIN

It is prepared by the hydrolysis of collagen obtained from animal connective tissue, bone, skin, & sinew. This long polypeptide chain yields on hydrolysis 18 amino acids, the most prevalent which are glycine, alanine.

Gelatin can vary in its chemical and physical properties, depending on the source of collagen and the manner of extraction.

Two types of gelatin

- Type A; derived mainly from pork skin by acid processing
- Type B; obtained from bones, animal skin by alkaline hydrolysis.

These 2 types can be differentiated by their isoelectric points (4.8-5.0 for type B, 7.0-9.0 for type A) & by their viscosity building& film forming characteristics.

-either type of gelatin may be used, but combinations of pork skin& bone gelatin are often used to optimize shell characteristics.

-bone gelatin contributes firmness.

-pork skin gelatin contributes plasticity& clarity.

b. COLORANTS;

Various soluble synthetic dyes ('coal tar dyes') &in soluble pigments are used.

-colorants not only play a role in identifying the product, but may also play role in improving patient compliance.

-color of drug product may be select in consideration of disease state for which it is intended.

-buckalew & coffield found in panel test that four colors were significantly associated with certain treatment groups. (White-analgesia; lavender-hallucinogenic effects: orange-stimulants: yellow-anti depressants)

c. OPAQUING AGENT

Titanium dioxide may be included to render the shell opaque.

Opaque capsules may be employed to provide protection against light or to conceal the contents.

d. PRESERVATIVES;

Include parabens or sulfur dioxide in the form of sodium metabisulfate or sodium sulfate.

e. WATER

Finished capsule contain an equilibrium moisture content of 12-16%

Moisture content low – brittle

High-soft/sticky

SHELL MANUFACTURE

The below steps are involved.

These are

- Dipping
- Rotation
- Drying

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

- Stripping
- Trimming
- Joining

a. DIPPING

Pairs of Stain less steel pins are dipped into the dipping solution to form the caps & bodies simultaneously

The pins are lubricated with a proprietary mold release agent

The pins are at ambient temperature (22) where as dipping solution is maintained at (50^0 temperature, jacketed dipping pan

The length of time to cast the film has been reported to be about 12 second with larger cap require lower time

b. ROTATION

After dipping the pins are with drawn from the dipping solution as this is done, they are elevated & rotated 2 1/2 times until they are facing upward

Rotation helps to distribute the gelatin over the pins uniformly and avoid formation of a bead at the capsule ends. After rotation, they are given a blast of cool air to set the film

c.DRYING

the racks of film coated pins then passes into a series of 4 drying ovens. Drying is done mainly by dehumidification by passing large volume of dry air over the pins

Only temp elevation of few degrees is permissible to prevent film melting

Drying also must not be too raped to prevent case hardening

Over drying also be avoided this could cause films to split on the pins due to shrinkage or at least make them too brittle for the later trimming operation

Under drying will leave the films too pliable or sticky for subsequent operation

d. STRIPPING

A series of bronze jaws (softer than stainless steel) strip the cap and body portion of capsules from the pins.

e. TRIMMING

The stripped cap and body portion are delivered to collect, in which they are firmly held.

As the collets rotate, knives are brought against the shells to trim them to the length required.

f. JOINING

The cap & body portion are aligned concentrically in channels and the two portions are slowly pushed together.

This entire cycle takes about 45 minutes

g. SORTING

The moisture content of the capsules as they are ejected from the machine will be range 15 to 18 % w/w

Additional adjustment of moisture content toward the final desired specification will occur during sorting step

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

During sorting the capsules passing on a lighted moving conveyer are examined visually by inspectors. Any defective capsules spotted are removed manually

h. PRINTING

In general capsules are printed prior to filling .Empty capsules can be handled faster than filled capsule & should there be any loss or damage to the capsule during printing, no active ingredients would be involved. Generally, printing is done on offset rotary presses having through put capabilities as high as ¾ million capsules per hour.

Available equipment can print either axially along the length of capsule or radially around the circumference of capsule

SIZE&SHAPE

Capsules are supply in variety of sizes .For human use, Empty capsules are manufactured in 8 sizes ranging from 000(largest) to 5(Smallest)

The density and compressibility of the fill will largely determine to what extent if may be packet into capsule shell

CAPSULE CAPACITES		
SIZE	**VOLUME**	**FILL Wt AT POWDER DENSITY0.88/cm^3**
000	1.37	1.096
00	0.95	0.760
0	0.68	0.544
1	0.50	0.400
2	0.37	0.296
3	0.30	0.240
4	0.21	0.168
5	0.13	0.104

- As practical matter, the largest size normally acceptable to patients is no- 0.
- Largest sizes are available for veterinary use no-10, 11, and 12
- Have approximate capacities of 30,15,7.5 grams respectively
- Although the standard shape of capsules is the traditional, symmetrical bullet shape, some manufactures have employed distinctive proprietary shapes; Lilly's pulvule is designed with characteristic body section that tapers to bluntly pointed end.
- Smith Kline & French's spansule capsule formerly exhibited a characteristic taper at both ends (cap & body)

SEALING & SELF LOCKING CLOSURES:

- Positive closures help prevent the inadvertent separation of capsules during shipping and handling
- Such safe guards have become particularly important with the advent of high speed filling and packing equipment

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

- The problem is particularly acute in the filling of non-compacted, beadlet formulation (E.g.: sustained –release products)

- Hard gelatin capsules may be made self-locking by forming indentations or grooves inside of cap & body portions.
- Thus when they are fully engaged, a positive inter lock is created between the cap & body portions.
- Indentations formed farther down on the cap provide a prelock, preventing accidental separation of the empty capsules
  Eg:-posilok (elanco qualicaps)
  Coni-snap (capsuegel)
  Starlok (R.P.Scherer hard capsule)

The rim of body portions of coni-snap capsules is tapped to help guide the guide the cap on to the body

1. Tapered rim prevent faulty joins
2. These indications prevent the preclosed capsule from opening too early.
3. These grooves lock the two halves together after filling

- Self locking capsules are also a deterrent to tampering. More recently, capsugel introduced the coni-snap supro
- Similar to coni-snap in regard to locking mechanism and tapered body edge ,this capsule differs in that it is short ,and squat and the cap over laps the body to such a degree that it is very difficult to grasp the body segment. Once fully engaged it is quite difficult to open these capsules with out causing visible damage, thus increasing the security of the contents.
- Hard gelatin capsules may also to be sealed by the technique of banding, where in a film of gelatin; often distinctively colored is layered down around the seam of the cap & body.
- Parke –Davis's Kapseal is a typical example.
- Spot welding is another means of locking the cap & body sections together, in the thermal method ,two hot metal jaws are brought into contact with the area where the caps over laps the filled body.

HARD GELATIN CAPSULE FILING MACHINE

Several types of capsule filling machines are in use in the pharmaceutical industry. All have in common the following operations.

These are

- Rectification
- separation of caps from bodies
- Dosing of fill material
- Replacement caps & ejection of filled capsules. .

1. RECTIFICATION:

The empty capsules are oriented so that all point the same direction, body end down ward. In general, the capsule pass one at a time through a channel just wide enough to provide a frictional grip at the cap end. A specially designed blade pushes against the capsule and causes it to rotate about its cap end as a fulcrum. After two pushes (one horizontally and one vertically

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., 531162

down ward). The capsules will always be aligned body end down ward regardless of which end entered the channel first.

2. SEPERATION OF CAPS FROM BODIES

Like Rectification, this process depends on the difference in diameters between cap and body portions. Here the rectified capsules are delivered body end first into the upper portion of split bushing or split filling rings.
A Vacuum applied from below pulls the bodies down into the lower portion of the split bushing. The diameter of the caps is too large to allow them to follow the bodies into the lower bushing portion. The split bushings are then separated to expose the bodies for filling.

3. DOSING OF FILL MATERIAL

Various methods are employed as described below

4. REPLACEMENT OF CAPS & EJECTION OF FILLED CAPSULES

The cap & body bushing portion are rejoined pins are used to push the filled bodies up into the

Make/Model Principle	Dosing Principle (Cap/Hr)	Motion	Rated Capacity
Hofliger-karg			
GKF 400		I	24,000
GKF 1200		I	48,000
GKF 3000		I	1, 80,000
ZANASI	piston-tamp (Dosing disk)		4000
Lz-64	Piston-tamp (doster)	I	60,000
Az-60	Piston-tamp (dostor)	I	70,000-1, 50,000
Z-5000		c	36,000
MG-2	Vibratory fill	c	60,000
G-36	Piston-tamp (doster)	c	1, 00,000
G-38	Piston-tamp	c	1, 65,000
G-100		c	30,000
Osaka's		I	18,000
R-180		I	
Dott bonapace&Co Harro hofliger			

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

(Doster)			

caps for closure & to push the closed capsules out of the bushing.
Compressed air also may be used to eject the capsules
These machines may be either semi automatic or fully automatic. Semi automatic machine such as the elanco or Parke Davis no: 8 machines require an operator to be in attendance at all times Depending on the skill of the operator, the formulation and the size capsules being filled, these machines are capable filling as many as 1, 20,000 to 1, 60,000 capsules in an 8 hour shift
This out put contrasts sharply with the out put of fully automatic machines. Some models of which are rated to fill that many capsules in 1 hour.

Some representative automatic capsules filling machines are listed as

A) These machines may be classified as either intermittent or continuous-motion machines.
B) Intermittent machines exhibit an interrupted filling sequence, as indexing turn tables must stop at various stations to execute the basic operations described above.
C) Continuous machines execute these functions in a continuous cycle.
D) The elimination of the need to decelerate & accelerate from one station to the next makes grater machines speed possible with continuous-motion machines.
E) Capsule filling equipment has been the subject of several reviews & 4 main dosing methods may be identified.

AUGAR FILL PRINCIPLE:

Until, about 20 years ago, nearly all capsules were filled by means of semi automatic equipment where in the powder is driven into the capsule bodies by means of rotating auger.

→ This type of filling machine is exemplified by the elanco no 8 & capsugel type 8 machines.
→ The empty capsule bodies are held in a filling ring which rotates on a turn table under the powder hopper. The fill of the capsule is primarily volumetric. Because the auger mounted in the hopper rotates at a constant rate, the delivery of powder to the capsule tends to be at a constant rate.
→ Consequently, the major control over fill wt is the rate of rotation of the filling ring under the hopper.
→ Faster rates produce lighter fill wt because bodies have a shorter dwell time under the hopper.
→ Itoetal compared an experimental flat-blade auger with an original screw auger &found that the screw auger provided grater fill wt (30-60% grater for a test lactose formulation.)And smaller coefficient of wt variation (up to 50% smaller at the two fastest ring speeds.)
→ The formulation requirement of this type of machine has been the subject only of a limited no of reports. In general, the flow properties of the powder blend should be adequate to assure a uniform flow rate from the hopper. Glidents may be helpful. Glident effect of colloidal silica using a capsugel type filling machine.
→ They found that there was optimum con for min wt variation (0.5% for lactose, 1% corn starch capsules).
→ Presence 3% talc reduces wt variation compared to 0% talc in a multivariate study involving several fillers.
→ These investigators analyzed their data by multiple stepwise regression analysis& concluded that the mean fill wt was dependent on machine speed, capsule size, & on the formulation specific vol in that order.
→ Wt variation was found to be a function of machine speed, specific vol, flow ability & the presence of glident, but independent of capsule size.

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

→ Lubricants, such as magnesium seriate & stearic acid, are also required. These facilitate the passage of filling ring under the foot of the powder hopper &help prevent the adherence of certain materials to the auger.

VACCUM FILL PRINCIPLE:

- The vacuum fill principle is represented by the Perry accofil machine. This dosing unit is a cylinder containing a porous piston (usually, porous plastic of 1-3 micrometer pore size).
- The position of the piston in the cylinder can adjusted to define a vol which provide the desired dosage of the formulation. The cylinder is dipped into the powder & vacuum is applied through the piston, thus causing powder to fill the cylinder up to the piston...
- The other end of the powder plug thus formed is scraped off level with the edge of the cylinder. The cylinder is than moved to the open capsule body &plug of powder is ejected from the cylinder into the capsule by means of pressurized air.
- A review of the literature reveals no reports concerning the formulation requirements of this machine. However, it has been noted that the method does not rely on any cohesiveness of the formulation & thus may be suited to powders difficult to fill by other methods.
- It would appear that there would be few, if any, lubrication requirement,& there appear to be little opportunity for significant consolidation of bulky materials in the filling process it self
- Originally developed in association with Eli Lilly& company and introduced in 1972. The machine has since been turned over exclusively to Perry industries. This machine is no longer actively marketed.

VIBRATORY FILL PRINCIPLE

The Osaka machine, utilize a vibratory feed mechanism. In this machine, the capsule body passes under a feed frame which holds the powder in the filling section. In the powder, a perforated resin plate is positioned which is connected to a vibrator.
The powder bed tends to be fluidized by the vibration of the plate &this assist the powder to flow into the bodies through holes in the resin plate.

→ The fill wt is controlled by the vibrators & by setting the position of the body under the feed frame.

→ Much like the fill mechanism of tablet press, there is over fill &then adjustment of with scrape-off of the excess material as the capsule bodies pass under the feed frame. The capsule bodies are supported on pins in holes bored through disk plate. While they pass under the feed area, the pins may be set to drop the bodies to below the level of the disk, there by causing over fill.

→ However, before their passage is completed under the feed frame, the capsules are eventually pushed up so that their upper edges become level with the surface of the disk plate. When this occurs, the excess powder is forced out & eventually scraped off by the trailing edge of the feed frame

→ This process affords some light compression of the powder against the resin plates & offers the opportunity to modify the fill weight.

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., 531162

→ Weight variation has been related to the formulation flow properties. Minimum orifice diameter is a better analogy of the flowing of powder into capsule bodies than is the static angle of repose.

→ Typical state lubricants may be indicated to prevent the binding of push rods & guides.

PISTON-TAMP PRINCIPLE

These machines are fully automatic fillers in which pistons fully automatic fillers in which pistons tamp the individual doses of powder into plugs, which often resemble soft tablets in consistency, & eject the plugs into the empty capsule bodies. There are two types of piston tamp fillers.

- ✓ Dosing disk machines
- ✓ Doster machines

DOSING DISK MACHINES

This type of machine is exemplified by the hofliger –karg GKF models & Harro – Hofliger KFM models. The dosing disk which forms the base of the dosing or filling chamber has a no of holes bored through it.

A solid brass "Stop" plate slides along the bottom of the dosing disk to close off these holes, thus forming openings similar to the die cavities of tablet press. .

The powder is maintained at a relatively constant level over the dosing disk .five sets of pistons (Hofliger –karge machines) compress the powder into the cavities to form plugs.

The cavities are indexed under each of the five sets of pistons so that each plugs is compressed five times per cycle .After the five tamps, any excess powder is scrapped off as the dosing disk indexes to position the plugs over empty capsule bodies, where they are ejected by transfer pistons the dose is controlled by the thickness of the dosing disk (i.e. cavity depth) the powder depth & tampering pressure

The flow of powder from the hopper to disk is anger assisted .A capacitance probe senses the powder level & activates an auger feed if the level falls to below the present level. The powder is distributed over the dosing disk by centrifugal action of the indexing rotation of the disk. Baffles are provided to help maintain a uniform powder level. How ever working with Holliger-kerg model 330, shah et al. noted that ever a uniform powder bed height was not maintained at the first tamping station because of it's nearness to the scrape off device

Kurihara & Ichikawa reported that variation in fill weight was closely report to the angle of repose of the formulation ;hoe ever a minimum point appeared in the plots of the angle of repose v/s coefficient of variation of filling weight .Apparently, at higher angle of repose the powder did not have sufficient mobility to distribute well under the acceleration of the intermittent indexing motion A lower angle of repose ;the powder was apparently too fluid to maintain a uniform bed .How ever , these investigators did not appear to make use of powder compression through tamping and this complicates the inter pretation of their results.

These machine generally require that formulation be adequately lubricated for efficient plug ejection, to prevent filing on pistons and to reduce friction b/w any sliding components with which powder may come into contact

MACHINE	CAPACITY
Lilly/parke-davis	2,00,000capsulesdaily
Tarmatic 2000/15	40,000
2000/30	80,000

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

2000/60	1, 60,000 cap/hr
Hofliger&karg	
GKF-303	
Gkf-602	
Gkf-1500	No represent the approximate
Gkf-2500	Out put of filled cap/min
Macofar	
Mt-12	5000
Mt-13/1	10000
Mt-13/2	35000 cap/hr.
Mg2	
G 36/4	150
G 36/2	300
G 36	600
G 37N	1600
G 38	1000 cap/mn
Osaka	
R-180	70,000 -1, 65,000 cap/hr
Perry	60000 cap/hr
Zanasi	
lz-64	4000
Az-20	9000-20,000
Bz-40	30,000
Bz-12	60,000
Bz-110	1, 10,000
Bz-150	1, 50,000
Z-5000R1	70,000
Z-5000R2	110000
Z-5000R3	150000 cap/hr

Some degree of compressibility is important, as coherent plugs appear to be desirable for clean, efficient transfer at ejection. However, there may be less dependence on formulation cohesiveness than is true with dostar machines

DOSTOR MACHINES:

The dostor machines are exemplified by the ZANASI, MG2, DOTT, BONAPACE&MACOFAC machines.

The dostor consist of cylindrical dosing tube fitted with a movable piston. The end of the tube is open & position of the position is preset to particular height to define a vol that would contain the desired dose of powder. In operation, the dostor is plunged down into a powder bed maintained at a constant preset level by agitators & scrapers. The powder bed height is generally grater than the piston height. Powder enters the open end &is slightly compressed against the piston (pre compression). The piston then gives a tamping blow, thus forming the powder into a

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

plug. The dostor, bearing the plug, is with drawn from the powder hopper & is moved over to the empty capsule body, where the piston is pushed down ward to eject the plug. In certain machines, such as the macofar machines, the body bushing is rotated into position under the dostor to receive the ejected plug.

→ The primary control over fill weight is the initial piston height in the dosing tube.
→ The secondary control of wt is the height of the powder bed into which the dostor dips.

In one of the earliest reports evaluating the zanasi machine, stoyle suggests that formulations should have the following characteristics for successful filling

1. Fluidity is important for powder feed from the reservoir to the dipping bed & also permits efficient closing in of the hole left by the dostor.
2. A degree of compressibility is important to prevent loss of material from the end of plug during transport to capsule shell.
3. Lubricity is needed to permit easy & efficient ejection of the plug.
4. It was suggested that formulations have a moderate bulk density.

Low bulk-density materials or those that contain entrapped air will not consolidate well & capping similar what occurs in tableting may result.

DESIGN OF HARD GELATIN CAPSULE FORMULATIONS FOR POWDER FILL

Like any dosage form, the capsule can be viewed as a drug delivery system, since the choice of excipients and the principles involved in the design of the dosage form can affect the rate& amount of drug delivered to the site of action.

The dosage form also must be design to meet a no of other criteria. These include stability manufacturability and patient acceptability. Both the shell & its content must exhibit physical &chemical stability not only must the drug substance be stable but the rate &extent of drug release must be stable for an extended period of time.

The formulation also found should allow for efficient, cost effective production of the required batch sizes & provide for accuracy & uniformity of drug content from on capable to the next with in acceptable limits.

Patient's acceptability is also an important design criterion as this encourages patent compliance with the prescribed dosing.

The dosage form should be an attractive appearance, including color, to be of a size easily swallowed, and not have &unpleasant odor or taste.

Capsule sizes that are difficult to swallow should be avoided.

When immersed in a dissolution fluid at 37°c.

Hard gelatin capsule can be seen to rapture first at the shoulders of the cap & body where the gelatin shell is thinnest as the dissolution fluid penetrates the capsule contents the powder mass begins to disintegrate & deagregate from the ends to exposé drug particles for dissolution.

It is apparent that the efficiency with which the drug will be released will depend on the wettability of the powder mass, how rapidly the dissolution fluid penetrates the powder the rate of disintegration & deagregation of the contents &the nature of the primary drug particles

ACTIVE INGREDIENTS:

The dose of the drug & its solubility are important consideration in the design of the formulation. The amount & type of active ingredients influences capsule size & the nature and amount of excipients to be used in the formulation.

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

Large-dose drugs that must be granulated to produce tablets may be more easily direct-filled into hard capsules with proper choice of excipients.

The dissolution of the drug in GI fluids must occur before absorption can occur, & drugs having high water solubility generally exhibit few formulation problems. For drugs of law water solubility, the absorption rate may be governed by the dissolution rate. In such cases if dissolution occurs too slowly, absorption efficiency may suffer. Drug stability in GI fluids is another concern for slowly dissolving drugs, which can affect their bioavailability.

The solubility of a drug should be considered together with its dose; even a poorly soluble drug can completely dissolve under physiological conditions if its dose is sufficiently small. Thus a dose solubility volume i.e. the vol required to dissolve the dose of the drug is a more useful tool to judge potential solubility problems than the equilibrium solubility of the drug alone. If drug as having 'high solubility' if the largest human dose is soluble in 250ml (or less) of water through out the physiological ph range of 1-8 at 37degree centigrade.

A drug is considered a 'low solubility' drug if more than 250 ml of water is required to dissolve the largest dose at any ph with in hat range at 37 degree centigrade.

Bioavailability depends not only on having the drug in solution, but also on the drug's permeability.

A jejunal permeability of at least 2-4x10^{-4} cm/s measured in human subjects by intubation is considered high. For many drugs & other substances, this permeability corresponds to a fraction absorbed of 90% or better.

BCS (bio pharmaceutics classification system) for drugs based on the above definitions of these two parameters.

BCS	**High permeability** (>90%)	**low permeability** (<90%)
High solubility (<250 ml required to Dissolve largest dose In ph 1-8 at 37 ^{o} c)	I Meta prolol tatrate Propranolol Hcl	II Piroxicam Naproxen
Low solubility (>250 ml required to Dissolve largest dose in ph 1-8 at 37^{o} c)	III Ranitidine Cimitidine	IV Furosemide Hydrochlorothiazide.

Since BCS gives formulation scientists the ability to estimate the likely contribution of dissolution rate, solubility & intestinal permeability to oral drug absorption, it provides a basis for estimating the risk of encountering bioavailability problems, because of their high solubility & permeability,

- Class I drugs are expected to exhibit few bioavailability problems
- Class II drugs are prone to exhibit dissolution rate-limited absorption.
- Class III drugs are likely to exhibit permeation rate-limited absorption.
- Class IV present serious obstacles to bioavailability & some may best be formulated in solubulized form. Such as a parentral or liquid-filled or semi solid filled soft or hard gelatin capsule formulation.

These provide important guidance in making formulation decisions.

Drugs of low water solubility are usually micron zed to increase the dissolution rate. Particle size reduction increases the surface area per unit wt of the drug. Thereby increase surface area available from which dissolution can occur.

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

Small particle size gave highest blood level.

Fincher-studied that different particle sizes fractions of sulfathiazole administered in capsules to drug & found that the smallest particle size gave the highest blood level.

Nowton & Rowley found that at equivalent bed porosities, larger particle size fractions of a poorly soluble drug, ethinamate gave better dissolution from capsules of the pure drug than smaller particle sizes.

The compaction of fine particles into capsules also reduces the bed permeability & generally retards dissolution.

FILLERS:

Fillers (diluents) are often needed to increase the bulk of formulation
E.g.; starch, lactose.

In organic salts appearing in capsule formulations include, among others, magnesium & calcium carbonate, calcium phosphate.

-modification of fillers that enhance their flow ability & compactibility is particularly advantageous in developing formulations for automatic capsule filling machines.

E.g.; pre gelatinized starch, spray processed lactose, and unmilled di calcium phosphate dehydrate.

Formulations intended to be run on dostor machines may some times benefit from the greater compactibility of micro crystalline cellulose. Particularly when the drug dosage is large. In these machines it is essential to prevent powder loss from the end of the cylinder during the transfer from the powder bed to ejection into capsule body. The failure to have a cohesive plug may also cause a 'blow off' of powder as the plug ejected into the shell.

From a drug dissolution point of view, formulators may need to consider the solubility of both the fillers &the drug.

Newton demonstrated that the dissolution of poorly soluble ethinamate from capsules improved greatly when the con of lactose in the formulation was increased to 50%.

However, with the soluble drug chloramphenicol, withey & mainville found that the inclusion of 80% lactose in the formulation severely retarded drug dissolution from capsules. There was little or no effect on dissolution when upto 50% lactose was included.

It was suggested that dissolution of lactose occurs more (readily) rapidly & that chloramphenicol dissolution is retarded because of the high con of lactose already in solution.

Intrinsic dissolution rates of selected fillers are compared in table.

- Hydrous lactose
- Purified water-21.9
- Lactose mono hydrate
- Purified water-12.4
- Di calcium phosphate, di hydrate
  - M Hcl-6.27
  - M Hcl -0.90
- A hydrous dicalcium phosphate
  - M Hcl-5.37
  - M Hcl-0.69
- Calcium sulfate dehydrate
  - M Hcl-1.15
  - M hcl-0.75

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

GLIDENTS:

Glidents are used to improve the fluidity of powders. They are fine particles that appear to coat the particles of the bulk powder & enhance fluidity by one or more of several possible mechanisms.

-Reducing roughness by filling surface irregularities
-Reducing attractive forces by physically separating the host particles
-Modifying electrostatic charges
-Acting as moisture scavengers
-Serving as ball bearing b/w host particles

Usually, there is an optimum concentration for flow, generally less than 1% & typically 0.25-0.50%. The optimum con may be related to the con just needed to coat the host particles. Exceeding this concentration usually will result in either no further improvement in flow or even a worsening of flow. Glidents include the colloidal silica's, corn strch, and talk & magnesium state.

LUBRICANTS:

Capsule formulations usually require lubricants just as do tablet formulations. Lubricants ease the ejection of plugs, reduce filming on pistons & adhesion of powder to metal surface &reduce friction b/w sliding surface in contact with powder.

E.g.; mg state, stearic acid

Increasing the con of hydrophobic lubricants such as mg state is generally understood to retard drug release by making formulations more hydrophobic.

Stewart reported that the effect of mg.sterate con on the dissolution of a model low-dose drug, riboflavin, from capsules was dependent in some manner on the type of filler.

Soluble filler exhibit the anticipated prolong times with increasing lubricant values.

However, the trends with insoluble fillers were less predictable, in some cases; insoluble fillers were only slightly affected by the con of mg state. Microcrystalline cellulose, there appeared to be an ideal con of lubricants at which the dissolution rate was maximized.

DISINTIGRANTS:

Although, tablet disintegrants are being used in some capsule formulations, until recently, the role they play in capsules has been a relatively unexplored area.

The few studies that had been reported produced only mixed results& usually involved hand filled capsules. Capsules filled by methods that afford little compression of contents are much looser than tablets & there is little structure for disintigrants to swell against to effect disintegration.

However, the advent in recent years of filling machines that actually compress, capsule contents , together with the development of newer disintigrants which have superior swelling and/or moisture absorbing properties, appear to warrant serious consideration of disintigrants in modern capsule formulations. These newer disintigrants, which have been called "super disintigrants", include croscarmellose sodium, sodium starch glycolate, explotab, crospovidone.

Disintegrate efficiency was concentration dependent. Although the typical use levels, of these disintigrants in tablets is 2-4%, the most effective disintigrants required 4-6% for post dissolution

Disintegrates are effective in promoting drug dissolution from both fillers, the effect was much less dramatic with lactose.

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

SURFACTANTS:

Surfactants may be included in capsule formulations to increase the wetting of the powder mass & enhance drug dissolution the "water proofing" effect of hydrophobic lubricants may be effect by the use of surfactants. Numerous studies have reported the beneficial effects of surfactants on disintegration & deagregation and/or drug dissolution.
Botzobkis demonstrated enhanced liquid uptake into capsule plugs due to surfactants.

The most common surfactants employed in capsule formulations are SLS & Sodiumdocusate. Levels of 0.1-0.5% are usually sufficient to over come wetting problems.

HYDROPHYLIZATION:

Another approach to improving the wettability of poorly soluble drugs is to treat the drug with a solution of hydrophilic polymer.

Lerk reported that both wettability of the powder & the rate of dissolution of hexobarbital from hard gelatin capsules could be greatly enhanced if the drug were treated with methyl cellulose or hydroxyl ethyl cellulose.
In this process, called "hydrophylization" a solution of the hydrophilic polymer was spread on to the drug in a high-shear mixer & resultant mixture dried & screened

SOFT GELATIN CAPSULES

Soft gelatin capsule is soft, globular, gelatin shell some what thicker than that of hard gelatin capsules. The gelatin is plasticized by the addition of glycerin, sorbital, or a similar polyol.

The soft gelatin shells may contain a preservative to prevent the growth of fungi. Commonly used preservatives are methyl & propyl parabens& sorbic acid. When the suspending vehicle or solvent can be oil. Soft gelatin capsules provide a convenient & highly acceptable dosage form. Large scale production methods generally are required for the preparation & filling of soft gelatin capsules.

Formally, empty soft gelatin capsules were available to the pharmacist for extemporaneous compounding of solution or suspension in oils. Commercially filled soft gelatin capsules come in as wide choice of sizes & shapes; they may be round, oval, oblong, tube, and misc.

Some sugar coated tablets are quite similar in appearance to soft gelatin capsules. The essential differences are that the soft gelatin capsule has a seam at the point of closure of the two halves, & the content can be liquid, paste or powder.

The sugar coated tab will not have a seam but will have a compressed core.

ADVANTAGES:

- ✓ Several advantages of soft gelatin capsules derive from the fact that the encapsulation process requires that the drug be liquid or at least dissolved, solubilized or suspended in a liquid vehicle.
- ✓ Since liquid fill is metered into individual capsules via-positive-displacement pump a higher degree of reproducibility is achieved than is possible with powder or granule feed in the manufacture of tablets & hard gelatin capsule products. More over, a higher degree of homogenecity is possible in liquid systems than can be achieved in powder blends. A content

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

uniformity ± 1 to 3% has been reported for soft gelatin capsules manufactured in a rotary die process.

✓ Another advantage that derives from the liquid nature of fill is rapid release of contents with potential enhanced bioavailability. The proper choice of vehicle may promote rapid dispersion of capsules contents & drug dissolution.

✓ Soft gelatin capsules are hermetically sealed as a natural consequence of the manufacturing process. Thus the dosage form is uniquely suited for liquids & volatile drugs.

✓ Many drugs subject to atmospheric oxidation may also be formulated satisfactorily in this dosage form.

✓ Water-immiscible volatile & non volatile liquids such as vegetable & aromatic oils, aromatic& aliphatic hydrocarbons, chlorinated hydrocarbons, ethers, esters, alcohols & organic acids that may be encapsulated into soft gelatin capsule.

✓ Water miscible non volatile liquids such as polyethylene glycols & non-ionic surface active agents such as poly sorbate 80 that may be encapsulated into soft gelatin capsules

DISADVANTAGES:

- ✓ One disadvantage of soft gelatin capsules is that such products must be contracted out to a limited no of firms having the necessary filling equipment & expertise.
- ✓ Materials must be shipped to the soft gelatin capsules facility and products must be shipped back to the pharmaceutical manufacturer for final packaging & distribution.
- ✓ Additional quality control measures may be required.
- ✓ There is more intimate contact b/w the shell & it's liquid contents than exists with dry filled hard gelatin capsules which increase the possibility of interactions.
- ✓ For instance, chloral hydrate formulated with an oily vehicle exerts a proteolytic effect on the gelatin shell; however, the effect is greatly reduced when the oily vehicle is replaced by polyethylene glycol.
- ✓ Liquids that can easily migrate through the capsule shell are not suitable for soft gelatin capsules. These materials include water above 5% & low molecular wt water soluble & volatile organic compounds such as alcohols, ketones, acids, amines & esters.
- ✓ Drugs can migrate from an oily vehicle into the shell, and this has been related to their water solubility and partition coefficient b/w water & non polar solvent.

COMPOSITION OF SHELL

Like hard gelatin shell, the basic component of soft gelatin shells is gelatin; however, the shell has been plasticized by the addition of glycerin, sorbital, or propylene glycol. Other components may include dyes, opacifiers, preservatives & flavors.

The ratio of dry plasticizer to dry gelatin determines the 'hardness' of the shell to 1-1.8 for very soft shell.

Up to 5% sugar may be included to give "chewable" quantity to the shell. The basic gelatin formulation from which the plasticized films are cast usually consists of 1 part gelatin, 1 part water, 0.4-0.6 part plasticizer. The residual shell moisture content of finished capsules will be in the range 6-10%.

FORMULATION OF SOFT GELATIN CAPSULES:

It involves liquid rather than powder technology. Materials are generally formulated to produce the smallest possible capsule consistent with maximum stability therapeutic effective ness & manufacture efficiency.

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

i. Soft gelatin capsules contain a single liquid, a combination of miscible liquids, a solution of a drug in a liquid, or a suspension of drug in a liquid. The liquids are limited to those which do not have an adverse effect on the gelatin walls.
ii. The ph of liquid can be b/w 2.5-7.5.
iii. Liquids with more acid ph values would tend to cause leakage by hydrolysis of the gelatin; liquids with more alkaline ph values decrease the shell solubility by tanning the gelatin.
iv. Emulsions can't be filled because inevitably, water will be released, which will affect the shell.
v. BAUER&DORTUNC have proposed non aqueous emulsions for both soft and hard gelatin capsules. In general, the emulsions were composed of a hydrophilic liquid such as poly ethylene glycol400 and a tri glyceride oil ass the lipophilic liquid.

The types of vehicle used in soft gelatin capsules fall into two main groups.

1. Water-immiscible volatile or more likely non volatile liquids such as vegetable oils, aromatic& aliphatic hydrocarbons.
2. water-miscible non-volatile liquids such as low-molecular weight polyethylene glycol that have come into use more recently because of their ability to mix readily with water& accelerate dissolution of dissolved or suspended drugs.

All liquids used for filling must flow by gravity at a temp of 35^0c or less. The sealing temp of gelatin films is 37-40^oc. liquids that can't be encapsulated include water (>5% of content) low-molecular wt alcohols such as ethyl alcohol, emulsions, & aldehydes.

Gelatin's chemical, physical& physiological properties make it an ideal substance for the capsulation of pharmaceutical products.

The gelatin is USP grade with additional specifications required by the capsule manufacturer. The additional specifications concern the bloom strength, viscosity, and iron content of gelatins used.

The BLOOM or GEL STRENGTH of gelatin is a measure of the cohesive strength of the cross-linking that occurs b/w gelatin molecules and is proportional to the molecular weight of gelatin .bloom is determined by measuring the wt in grams required to move a plastic plunger that is 0.5 inches in diameter 4 mm into 6*2/3 % gelatin gel that has been held at 10^oc for 17 hr.

Bloom may vary with the requirement of the individual custom manufacturer but ranges from 150-250 g. in general with all other factors being equal the higher the bloom strength of gelatin used, the more physically stable is the resulting capsule shell. The cost of gelatin is directly proportional to its bloom or gel strength & thus is an important factor in the cost of soft capsules. Consequently, the higher bloom gelatins are only used when necessary to improve the physical stability of the product or for large capsules, which require greater structural strength during manufacture.

Viscosity of gelatin, determined on a $6^{2/3}$ % con of gelatin in water at 60^oc is a measure of the molecular chain length & determines the manufacturing characteristics of the gelatin film.

The desired film characteristics are usually based on standard gelatin formulation which allow production at a set sealing temp & definite drying conditions & produce a firm, non tacky, nonbrittle, pharmaceutically elegant product. The viscosity for gelatin can range from 25-45 millpoise, but the individual manufacturer sets a narrow range.

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

E.g.; 38± 2 millipoises for a particular type of gelatin, to make use of standard formulation & thus conform to standard formulation & thus conform to standard production conditions

Iron is always present, in the raw gelatin, and its con usually depends on the iron content of the large quantities of water used in its manufacture.

Gelatin used in the manufacture of soft gelatin capsules should not contain more than 15ppm of this element because of its effect on food, drug & cosmetic certified dyes and its possible color relations with organic compounds.

Plasticizers used with gelatin in soft capsule manufacture are relatively few. Glycerin, sorbitol, ph grade sorbitol special & combination of these are the most prevalent. The ratio by wt of dry plasticizer to dry gelatin determine the 'hardness' of the gelatin shell assuming that there is no effect from the capsulated material.

HARDNESS	RATIO DRY GLYCERIN/GELATIN	USAGE
Hard	0.4/1	Oral, oil-based or shell Softening products & Those Destined primarily for Hot, Humid areas.
Medium	0.6/1	Oral, vaginal oil based, Water miscible based or shell Hardening products & those Destined primarily for Temperature areas
Soft	0.8/1	Tube, vaginal, water-miscible Based or shell hardening Products destined for cold, Dry areas.

Soft gelatin capsules can be used to dispense a verity of liquids & solids. In the formulation of suspensions for soft gelatin encapsulation, certain basic information must be developed to determine minimum capsule size.

One laboratory tool for this purpose is known as the 'base adsorption' of the solids to be suspended. Base adsorption is expressed as the no of grams of liquid base required to produce a capsulable mixture when mixed with 1 gram of solid. The base adsorptions of a solid is influenced by such factors as the solids particle size& shape its physical state (fibrous,

amorphous, and crystalline) it's density, its moisture content & its oleophatic or hydrophilic nature.

In the determination of base adsorption, the solid must be completely wetted by the liquid base. A particle procedure for determining base adsorption and for judging the adequate fluidity of a mixture is as follows. Weigh a definite amount (40 g is convenient) of the solid into a 150 ml tared beaker. In a separate 150 ml tared beaker, place about 100g of the liquid base, add small increments of the base to the solid and using a spatula stir the base into the solid after each addition until the solid is thoroughly wetted & uniformly coated with the base.

This should produce a mixture that has a soft ointment like consistency. Continue to add liquid and stir until the mixture flows steadily from the spatula blade when held at a 45cdegree angle above the mixture. The flow is even and continuous & not in 'globs', attention also should be given to the nature of the 'cut-off' quality of mixture.

As the mixture tends to stop flowing, proper cut-off is exhibited when the stream contracts rapidly upward toward the spatula blade rather than ''stringing out' in intermediate flow.

Base adsorption =wt of base/wt of solid

The base adsorption is used to determine the 'minimum per gram' factor (m/g) of the solid(s). The minim per gram factor is the vol in minims that is occupied by one gram(s) of the solid plus the wt of liquid base (base) required to make a capsulated mixture.

M/G = (BA+S) V /W

The base adsorption mixture is milled or homogenized & dearated & specific gravity taken. The specific gravity is wt of mixture (w) per cubic centimeter or per 16.23 minims (v).

MANUFACTURE OF SOFT GELATIN PROCESS;

Plate process:

The oldest commercial process, the plate process, a semi automatic batch process, the plate process, a semi automatic batch process, has been supplanted by more modern, continuous processes. Equipment is no longer available for plate process. In general the process involves.

-placing the upper halves of a plasticized gelatin sheet over a die plate containing numerous die pockets
-application of vacuum to draw the sheet into the die pockets
-filling the pockets with liquid or paste.
-folding the lower half of the gelatin sheet back over the filled pockets.
-inserting the 'sandwich' under a die press where the capsules are formed & cut out.

ROTARY DIE PROCESS:

The first continuous process is the rotary die process, invented in 1933, by RP Scherer. A side from it's being a continuous process; the rotary die process reduced manufacturing losses to a negligible level & content variation to the range ±1 to3%, both major problems with earlier processes.

In this process, the die cavities are machined into the outer surface of two rollers (i.e. die rolls)
-The die pockets on the left-hand roller from the left side of the capsule.

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

-The die pockets on the right- hand roller from the right side of the die capsule.
-The die pockets on the two rollers match as rollers rotate. The plasticized gelatin ribbons are continuously & simultaneously fed with the liquid or paste fill b/w the rollers of the rotary die mechanism.

Force full injection of the feed material b/w the two ribbons cause the gelatin to swell into the left & right – hand die pockets as they converge. As the die rolls rotate, the convergence of the matching die pockets seals and cut out the filled capsule.

The rotary die process makes it possible to encapsulate heavy materials such as ointments& pasts. In this manner solids can be milled with a vehicle & filled into capsule. When it is desirable to have a high degree of accuracy & a hermetically sealed product, this form of enclosure is suited ideally.

ACCOGEL PROCESS:

This continuous process for the manufacture of soft gelatin capsule filled with powders or granules was developed by lederle laboratories in 1949. In general, this is another rotary process involving-measuring roll-die roll-sealing roll

The measuring roll rotates directly over the die roll. & the pockets in the two rolls are aligned with each other. The powder or granular fill material is held in the pockets of the measuring roll under vacuum.

A plasticized sheet is drawn into the die pockets of the die roll under vacuum. As the measuring roll& die rolls rotate, the measured doses are transferred to the gelatin-lined pockets of the die roll. The continued rotation of the filled die converges with the rotating sealing roll, where a second gelatin sheet is applied to form the other half of the capsule. Pressure develops b/w the die roll & sealing roll seals & cuts out the capsule.

BUBBLE METHOD:

The globex mark 2 capsulator produces truly seamless, one piece soft gelatin capsules by a 'bubble method'. A concentric tube dispenser simultaneously discharges the molten gelatin from the outer annulus & the liquid content from the inner tube. By means of pulsating pump mechanism the liquids are discharged from the concentric tube orifice into a chilled oil column as droplet which consists of liquid medicament core with in a molten gelatin envelop. The droplets assume a spherical shape under surface tension forces and the gelatin congeals on cooling. The finished capsule must be then be degreased & dried.

EVALUATION OF CAPSULES

Weight variation (uniformity of filling weight):

In this 20 intact capsules are individually weighed and average weight is determined and wt variation of each capsule against average value is taken.

The test requirements are of met (1), if not more than two of individual differences are greater than 10% of average and if not a single capsule is greater than 25%
If more than 2 but less than 6 net weight of test deviate more than 10% but less than 25% than the test is determined for additional 40 capsules and average is calculated for 60 capsules.

The test is passed if the difference does not exceed 10% of average in not more than 6 of 60 capsules and if not a single capsule exceed a difference of 25%
-roto weight is high speed capsule filling machine and rejects the over filled and under filled capsule.
-venicap 1200 is a high speed capsule filling machine fills at a rate of 78000 capsules per hr and it also rejects over filled and under filled capsule.

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

Content uniformity:

In this 30 capsules are selected out of which 10 capsules are assayed; the requirements are met if 9 of 10 capsules are with in the potency range of 85 to 115%. The remaining 20 capsules have to be assayed.

The requirements are met if 30 capsules are with in 75-125% of specified potency range and not less than 27 of 30 are with in 85-115% range

Moisture permeation test:

The USP requires determination of the moisture permeation character sticks of single-unit & unit dose containers to ensure their suitable for packaging capsules. The degree & rate of moisture penetration is determined by packing the dosage unit together with a color – revealing desiccant pellet, exposing the packaged unit to known relative humidity over a specified time; observing the desiccant pellet for color change & comparing the pretest & post test wt f the packaged unit.

Disintegration test:

The time that it takes a capsule to disintegrate and it is considered as the first rate limiting step of bioavailability of a drug.

The device used to test disintegration uses 6 glass tubes that are 3 inches long, with a 10-mesh screen at the bottom. To test for disintegration time, one capsule is placed in simulated gastric fluid or simulated intestinal fluid, at 37+_ 2c, such that the capsules remain 2.5 cm below the surface of the liquid on their upward movement and descend not closer than 2.5 cm from the bottom of the beaker.

To be in compliance with the standards, the capsule must disintegrate and all particles must pass through 10- mesh screen in the time specified in standards

Dissolution test:

One rate of dissolution may directly relate to the efficacy of the capsule product, bioavailability differences b/w formulations.

One objective in the *in vitro* dissolution tests is to show that the release of the drug is 100% and the rate of drug release is uniform

.Dissolution testing of a tablet is done by using apparatus

Type 1 basket type dissolution apparatus

Type 2 paddle type dissolution apparatus

In dissolution testing necessary, capsules are acceptable if all of the capsules are not less than the monograph tolerance limit 0+5%. If the capsules fail first set of test, an additional 6 capsules are tested and the capsules are acceptable if the average of the 12 capsules is greater than or equal to 0 & no unit is less than 0-15%. If the capsules still fail the test, an additional 12 capsules are tested. The capsules are acceptable if the average of all 24 capsules is greater than or equal to 0 and if not more than 2 capsules.

INSPECTING, COUNTING, PACKING & STORING CAPSULES

Capsules produced on a small or large scale should be uniform in appearance. Visual or electronic inspection should be under taken to detect any flaws in the integrity & appearance of capsules.

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

Defective capsules should be rejected .in commercial manufacture, CGMP regulations require that if the no of production flaws is excessive, the cause must be investigated& documented & steps under taken to correct the problem.

In the pharmacy, capsules may be counted manually or by automated equipment. Specially designed trays are used for counting small numbers of solid dosage units. (using spatula)

With this method, the dosage units remain untouched by the pharmacist. To prevent batch-to-batch contamination, the tray must be wiped clean after each use because powder particularly from the uncoated tablets may be remaining.

In some community & hospital pharmacies small automated counting & filling machines may be used.

Computer based automated dispensing systems are also available that will fill label & check the drug using bar code or video systems.

On the industrial scale, solid dosage forms are counted by large automated pieces of equipment that count &transfer the desired no. of dosage until into bulk containers. The containers are then automatically capped, inspected visually or electronically, labeled &inspected once more some filled containers are then placed in outer packing cartons

Capsules are packaged in glass or in plastic containers, some containing pockets of a desiccant to prevent absorption of excess moisture.

The unit dose & strip packaging of solid dosage forms particularly by pharmacies that service nursing homes &hospitals provide sanitary handling of medications ease of identification & security in accountability for medication

Store- tightly capped containers in cool, dry places.

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

Oral Liquids-

Oral Liquids are homogeneous liquid preparations, usually consisting of a solution, an emulsion or a suspension of one or more medicaments in a suitable vehicle. Liquid dosage forms are either monophasic or biphasic. A monophasic liquid dosage form is one which contains only one phase. A biphasic liquid dosage form contains two phases.

Liquid preparations for oral use are either supplied in the finished form or, with the exception of Oral emulsions, may also be prepared just before issue for use by dissolving or dispersing granules or powder in the vehicle stated on the label.

The vehicle for any liquid preparation for oral use is chosen having regard to the nature of the active ingredient(s) and to provide organoleptic characteristics appropriate to the intended use of the preparation. Liquid preparations for oral use may contain suitable antimicrobial preservatives, antioxidants and other excipients such as dispersing, suspending, thickening, emulsifying, buffering, wetting, solubilizing, stabilizing, flavouring and sweetening agents and authorized colouring matter.

Classification of Liquid Orals

Liquid dosage forms are broadly classified into two groups:

a) Monophasic liquid dosage forms b) Biphasic liquid dosage forms

1.Monophasic liquids dosage forms are mixtures, elixirs, syrups, linctuses, draughts and drops etc.

2. Biphasic liquids dosage forms are suspensions and emulsions.

Advantages of Liquid Dosage Forms

i) They are the most suitable dosage form for infants, children and geriatric patients.

ii) The unpleasant taste of the drugs can be masked by adding sweetening and flavouring agents.

iii) It is attractive in appearance and gives beneficial psychological effects.

iv) The drug is rapidly available for absorption.

Disadvantages of Liquid Dosage Forms

i) The liquid dosage forms have less stability when compared to solid dosage forms.

ii) Liquids are bulky and therefore inconvenient to transport and store

iv) Accidental breakage of the container results in loss of whole dosage form.

Formulation consideration:

The common excipients used in liquid formulation are

Vehicles

Solvents: In liquid pharmaceutical formulations, vehicles are major components used as a base in which drugs and other excipients are dissolved or dispersed. They function by breaking of bond and reducing effective charge on ions thus increasing solute-solvent forces of attraction which are eventually greater than solute-solute and solvent-solvent forces of attraction. Eg: water, hydro-alcoholic liquid systems, polyhydric alcohols, acetic acid, ethyl acetate and buffers. These may be thin liquids, thick syrupy liquids, mucilage or hydrocolloid bases. The oily vehicles include vegetable oils, mineral oils, organic oily bases or emulsified bases etc.

Co-solvent: are defined as water- miscible organic solvents that are used in liquid drug formulations to increase the solubility of poorly water soluble substances or to enhance the chemical stability of a drug. Co-solvent increases the solubility of a drug. An ideal co-solvent should possess values of dielectric constant between 25 and 80. The most widely used system that will cover this range is a water/ethanol blend. It should not cause toxicity or irritancy when administrated for oral or parental use. Other co-solvents are sorbitol, glycerol, propylene glycol and syrup.

Water : They contain large number of dissolved and suspended particles as impurities like inorganic salts sodium, potassium, calcium, magnesium and iron as chlorides, sulfates and bicarbonates, organic impurities are either soluble or insoluble state. Microorganism is other impurities present in water. Drinking water contains less than 0.1 % of total solid. For the preparation in pharmaceutical formulation IP refers water as clear, odorless, colorless and neutral with slight deviation in pH due to dissolved solids and gases. Purified water IP is commonly used as vehicle or as a component of vehicle for aqueous liquid formulations but not for those intended for parenteral administration. Ethanol, frequently referred as alcohol is the most commonly used solvent in liquid pharmaceutical formulation next to water. It is generally used as hydro-alcoholic mixture to dissolve water and soluble drugs and excipients. Diluted ethanol is prepared by mixing equal volumes of ethanol IP and purified water IP is a most useful solvent in various pharmaceutical processes and formulations to dissolve poorly soluble substances Glycerol is called glycerin is a clear, colorless liquid with thick, syrupy consistency, oily to the touch, odorless, very sweet and slightly warm to taste. They are prepared by the decomposition of vegetable or animal fats or fixed oils and containing not less than 95% of absolute glycerin. It is soluble in all proportions, in water or alcohol; also soluble in a mixture of 3 parts of alcohol and 1 part of ether, but insoluble in ether, chloroform, carbon di-sulphide, benzene, benzol, and fixed or volatile oils.

(1) **Solubilizers:** To increase the solubility of the drug

pH adjustment : By addition of buffer to the formulation .buffers act by binding hydrogen formulations to control potential changes in the pH. Buffers act by binding hydrogen ions in acids and donating hydrogen ions in bases. The selection of as suitable buffer should be based

on suitability of acid-base form for use in oral liquids, stability of the drug and excipients in the buffer, and compatibility between the buffer and container. The stabilizing effect of buffers determines the potential reaction between excipients and drug. For example, buffers containing carbonate, citrate, tartarate and phosphate salts may precipitate with calcium ions by forming sparingly soluble salts. The other factors that may affect the solution pH include temperature, ionic, strength, dilution and the amount and the type of co-valents presents. For example the pH of acetate buffers is known to increase with temperature, whereas the pH of boric acid buffers decreases with temperature. It is important to know that the drug in solution may itself act as a buffer. If the drug is a weak electrolyte such as salicyclic acid or ephedrine, the addition of base or acids, respectively will create system in which the drug can act as a buffer Eg: phosphate buffers, acetate buffers, citric acid phosphate buffers etc.

Co-solvency: By addition of water miscible solvent in which drug has good solubility. The solvent known as co-solvent.

Complexation: Drug-complexing agent complexation formed when complexing agent is added to solution. It increase solubility of drug on the basis of Le Chatelier's principle or " The equilibrium law". Eg disodium EDTA, dihydroxy ethyl glycine, citric acid.

Micronization: The processes involve size reduction of drug particle 1 to 10microns either by spray drying or fluid energy mill.

Hydrotrophy : Drug dissolve in the cluster of hydrotropic agent. Also there is drug-hydrotrophy agent complexation formation to increase drug solubility.

Wetting agents and surfactants:

In pharmaceutical formulations wetting agents are routinely used, they air adsorbed at solid particles surfaces keep them away from vehicles which ultimately promotes penetration of the vehicle into pores and capillaries of the particles. For non-aqueous based formulations mineral oils are commonly we use wetting agents because hydrophobic drug particles are difficult to wet even after the removal of adsorbed air. In such cases it is necessary it is necessary to reduce the surface tension between the particles and the liquid vehicles. Surface active agents that work as wetting agents, comprises of branched hydrophobic chains with central hydrophilic groups or short hydrophobic chains with hydrophilic end groups.

For example- Sodium lauryl sulphate is one of the most commonly used surface-active agents as a wetting agent. When dissolved in water, it lowers the contact angle of water and support in spreading of water on the particles surface to remove the air layer at the surface and replace it with the liquid phase.

(2) Preservatives

Microbial contamination is major problem encountered by aqueous based liquid dosage forms. Use of preservatives becomes unavoidable in such cases to prevent the growth of micro-organisms during production and over storage time. In fact, it is desirable to develop a

Preservatives must have following criteria: Effective against broad spectrum of microorganisms. Physically, chemically and microbiologically stable for lifetime of the product. Non toxic, non sensitizing, soluble, compatible and with acceptable taste and odour.

Types of Preservatives

Acidic: phenol, benzoic acid, sorbic acid

Neutral preservatives: Chlorobutanol, benzyl alcohol

Quarternary ammonium compounds: Benzalkonium chloride

(3) Stabilizers

Oxidation, photolysis, solvolysis and dehydration are common transformations taking place in liquid dosage forms. Amongst them for oxidation and photodecomposition of drug are very common pathways of drug decomposition and are very difficult to control due to low activation energies. Trace amounts of impurities, which are invariably present in the drug or excipient intitates the oxidation reaction. Drugs exists in reduced form show increased susceptibility when it is consistently exposed an open environment. The pH of the solution may contribute in the oxidation of drugs because ionized forms of these drugs at particular pH are very prone oxidation

Physical stability: A stable formulation retains its viscosity, color, calarity, taste and odour throughout its shelf life Color can be measured spectrophotometrically. Clarity can be determined by measurement of its turbidity or light scattering equipment. Viscosity can be measured by use of viscometers. Taste and odour can be determined either by pharmaceutical investigator or by a panel of unbiased, taste sensitive individuals.

Chemical stability of the formulation is affected by pH, temperature, Ionic Strength, Solvent effects, Light, Oxygen. Instability can be prevented by use of: Buffering agents, Antioxidants, Proper packaging (eg: use of amber bottle for light sensitive products)

Antioxidants act as chain terminators where it reacts with free radicals in solution to stop the free-radical propagation cycle. A combination of chelating agents with antioxidants is often used to exert synergistic effect. This is because many of these agents act at differing steps in the oxidative process. Oxidation of formulation component leads to products with an unpleasant odor taste appearance, ppt, discoloration or even a slight loss of activity. Some substances prone to oxidation include unsaturated oils/fats, compounds with aldehyde or phenolic groups, colors, flavors, sweeteners, plastics and rubbers, the latter being used in containers for products. Eg: acetone sodium bisulfite, acetylcysteine, ascorbic acid, thiourea.

Emulsifying agents which prevent coalescence of the dispersed globules. Forms barriers at interface, and reduce interfacial tension Eg sodium lauryl sulphat, cetrimide, macrogols

Antifoaming agents: the formation of foams during manufacturing processes or when re constituting the liquid dosage forms can be undesirable and disruptive. Antifoaming agents are

tension and cohesive binding of the liquid phase. Eg: Simethicone, organic phosphates, alcohols, paraffin oils etc.

Suspending and Viscosity Enhancing Agents: The selection of an appropriate suspending agent is one of the most crucial factors in formulating a pharmaceutical suspension. Suspending agents impart viscosity and thus regard particle settling. Other factors considered in the selection of the appropriate suspending and viscosity enhancing agent include desired reheological property supendability in the system, chemical compatibility with other excipients, pH stability, hydration time, reproducibility, and the cost. Eg: clays, natural gums, synthetic gums In many formulations these excipients are employed in combination for enhanced effects.

Humectants: are hygroscopic substances that help to retard evaporation of aqueous vehicles from dosage forms. These excipients are used at 5% strength in aqueous suspension and emulsion for external application. They are also used to prevent drying of the product after application to the skin as well as prevent drying of product from the container upon opening. It also helps to prevent cap-locking caused by condensation onto neck of container-closure at first opening Eg propylene glycol, glycerol, polyethylene glycol.

Flocculating agents: prevent caking. Addition of an electrolyte reduces the magnitude of zeta potential of dispensed particles Eg: Starch, sodium alginate.

Chelating agents: are substances that form complexes with metal ion in activating their catalytic activity in oxidation of medicaments. These agents are capable of forming complexes with the drug involving more than one bond it's a complex compound contains one or more ring in its structure. Protect drug from catalysts that accelerate the oxidative reaction. Eg Disoium EDTA, dihydroxy ethyl glycine, citric acid and tartaric acid

(4) Organoleptic properties

Flavouring agents: are agent in liquid pharmaceutical products is added to the solvent or vehicle component of the formulation in which it is most soluble or miscible. That is water soluble flavors are added to the aqueous component of a formulation and poorly water soluble flavors are added to the alcoholic or other non-aqueous solvent component of the formulation. In a hydro-alcoholic or other multi-solvent system, care must be exercised to maintain the flavorants in solution. This is accomplished by maintaining a sufficient level of the flavorants solvent.

Sweetening agents: Sucrose enhances viscosity of liquids and also gives a pleasant texture in the mouth. The term sugar free solution include sweetening agents such as sorbitol, mannitol, saccharin and aspartame as alternative to sugar such as sucrose, fructose. In addition to sucrose, a number of artificial sweetening agents have been used in food and pharmaceuticals over the years. Some of these including asparatame, saccharin, and cyclamate have faced challenges over the safety by the FDA and restriction to their use and sale in fact in 1969, FDA banned cyclamates from use in US. Sucralose is most popular due to its excellent sweetness, non-

Coloring agent: A distinction should be made between agents that have inherent color and those that are employed as colorants. Colors used in liquid dosage form must be certified by FDA as per D&C Act 1940. Certain agents- sulphur (yellow), riboflavin (yellow), cupric sulfate (blue), ferrous sulfate (bluish green) cyanocobalamin (red) and red mercuric iodide (vivid red) have inherent color and not thought of as pharmaceutical colorants in the usual sense of the term. Although most pharmaceutical colorants in use today are synthetic, a few are obtained from natural mineral and plant sources. For example, red ferric oxide is mixed in small proportions with zinc oxide powder to give calamine its characteristic pink color, which is intended to match the skin tone upon application. The age of the intended patient should also be considered in the selection of the flavorings agent, because certain age groups seem to prefer certain flavors. Children prefer sweet candy-like preparations with fruity flavors, but adults seem to prefer less sweet preparation with a tart rather than a fruit flavor.

Manufacturing Consideration-

The manufacturing process for liquid preparations for oral use should meet the requirements of Good Manufacturing Practice (GMP). The following information is intended to provide broad guidelines concerning the critical steps to be followed during production of liquid preparations for oral use.

In the manufacture of liquid preparations for oral use, measures are taken to:

- ensure that all ingredients are of appropriate quality
- minimize the risk of microbial contamination
- minimize the risk of cross-contamination

Steps of Liquids Manufacturing Process

1. Planning of Material Requirements: Research and development of protocols and selection of materials; acquisition and analysis of raw materials; physical plant design, building, and installation; equipment selection and acquisition; personnel selection and initial training; and monitoring information system.

Raw Materials : Incoming raw materials should be tested as per specifications that is identity, purity, uniformity and microbial contamination .

Equipments : The following types of equipments may be used in the manufacture of liquid formulations:

1. Mixing tanks (SS 316 Stainless Steel) equipped with an agitator.

2. Measuring devices for large and small amount of solids and liquids. 3. Afiltration system e.g. filter press

Cleaning of equipments

- All equipments must be thoroughly cleaned and sanitized before use.
- Disinfectants used: Dilute solutions of H2O2, phenol derivatives.

2. Liquid Preparation: Research and development of protocols concerning liquid compounding; scale - up of the bulk product compounding; physical plant control and maintenance; equipment maintenance and renovation; continuous training of personnel and personnel compensation plan; and supervision of system reports.

3. Filling and Packing: Research and development of protocols concerning filling and packing; scale-up of the finished drug product filling and packing; physical plant control and maintenance; equipment maintenance and renovation; continuous training of personnel and personnel compensation plan; and supervision of system reports.

Filling and Packing

Gravimetric	Volumetric	Constant Level
Containers are filled with liquids to a given weight.	Containers are filled with liquids to a given volume.	Filled amount is verified by adjusting the height to which the container is to be filled.
Usually limited to large container filling or highly viscous products.	Filled amount is measured by the stroke of the piston and cylinder assembly.	Variation in container dimension may result in variations in the net fill per unit.
Cannot be used in high speed, automatic equipment	Problems may arise when containers used are not dimensionally uniform.	

Techniques of Filling

Vacuum filling	Gravity vacuum filling	Pressure vacuum filling
Vacuum developed within the container causes liquid to flow from tank to container.	Bulk liquid tank is placed above filling stem so that liquid flows to the container due to force of gravity.	Pressure applied to bulk liquid tank and vacuum developed in the container results in pressure difference so that liquid flows to the container.

4. Sales of Drug Products: Research and development of protocols concerning product storage; distribution process; continuous training of personnel and personnel compensation plan; and supervision of system reports.

5. Vendor Handling: Research and development protocols concerning precautions to maintain product stability; control of vendor stock; and sales system reports.

6. Customer Service: Research and development of protocols concerning home storage and handling to maintain product stability; relations with health insurance companies and health care professionals; educational materials for patient counseling; and customer service system reports.

Elixirs

Elixirs are clear, flavoured, sweetened, hydroalcoholic preparations for oral administration. They are more stable than mixtures. Elixirs are classified into two classes.

a) Non medicated elixirs: These elixirs do not contain any medicament but contain some aromatic or pleasantly flavoured substances. These are used as solvents for other liquid preparations.

b) Medicated elixirs: These elixirs contain some medicinal substance along with other ingredients.

Syrups

Syrups are liquid oral preparations in which the vehicle is a concentrated solution of sucrose or other sugars in water. The concentration of sugar in syrup is 66.7 % W/W. Syrups are further classified into 2 classes.

a) Simple syrups: The simple syrups do not contain any medicament, but contains some pleasantly flavoured substances. These syrups are used as a medium for other liquid preparations.

b) Medicated syrups: These syrups contain some medicinal substance along with other ingredients.

Advantages of syrups

- Syrups prevent oxidation and decomposition of drugs.
- Syrups are sweet in taste and therefore bitter taste of drugs can be reduced.

Disadvantages of syrups

- Syrups are not preferred for diabetic patients.
- On continuous take syrup promote dental decay.

Suspensions

Suspensions are the biphasic liquid dosage form of medicament in which the finely divided solid particles are suspended or dispersed in a liquid or semisolid vehicle with the help of suspending agent.The solid particle is the 'dispersed phase' or 'discontinuous phase' whereas

The solid particles act as disperse phase whereas liquid acts as a continuous phase. The medicaments that are insoluble or poorly soluble are formulated as suspensions. Suspensions contain a suspending agent. A suspending agent is a substance that is added to the preparation to suspend the insoluble particles in the preparation. It can be classified into four groups.

a) Oral suspensions: These suspensions are to be consumed by oral route.

b) Parenteral suspensions: The suspensions which are administered by parenteral route are called parenteral suspensions.

c) Ophthalmic suspensions: These are used for instilling into the eye.

d) Suspensions for external use: These are used for external applications.

Advantages:

- Can improve chemical stability of certain drugs.
- Higher rate of bioavailability, as order of bioavailability is: Solution>Suspension>Capsules>Compressed tablets

Disadvantages:

- Physical stability, sedimentation and compaction.
- Bulky, handling require care.
- Uniform drug delivery cannot be achieved sometimes.

Ideal properties of suspensions:

1. The dispersed particles should not settle readily and the settled particles should redisperse immediately on shaking.

2. The particles shouldn't form a cake on settling.

3. The viscosity should be such that the preparation can be easily poured.

4. It should be chemically stable.

5. Suspensions for internal use must be palatable and suspension for external use must be free from gritty particles.

Types of suspensions:

Depending upon particle nature/dispersed particle nature the suspensions are of two types:

1. Flocculated suspensions

2. Non-flocculated/deflocculated suspensions.

Flocculated suspensions:

Suspension in which particles are weakly bonded, settle rapidly, don't form a cake and are easily resuspended with a minimum of agitation.

Suspension in which particles settle slowly and eventually form a sediment in which aggregation occurs with the resultant formation of a hard cake which is difficult to resuspend.

Stability of suspensions:

A stable suspension can be redispersed homogenously throughout its shelf life.The more stable pharmaceutical suspensions are flocculated i.e.,the suspended particles are bonded together physically to form a loose cake.

Packing of Suspensions

Suspensions can be packed in narrow mouth screw caped colour less plain bottle. Suspensions that are very thick require a container with wide mouth. Suspensions should be stored in a cool place.

Evaluation of suspension stability:

The following are commonly used for evaluating the physical stability of suspensions:

1.Sedimentation method.

2.Rheological method.

3.Electrokinetic method.

4.Micromeritic method.

1.Sedimentation method:

It is determined by keeping a measured volume of suspension in a graduated cylinder in an undisturbed position for a definite period of time, the ultimate volume (V0) and the initial volume (Vu) of the sediment is to be noted. Sedimentation volume is a ratio of the ultimate volume of sediment (V0) to the original volume of the sediment (VU) before settling. Sedimentation volume F=V0/VU

2.Rheological method:

- It provides information about settling behaviour.
- The arrangement of the vehicle and the particle structural features.
- Brookfield viscometer is used to study the viscosity of the suspension. If viscosity of the suspension increases, the stability of the suspension increases.

3.Electrokinetic method:

The determination of surface electric charge or zeta potential is helpful to find out the stability of suspension. Zeta potential can be calculated from the migration of particle measured by the electrophoretic method.

4.Micromeritic method:

The stability of suspension depends on the particle size of the disperse phase. The size of the

So, any change in particle size distribution with reference to time gives a stable suspension. The particle size can be studied by microscopy or coulter countered method.

Emulsions

An emulsion is defined as a dibasic or heterogenous liquid preparation immiscible liquids which is dispersed as a minute globules in another liquid by adding emulsifying agent.

Medicines having an unpleasant taste and order can be made more palatable for oral administration in the form of an emulsion. Emulsions protect drugs against oxidation or hydrolysis.

• Emulsions are less stable.

• They are susceptible to microbial growth.

Classification of emulsions:

Emulsions can be classified into the following types:

1. Oil in water (o/w) type of emulsion.

2. Water in oil (w/o) type of emulsion.

3. Microemulsions

4. Multiple/double emulsion.

Advantages:

- Mask the unpleasant taste.
- Sustained release medication.
- Inert and chemically non-reactive.
- Reasonably odourless & cost effective.

Disadvantages:

- Packing, handling & storage is difficult.
- Thermodynamically unstable & have short shelf life.
- Leads to creaming & cracking.
- Leads to phase inversion.

Packing of Emulsions

Emulsions can be packed in narrow mouth screw caped colourless plain bottle. Emulsions that are very thick require a container with wide mouth. Emulsions should be stored in a cool place.

a) Oil in water type: This type of emulsion is the one in which the oil is dispersed in the water

b) Water in oil type: This type of emulsion is the one in which the water is dispersed in the oil. Emulsions may be liquid or semi-solid. Liquid emulsions can be classified as i) emulsions

i) Emulsions for oral administration

Some medicaments are unpleasant in taste. For example fish liver oil, we can mask this unpleasant taste by converting it into an emulsion and can be given orally.

ii) Emulsions for external use

The external preparation of emulsion consists of three classes. Applications, lotions and liniments, these emulsions can be either oil in water or water in oil.

iii) Emulsions for parenteral use

Some patients are unable to ingest food in the normal way. We can administer oil in water emulsions of nutritive oils and fats to these patients. Vitamin K that prevents blood clotting is injected in this form.

iv) Emulsions for rectal use

Some emulsions are given by rectal route. Semi-solid emulsions are water in oil or oil in water type. The water in oil type semi-solid emulsions are oily creams while the oil in water semi-solid emulsions are aqueous creams. Creams are easy to apply and are less greasy.

Preparation of emulsions:

The emulsions are prepared by two methods:

1. Small scale method

a) Dry gum method

b) Wet gum method

c)Bottle method.

2. Large scale method.

Identification tests:

The type of emulsion can be determined by the following tests:

1. Dilution test.

2. Conductivity test.

3. Dye test.

4. Fluorescence test.

5. Cobalt chloride test (CoCl2).

1.Dilution test: This test is based on the solubility of external phase of emulsion.

- o/w emulsion can be diluted with water.

2. Conductivity test: The basic principle of this test is that water is a good conductor of electricity. Therefore in case of o/w emulsion this test will be +ve as water is the external phase. In this test, an assembly is used in which a pair of electrodes connected to an electric bulb is dipped into an emulsion. If the emulsion is o/w type, the electric bulb glows.

3. Dye test: When an emulsion is mixed with a water soluble dye such as amaranth and observed under the microscope.

- If the continuous phase appears red, then it means that the emulsion is o/w type as water is the external phase.
- If the scattered globules appear red and continuous phase is colourless, then it is w/o type.

4. Fluorescence test:

Oil gives fluorescence under UV light, while water doesn't. Therefore, o/w emulsion shows spotty pattern when observed under UV, while w/o emulsion fluoresces.

5. Cobalt chloride test:

When a filter paper soaked in cobalt chloride solution is dipped into an emulsion and dried, it turns from blue to pink, indicating that the emulsion is o/w type.

Evaluation of emulsions:

1. Size distribution analysis.
2. Rate of phase separation.
3. Viscosity & rheological study.
4. Measurement of dielectric constant.
5. Conductivity measurement.
6. Influence of temperature.
7. Microwave radiation.
8. Microelectrophoretic measurement.

Stability of emulsions:

The following three changes usually occurs during the storage of emulsion:

1. Creaming.
2. Cracking.
3. Phase inversion.

1. Creaming:

Creaming may be defined as the upward movement of dispersed globules to form a thick layer at the surface of emulsion. The creaming depends on "Stokes law", the rate of creaming depends on the various factors. V=2r2(d1-d2)g/9n

2. Cracking:

Cracking means the separation of two layers of dispersed phase and continuous phase due to coalescence of dispersed phase globules. Cracking may be due to the following reasons:

a) By addition of emulsifying agent of opposite type.

b) By decomposition of emulsifying agent.

c) By addition of common solvent.

d) By microorganisms.

e) Changes in temperature.

3. Phase inversion:

Phase inversion means change of one type of emulsion into the other type i.e., o/w emulsion changes into w/o type and vice versa. It may be due to following reasons:

a) By the addition of an electrolyte. b) By changing the phase volume ratio. c)By temperature change. d)By changing the emulsifying agent.

Reference

1. Lieberman HA, Rieger MM, Banker GS. "Pharmaceutical Dosage Forms: Disperse System", vol.3; Second Edition,473-511
2. The theory and practice of industrial pharmacy by Leon Lachman, Herbert A. Liberman, Joseph L. Kanig; Third edition
3. Aulton, ME. "Pharmaceutics, The Science of Dosage Form Design", 2nd edition, Churchill Livingstone, London, 2002, pp 309-322.
4. Lachman L, Lieberman HA, Kanig JL. "The Theory and Practice of Industrial Pharmacy", 3rd edition, Varghese Publishing House, Bombay, 1991, pp 457-477.
5. Niazi SK. "Handbook of Pharmaceutical Manufacturing Formulation: Liquid products", CRC Press LLC, 2004.
6. Remington-The science and practice of pharmacy 21st edition pg 323,740-744.
7. Lachman L, Lieberman HA, Kanig JL. 'Theory and Practice of Industrial pharmacy'- Varghese publishing house, third edition-pg no-511.
8. Edward J, Pittsburgh B, Pennsylvania,' Pharmaceutical Packaging Handbook' USA

Unit 4

SUSPENSIONS

Definition

- A Pharmaceutical suspension is a coarse dispersion in which internal phase is dispersed uniformly throughout the external phase.
- The internal phase consisting of insoluble solid particles which is maintained uniformly throughout the suspending vehicle with aid of single or combination of suspending agents.
- The external phase (suspending medium) is generally aqueous in some instance, may be an organic or oily liquid for non oral use.

Classification of suspensions:

1- Based On General Classes

- Oral suspension e.g. antacid, antibiotic
- Externally applied suspension e.g.lotion
- Parenteral suspension
- Ophthalmic suspension

2- Based On Proportion of Solid Particles

- Dilute suspension (2 to10% w/v solid)
- Concentrated suspension (50% w/v solid)

3- Based on Electro kinetic Nature of Solid Particles

- Flocculated suspension
- Deflocculated suspension

Advantages:

1. Used for insoluble drug or poorly soluble drugs, which required to be given orally in liquid dosage forms (in case of children, elderly, and patients have difficulty in swallowing solids dosage forms)

2. To overcome the instability of certain drug in aqueous solution:

a) Reduce the contact time between solid drug particles and dispersion media ⇨ increase the Stability of drug like *Ampicillin* by making it as reconstituted powder.

b) A drug that degraded in the presence of water ⇨ suspended in non-aqueous vehicles. Examples are *phenoxymethypencillin*/ coconut oil and *tetracycline HCL*/ oil

c) Drug in suspension exhibits higher rate of bioavailability than several dosage forms. Bioavailability is in following order,

Solution > Suspension > Capsule > Compressed Tablet > Coated tablet

d) Suspension can mask the unpleasant/ bitter taste of drug. E.g. Chloramphenicol

e) Some materials are needed to be present as finely divided forms to increase the surface area.

For example, Mg carbonate and Mg trisilcate are used to adsorb some toxins.

f) Suspension can be used for topical applications:

An example is Calamine lotion *BP,* after evaporation of dispersing media; the active agent will be left as light deposit.

g) Can be used for parentral administration, intramuscular (i.m.) to control rate of absorption.

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

h) In vaccines

i) X-ray contrast media: an example is oral and rectal administration of propyliodone.

j) In aerosol, suspension of active agents in mixture of propellants.

Disadvantages

1) Physical stability, sedimentation and compaction can cause problems.

2) It is bulky, sufficient care must be taken during handling and transport.

3) It is difficult to formulate

4) Uniform and accurate dose cannot be achieved unless suspension are packed in unit dosage form

Features Desired In Pharmaceutical Suspensions

1) The suspended particles should not settle rapidly and sediment produced, must be easily re-suspended by the use of moderate amount of shaking.

2) It should be easy to pour yet not watery and no grittiness.

3) It should have pleasing odour, colour and palatability.

4) Good syringeability.

5) It should be physically, chemically and microbiologically stable.

6) Parenteral/Ophthalmic suspension should be sterilizable.

FACTORS TO BE CONSIDERED

I. Particle size control:

- Particle size of any suspension is critical and must be reduced within the range as determined during the preformulation study.
- Too large or too small particles should be avoided.

Larger particles will:

A) Settle faster at the bottom of the container

B) Particles > 5 um impart a gritty texture to the product which may cause irritation if injected or instilled to the eye.

C) Particles > 25 um may block the needle

- Too fine particles will easily form hard cake at the bottom of the container.

II. Wetting of the particles

- Hydrophilic materials (talc, ZnO, Mg_2CO_3) are easily wetted by water while hydrophobic materials (sulphur, charcoal) are not due to the layer of adsorbed air on the surface. Thus, the particles, even high density, float on the surface of the liquid until the layer of air is displaced completely.
- The use of wetting agent allows removing this air from the surface and to easy penetration of the vehicle into the pores.
- However hydrophobic materials are easily wetted by non-polar liquids.

Wetting agents include:

1) Surfactants

- Surfactants decrease the interfacial tension between drug particles and liquid and thus liquid is penetrated in the pores of drug particle displacing air from them and thus ensures wetting.

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

- Surfactants of HLB value 7 – 9 are used as wetting agents.

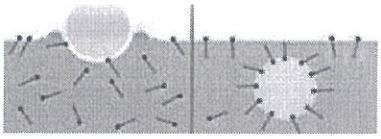
Disadvantages of surfactants are:

A) That they have foaming tendencies.

B) They are bitter in taste.

C) Some surfactants such as polysorbate 80 interact with preservatives such as methyl paraben and reduce antimicrobial activity.

- Polysorbate 80 is most widely used surfactant both for parenteral and oral suspension formulation.
- Sodium laurylsulphate is used for external application.



2) Hydrophilic Colloids

- Hydrophilic colloids coat hydrophobic drug particles in one or more than one layer. This will provide hydrophillicity to drug particles and facilitate wetting.

Disadvantage: They cause deflocculation of suspension because force of attraction is declined.

- e.g. acacia, tragacanth, alginates, gelatin, wool fat, egg yolk, bentonite, Veegum, Methylcellulose etc.

3) Solvents

- The most commonly used solvents used are alcohol, glycerin, polyethylene glycol and polypropylene glycol.
- The mechanism by which they provide wetting is that solvent flows into the voids between particles to displace air and it coats and separates the material so that water can penetrate and wet the particles.

III. Sedimentation:

Sedimentation means settling of particle or floccules occur under gravitational force in liquid dosage form.

Velocity of sedimentation expressed by Stoke's equation:

$$v_{sed.} = \frac{d^2(\rho_s - \rho_o)g}{18\eta_o}$$

$$= \frac{2r^2(\rho_s - \rho_o)g}{9\eta_o}$$

Where,

$v_{sed.}$= sedimentation velocity in cm / sec

d = Diameter of particle

r = radius of particle

ρ_s= density of disperse phase

ρ_o= density of disperse media

g = acceleration due to gravity

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

η_o = viscosity of disperse medium in poise

According to the Stoke's equation, the velocity of sedimentation of particles in a suspension can be reduced by:

1) decreasing the particle size
2) by minimizing the difference between the densities of the particles and the vehicle.

The density of the vehicle of a suspension can be increased by adding the following substances either alone or in combination: polyethylene glycol, polyvinyl pyrolidone, glycerin, sorbitol, and sugar.

3) The velocity of sedimentation decreases as the viscosity of the vehicle increases.

The viscosity and density of any vehicle are related to each other.

Sedimentation Parameters

1) Sedimentation volume (F) or height (H) for flocculated suspensions:

Definition: Sedimentation volume is a ratio of the final or ultimate volume of sediment (Vu) to the original volume of sediment (V_O) before settling.

$$\mathbf{F = V u / V_O}$$

Where, Vu = final or ultimate volume of sediment

V_O = original volume of suspension before settling

F has values ranging from less than one to greater than one. normally F < 1

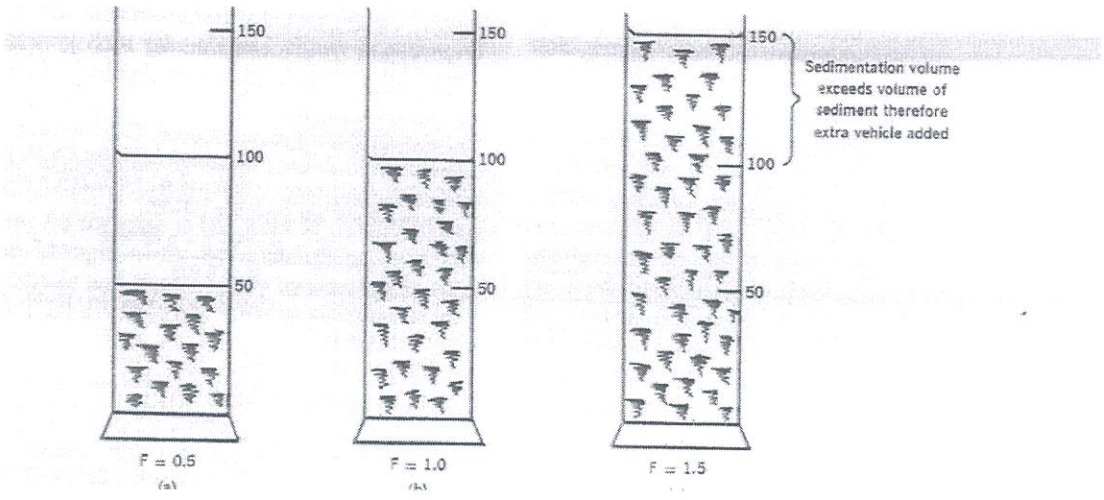
When F < 1, Vu < Vo

When F =1, Vu = Vo

- The system is in flocculated equilibrium and show no clear supernatant on standing.

When F > 1, Vu > Vo

- Sediment volume is greater than the original volume due to the network of flocs formed in the suspension and so loose and fluffy sediment



2) Degree of flocculation (β)

Degree of flocculation: is the ratio of the sedimentation volume of the flocculated suspension, F, to the sedimentation volume of the deflocculated suspension, F∞

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

$\beta = F / F\infty$

$$\beta = \frac{(Vu/Vo)\ \text{flocculated}}{(Vu/Vo)\ \text{deflocculated}}$$

When the total volume of both the flocculated and the deflocculated suspensions are same;

β = (Vu) floc / (Vu) defloc

- The minimum value of β is 1; this is the case when the sedimentation volume of the flocculated suspension is equal to the sedimentation volume of deflocculated suspension.
- β is more fundamental parameter than F since it relates the volume of flocculated sediment to that in a deflocculated system

IV. Brownian Movement (2-5 µm)

- Brownian movement of particle prevents sedimentation by keeping the dispersed material in random motion.
- Brownian movement depends on the density of dispersed phase and the density and viscosity of the disperse medium.
- The kinetic bombardment of the particles by the molecules of the suspending medium will keep the particles suspending.

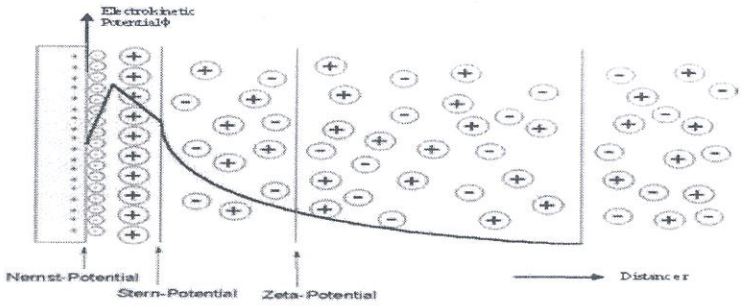
V. Electrokinetic Properties

Zeta Potential

- The zeta potential is defined as the difference in potential between the surface of the tightly bound layer (shear plane) and electro-neutral region of the solution.
- The ions that gave the particle its charge are called potential-determining ions.
- Immediately adjacent to the surface of the particle is a layer of tightly bound solvent molecules, together with some ions oppositely charged to the potentialdeterminin ions.
- These two layers of ions at the interface constitute a double layer of electric charge (shear plane).
- Zeta potential governs the degree of repulsion between the adjacent, similarly charged, dispersed particles.
- If the zeta potential is reduced below a certain value, the attractive forces exceed the repulsive forces, and the particles come together. This phenomenon is known as flocculation.
- Particles carry charge may acquire it from adjuvants as well as during process like crystallization, grinding processing, ionization of functional group of the particle, adsorption of ions from solution e.g. ionic surfactants.

AVANTHI INSTITUTE OF PHARMACEUTICAL SCIENCES * AVANTHI EDUCATIONAL SOCIETY * HYDERABAD * VIZIANAGARAM *

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162



VI. Deflocculation and flocculation

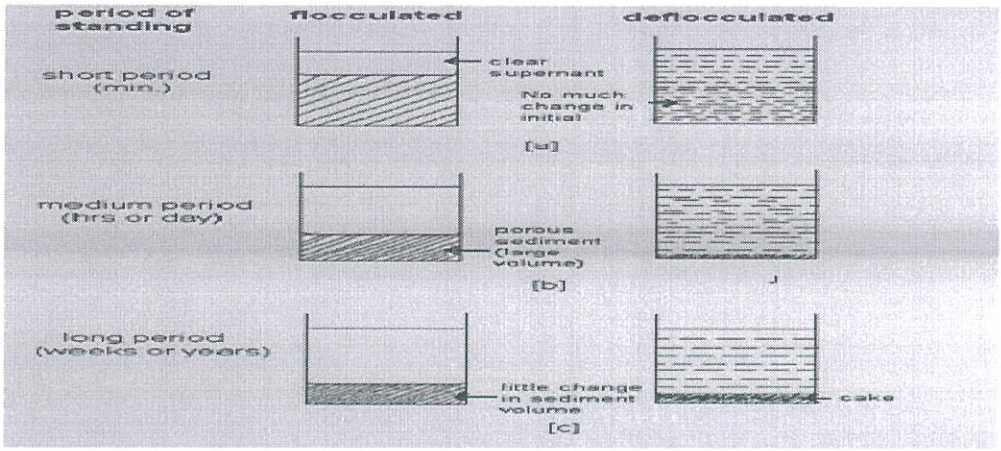
Flocculated Suspensions

- In flocculated suspension, formed flocs (loose aggregates) will cause increase in sedimentation rate due to increase in size of sedimenting particles.
- Hence, flocculated suspensions sediment more rapidly.
- Here, the sedimentation depends not only on the size of the flocs but also on the porosity of flocs.
- In flocculated suspension the loose structure of the rapidly sedimenting flocs tends to preserve in the sediment, which contains an appreciable amount of entrapped liquid.
- The volume of final sediment is thus relatively large and is easily redispersed by agitation.
- Even the smallest particles are involved in flocs, so the supernatant appears clear.

Deflocculated suspensions

- In deflocculated suspension, individual particles are settling.
- Rate of sedimentation is slow.
- Which prevents entrapping of liquid medium which makes it difficult to re-disperse by agitation.This phenomenon called 'cacking' or 'claying'.
- In deflocculated suspension, larger particles settle fast and smaller remain in supernatant liquid so supernatant appears cloudy cake.

Sedimentation behaviour of flocculated and deflocculated suspensions



Flocculating agents:

1. Electrolytes

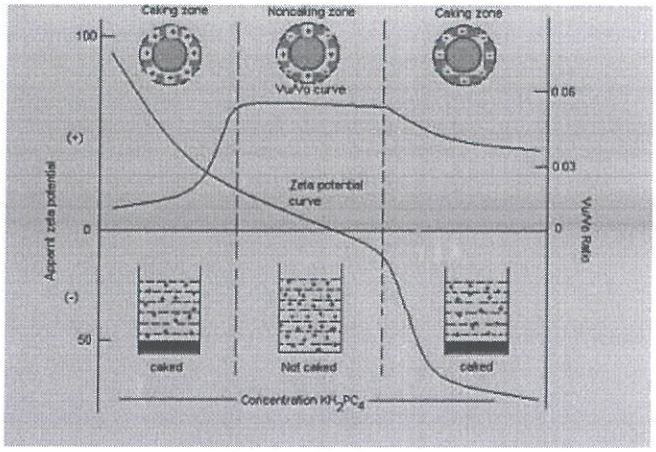
PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

(e.g. Nacl, sulfate, citrates, phosphates salts)

- Reduce the zeta potential surrounding the solid particles. This leads to decrease in repulsion potential and makes the particle come together to from loosely arrange structure (floccules).
- The flocculating power increases with the valency of the ions. As for example, calcium ions are more powerful than sodium ions because the velency of calcium is two whereas sodium has valency of one.

Eg: Bismuth subnitrate with KH_2PO_4

Caking Diagram



In 1st caking zone:

Addition of KH_2PO_4, ↓in +ve zeta potential (owing to adsorption of negatively charged phosphate anion) which accompanied by ↑ in Vu/Vo

In Non-caking zone:

↑ KH_2PO_4, More reduction in Zeta zone (~ zero) while Vu/Vo remain unchanged (approached the plateau)

In 2nd caking zone:

↑ KH_2PO_4, ↑ zeta potential in negative direction till becomes sufficient to re-induce deflocculated suspension, while Vu/Vo ↓.

2. Surfactants

- Both ionic and non-ionic surfactants can be used to bring about flocculation of suspended particles.
- Ionic surfactants: cause neutralization of the charge on each particle. The particles are then attracted towards to each other by van der waals forces and forms loose agglomerates.
- Non-ionic surfactant: they are adsorbed on to more than one particle thus forming a loose flocculated structure.

3. Polymers (e.g. alginate, starch, cellulose derivatives)

Polymers possess long chain in their structures. The part of the long chain is adsorbed on the surface of the particles and remaining part projecting out into the dispersed medium. Bridging between these later portions, also leads to the formation of flocs.

VI. Viscosity of Suspensions

- Viscosity of suspensions is of great importance for stability and pourability of suspensions.
- As we know suspensions have least physical stability amongst all dosage forms due to sedimentation and cake formation.
- As the sedimentation is governed by Stoke's law,
  $v=d^2 (\rho_s - \rho_l) g/18\eta$
- So as the viscosity of the dispersion medium increases, the terminal settling velocity decreases yielding higher stability to the suspension.
- On the other hand as the viscosity of the suspension increases, its pourability, decreases and inconvenience to the patients for dosing increases.
- Thus, the viscosity of suspension should be maintained within optimum range to yield stable and easily pourable suspensions.

Different approaches to Increase the Viscosity of Suspensions:

1) Viscosity Enhancers

- Some natural gums (acacia, tragacanth),
- polymers, cellulose derivatives (sodium CMC, methyl cellulose)
- clays(bentonite)
- sugars (glucose, fructose)

2) Co-solvents

Some solvents which themselves have high viscosity are used as co-solvents to enhance the viscosity of dispersion medium.

3) Structured vehicles

Method of preparation:

The preparation of suspension includes three methods:

(1) Use of controlled flocculation

(2) Use of structured vehicle

(3) Combination of both of the two previous methods.

The following is the general guidelines to suspension formulation:

A-Structured vehicle

- Structured vehicles called also thickening or suspending agents.
- They are aqueous solutions of natural and synthetic gums.
- These are used to increase the viscosity of the suspension.
- It is applicable only to deflocculated suspensions.
  E.g. Methyl cellulose, sodium carboxymethyl cellulose, acacia, gelatin and tragacanth
- These are non-toxic, pharmacologically inert, and compatible with a wide range of active and inactive ingredients.
- These structured vehicles entrapped the particle and reduces the sedimentation of particles.
- Thus, the use of deflocculated particles in a structure vehicle may form solid hard cake upon long storage.
- Note that too high viscosity isn't desirable:
  a) It causes difficulty in pouring and administration.

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

b) It may affect drug absorption since they adsorb on the surface of particle and suppress the dissolution rate.

- Structured vehicle is not useful for parenteral suspension because they may create problem in syringeability due to high viscosity.

B) Controlled flocculation

Controlled flocculation of particles is obtained by adding flocculating agents, which are:

(1) Electrolytes (2) surfactants (3) polymers

C) Flocculation in structured vehicles

- Sometimes suspending agents can be added to flocculated suspension to retard sedimentation
- Examples of these agents are: Carboxymethylcellulose (CMC), Carbopol 934, Veegum and bentonite.

Evaluation of suspensions:

- Suspensions are evaluated by determining their physical stability.
- Two useful parameters for the evaluation of suspensions are;

A) Sedimentation volume

B) Degree of flocculation.

- The determination of sedimentation volume provides a qualitative means of evaluation.
- A quantitative knowledge is obtained by determining the degree of flocculation.

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

Unit-4

EMULSIONS

- The term emulsion is derived from the word emulgeo meaning "to milk".
- Emulsions are thermodynamically unstable biphasic liquid preparations containing two immiscible liquids one of which is dispersed as minute globules into dispersion medium and stabilized by a third substance called emulsifying agent or emulsifier.
- The droplet phase is called the dispersed phase or internal phase and the liquid in which dropletsare dispersed is called the external (continuous phase).
- The particle size of the dispersed phase commonly ranges from 0.1 to 100 μm.

IDEAL PROPERTIES

1. It should consist of uniform dispersion of fine and mono sized droplets of internal phase, which should not aggregate and if they do, must not coalesce to form large droplet.
2. The internal droplets should not cream up or down and if they do, the cream layer shouldbe re dispersible.
3. Without phase inversion, it should remain in its original type.
4. It should be not contaminated by microbes on storage.
5. It should be stable at various temperatures.
6. It should not rancid or degraded due to oxidation. Exp. Oil and Fats.

Types of emulsions:

1. Macro emulsions (Simple Emulsions):

I. **Oil in water (o/w):** Oil droplets are dispersed in a continuous aqueous phase.

- Aqueous phase constitutes more than 45 % of the total weight.
- Hydrophilic emulsifier is used. (HLB value : low 9-14 eg: Tween 80)
- Used for oral administration, cosmetics and water washable drug bases.
  - The globule size is 0.25 to 10 microns.

ii. **Water in oil (w/o):** Aqueous droplets are dispersed in continuous oily phase.

- Oily phase constitutes more than 45 % of the total weight.
- Lipophilic emulsifier is used (HLB value : low 3-6 eg: Span 80).
- Used for cosmetics of dry skin and emollient applications.

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

2. Multiple emulsions: w/o/w, o/w/o

- They are developed with a view to delay the release of an active ingredient. They have three phases and various ionic and nonionic surfactants used to stabilize the emulsions.
- In these emulsions within emulsions any drug present in innermost phase must now cross two phase boundaries to reach the external continuous phase. Such emulsions also can invert.
- Drug inversion they form simple emulsions. So a w/o/w emulsion will get inverted to o/wemulsion.

3. Microemulsions: also known as transparent emulsions, micellar solutions, solubilised systems,and swollen micelles.

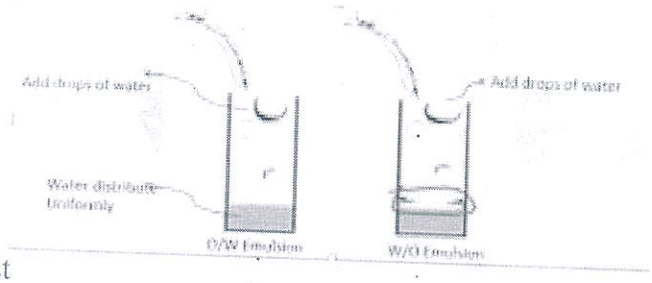
- They may be defined as dispersions of insoluble liquids in a clear and homogenous dispersion medium.

- Globule size below the range of 10-75 nm.
- The appearance of emulsion depends on the wavelength of visible light i.e. globules less than 120 nm do not reflect light and appear transparent to the eye.

Identification tests of emulsion

1. Dilution test: In this test the emulsion is diluted either with oil or water. If the emulsion is o/w type and it is diluted with water, it will remain stable as water is the dispersion medium" but if it is diluted with oil, the emulsion will break as oil and water are not miscible with each other

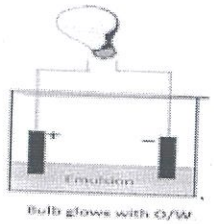
- o/w emulsion can be diluted with water.
- w/o emulsion can be diluted with oil.



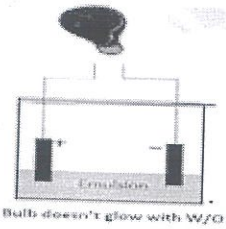
2.Conductivity Test

The basic principle of this test is that water is a good conductor of electricity. In this test, a pair ofelectrodes connected to an electric bulb and is dipped into an emulsion. If the emulsion is o/w type,the electric bulb glows and vice versa.

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162



Bulb glows with o/w



Bulb doesn't glow with W/O

1. Dye-Solubility Test

An emulsion is mixed with a water soluble dye (amaranth) and observed under the microscope. Ifthe continuous phase appears red, it means that the emulsion is o/w type as water is in the external phase and the dye will dissolve in it to give color. If the scattered globules appear red and continuous phase colorless, then it is w/o type. Similarly if an oil soluble dye (Scarlet red C or Sudan III) is added to an emulsion and the continuous phase appears red, then it is w/o emulsion.

clays can be used as auxiliary agents.

1. Antimicrobial agents

Available in oil and aqueous phase at effective level concentration.

- Acids and acid derivatives - Benzoic acid - Antifungal agent
- Aldehydes – Formaldehyde - Broad spectrum
- Phenolics - Phenol - Broad spectrum
  Cresol
  Propyl p-hydroxy benzoate
- Quaternaries -Chlorhexidine and
  salts - Broad spectrum
  Benzalkonium chloride
  Cetyl trimethyl ammonium bromide
- Mercurials -Phenyl mercuric acetate - Broad spectrum

Colours and flavourings

Colour is rarely needed in an emulsion, as most have an elegant white colour and thick texture. Emulsions for oral use willusually contain some flavouring agent.

THE HLB (HYDROPHILIC LIPOPHILIC BALANCE SYSTEM):

An HLB number (1-20) represents the relative proportions of the lipophilic and hydrophilic parts of the molecule. High numbers (8-18) indicate a hydrophilic molecule, and produce an o/w emulsion.Low numbers (3-6) indicate a lipophilic molecule, and produce a w/o

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

emulsion. Oils and waxy materials have a 'required HLB number' which helps in the selectionof appropriate emulsifying agents when formulating emulsions. Liquid paraffin, for example, has a required HLB value of 4 to obtain a w/o emulsion and 12 for an o/w emulsion.

HLB ca. 3.5 to 8: Water-in-Oil Emulsifiers HLB ca. 1 to 3.5: Antifoams

HLB ca. 7 to 9: Wetting and spreading agents HLB ca. 8 to 16: Oil-in-Water Emulsifiers

HLB ca. 13 to 16: Detergents

HLB ca. 15 to 40: Solubilizers

Methods of Preparation of Emulsions

Commercially, emulsions are prepared in large volume mixing tanks and refined and stabilized by passage through a colloid mill or homogenizer. Extemporaneous production is more concerned with small scale methods.

1) Dry Gum Methods
2) Wet Gum Methods
3) Bottle Method
4) Beaker Method.
5) In situ Soap Method

DRY GUM Method (Continental method)

Dry gum method is used to prepare the initial or primary emulsion from oil, water, and a hydrocolloid or "gum" typeemulsifier. (4 parts oil, 2 parts water, and 1 part Emulsifier).

Ratio of oil: gum: water in primary emulsionFixed oi= 4:1:2

Mineral oil = 3:1:2Volatile oil = 2:1:2

Procedure: Take mortar, 1 part gum is levigated with the 4 parts oil until the powder is thoroughly wetted; then the 2 parts water are added all at once, and the mixture is vigorously triturated until the primary emulsion formed is creamy white and produces a "crackling" sound as it is triturated. Active ingredients, preservatives, color, flavors are added as a

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

solution to the

primary emulsion. When all agents have been incorporated, the emulsion should be transferred to a calibrated vessel, brought to final volume with water.Oil soluble substances in small amounts may be incorporated directly into the primary emulsion. Any substance which might reduce the physical stability of the emulsion, such as alcohol (which may precipitate the gum) should be added as near to the end of the process as possible to avoid breaking the emulsion. When all agents have been incorporated, the emulsion should be transferred to a calibrated vessel, brought to final volume with water, then homogenized or blended to ensure uniform distribution of ingredients.

Wet Gum Method (English method)

(Oil 4 parts + Water 2 parts + Emulsifier 1 parts)

Procedure: In this method, the proportions of oil, water, and emulsifier are the same (4:2:1), but the order and techniques of mixing are different. The 1 part gum is triturated with 2 parts water to form a mucilage; then the 4 parts oil is added slowly, in portions, while triturating. After all the oil is added, the mixture is triturated for several minutes to form the primary emulsion. Then other ingredients may be added as in the continental method. Generally speaking, the English method is more difficult to perform successfully, especially with more viscous oils, but may result in a more stable emulsion.

Bottle Method

This method may be used to prepare emulsions of volatile oils, Oleaginous substances of very low viscosities. This method is a variation of the dry gum method. One part powdered acacia (or other gum) is placed in a dry bottle and four parts oil are added. The bottle is capped and thoroughly shaken. To this, the required volume of water is added all at once, and the mixture is shaken thoroughly until the primary emulsion forms.

Beaker Method

The most appropriate method. Dividing components into water soluble and oil soluble components. All oil soluble components are dissolved in the oily phase in one beaker and all water soluble components are dissolved in the water in a separate beaker. Oleaginous components are melted and both phases are heated to approximately 70°Cover a water bath. The internal phase is then added to the external phase with stirring until the product reaches room temperature.

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

In situ Soap Method

Two types of Soaps developed by this Methods:

1) Calcium Soaps
2) Soft Soaps

Calcium Soaps: W/O type Emulsions. E.g. Oleic acid + Lime water. Prepared by simple mixing of equal volumes of Oil and Lime water.Emulsifying agent used is Calcium salt of free fatty acids. E.g. Olive Oil + Oleic acid (FAA) = calcium Oleate.Advantage: O/W is external Phase used frequently on dry skin and sun burned skin.

LARGE SCALE METHODS

Physical parameters affecting the droplet size distribution viscosity, and stability of emulsion: Location of the emulsifier, method of incorporation of the phases, the rates of addition , the temperature of each phase and the rate of cooling after mixing of the phases considerably

Energy may be supplied in the form of:

- Heat
- Homogenization
- Agitation

Mechanical equipment for emulsification (Agitation)Mechanical Stirrers

An emulsion may be stirred by means of various impellers mounted on shafts, which are placed directly into the system to be emulsified. This is used for mixing, suspending, milling, dispersing, disintegrating solids etc. & reduces batch time. It consists of stator and rotor assembly. The rotor rotates inside the stator assembly which is fixed with three tie rods to the motor.

PROPELLER MIXERS

Simple top entering propeller mixers are adequate for routine development work in the laboratory and production.The degree of agitation is controlled by propeller rotation but the pattern of liquid flow and resultant efficiency of mixing are controlled by the type of impeller, its position in the container, the presence of baffles, and the general shape of the container. Thes e stirrers can not be used when :vigorous agitation is needed.

Extremely small droplets are needed.

Foaming at high shear rates must be avoided.These mixers may have paddle blades

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

counter rotating blades or planetary blades .

- Homogenizers

In homogenizers the dispersion of two liquids is achieved by forcing their mixture through a small inlet orifice at big pressures. Homogenizers can be made with more than one emulsifying stage, and it is possible to recycle the emulsion through the homogenizer more than one time. Homogenizers raise the temp. Of the emulsion, hence cooling may be required. It can be used when a reasonably mono disperse emulsion of small droplet size (1 nm) is required.

Colloid Mills

They operate on principle of high shear which is normally generated between rotor and stator of the mill.Colloid mill consists of a fixed stator plate and a high speed rotating rotator plea. Material drawn or pumped through an adjustable gap set between the rotor and stator is homogenized by the physical actionand the centrifugal force is created by high rotation of the rotor which operates within 0.005 to0.010 inch of the stator. Ultrasonifiers

Ultrasonic energy s used to produce pharmaceutical emulsions. These transduced piezoelectric devices have limited output and are expensive. They are useful for laboratory preparation of emulsions of moderate viscosity and extremely low particle size. Commercial equipment is based n principle of Pohlmn liquid whistle. The dispersion is forced through an orifice at modest pressure and is allowed to impinge on a blade. The pressure range is from 150-350 psi . This pressure causes blade to vibrate rapidly to produce an ultrasonic note. When the system reaches a steady state, a cavitational field is generated at the leading edge of the blade and the pressure fluctuations of approx. 60 tones psi can be achieved in commercial equipment. **Instability of emulsions**

1) Flocculation and creaming
2) Coalescence and breaking
3) Phase inversion.
4) Miscellaneous physical and chemical changes

Flocculation

Neighboring globules come closer to each other and form colonies in the continuous phase. This aggregation of globules is not clearly visible. This is the initial stage that leads to instability. Flocculation of the dispersed phase may take place before during or after creaming.The extent of flocculation of globules depends on

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

(a) globule size distribution.

(b) charge on the globule surface.

(c) viscosity of the external medium.

a. Globule size distribution

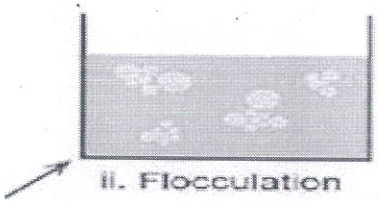
Uniform sized globules prevent flocculation. This can be achieved by proper size reductionprocess.

b. Charge on the globule surface

A charge on the globules exert repulsive forces with the neighboring globules. This can beachieved by using ionic emulsifying agent, electrolytes etc.

c. Viscosity of the external medium.

If the viscosity of the external medium is increased, the globules become relatively immobile and flocculation can be prevented. This can be obtained by adding viscosity improving agents (bodying agents or thickening agents) such as hydrocolloids or waxes. Flocs slowly move either



upward or downward leading to creaming. Flocculation is due to the interaction of attractive and repulsive forces, whereas creaming is due to density differences in the two phases.

Creaming

Creaming is the concentration of globules at the top or bottom of the emulsion. Droplets larger than 1 mm may settle preferentially to the top or the bottom under gravitational forces.Creaming may also be observed on account of the difference of individual globules (movement rather than flocs). It can be observed by a difference in color shade of the layers.It is a reversible process, i.e., cream can be redispersed easily by agitation, this is possible because the oil globules are still surrounded by the protective sheath of the emulsifier. Creaming results in a lack of uniformity of drug distribution. This leads to variable dosage. Therefore, the emulsion should be shaken thoroughly before use. Creaming is of two types, upwardcreaming and downward creaming

Upward creaming is due to the dispersed phase is less dense than the continuous phase. This is normally observed in o/w emulsions. The velocity of sedimentation decreases

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt. - 531162

negative.Downward creaming occurs if the dispersed phase is heavier than the continuous phase. Due to gravitational pull, the globules settle down. This is normally observed in w/o emulsions.Since creaming involves the movement of globules in an emulsion, Stokes' law can be applied.

$$v = \frac{d^2 (\rho_s - \rho_0) g}{18 \eta_0}$$

v = terminal velocity in cm/sec,

d is the diameter of the particle in cm,

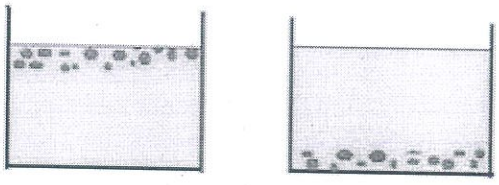
ρs and ρ0 are the densities of the dispersed phase and dispersion medium respectively, g is the acceleration due to gravity and

η_0 is the viscosity of the dispersion medium in poise.

Creaming is influenced by,

- Globule size
- Viscosity of the dispersion medium

Difference in the densities of dispersed phase and dispersion medium



Creaming can be reduced or prevented by:

Reducing the particle size by homogenization. Doubling the diameter of oil globules increases the creaming rate by a factor of four.Increasing the viscosity of the external phase by adding the thickening agents such as methyl cellulose tragacanth or sodium alginate.Reducing the difference in the densities between the dispersed phase and dispersion medium. Adjusting the continuous phase and dispersed phase densities to the same value

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

should eliminate the tendency to cream. To make densities equal, oil soluble substances such as bromoform, β-bromonaphthalene are added to the oil phase (rarely used technique).

Coalescence

If the sizes of globules are not uniform, globules of smaller size occupy the spaces between the larger globules. A few globules tend to fuse with each other and form bigger globules.This type of closed packing induces greater cohesion which leads to coalescence. In this process, the emulsifier film around the globules is destroyed to a certain extent. This step can be recognized by increased globule size and reduced number of globules.

Coalescence is observed due to:

- Insufficient amount of the emulsifying agent.
- Altered partitioning of the emulsifying agent.
- Incompatibilities between emulsifying agents.
- Phase volume ratio of an emulsion has a secondary influence on the stability of the product and represents the relative volume of water to oil in emulsion.At higher ratio (>74% of oil to water), globules are closely packed, wherein small globules occupy the void spaces between bigger globules. Thus globules get compressed and become irregular in shape, which leads to fusion of adjacent globules. Ostwald and others have shown that if one attempts to incorporate more than about 74% of oil in an o/w emulsion, the oil globules often coalesce and the emulsion breaks. This value known as the critical point, is defined as the concentration of the dispersed phase above which the emulsifying agent cannot produce a stable emulsion ofthe desired type.
- **Breaking (cracking)**
- Separation of the internal phase from the external phase is called breaking of the emulsion. This is indicated by complete separation of oil and aqueous phases, is an irreversible process, i.e., simple mixing fails. It is to resuspend the globules into an uniform emulsion. In breaking, the protective sheath around the globules is completely destroyed and oil tends to coalesce.

Phase inversion

- This involves the change of emulsion type from o/w to w/o or vice versa.
- When we intend to prepare one type of emulsion say o/w, and if the final emulsion turns out to be w/o, it can be termed asa sign of instability.

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

It may due to

- By addition of an electrolyte
- By changing Phase-Volume ratio
- By temperature change
- By changing emulsifying agent
- It can be minimized by keeping concentration of disperse phase between 30-60%

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

Unit-5

PARENTERALS

- Parenterals are derived from the Greek words "Para meaning Beside, Enteron meaning Intestine."
- These dosage forms differ from all other dosage forms because they are injected directly into the body tissue through the primary protective system of the human body, the skin & mucous membranes they must be exceptionally pure & free form physical, chemical & biological containments.
- A drug administered parenterally is one injected through the hollow of a fine needle into the body at various sites & to various depths. The Three primary routes of parenteral administration are Subcutaneous, Intramuscular & Intravenous, although they are others, such as Intra Cardiac & Intra Spinal.
- Parenteral products are unique from any other type of pharmaceutical dosage form.
- All products must be sterile.
- All products must be free from Pyrogenic (endotoxin) contamination.
- Injectable solutions must be free from visible particulate matter this includes reconstituted sterile powders.
- All products must be stable not only physically, chemically like all other dosage forms, but also "stable" microbiologically that is sterility, freedom from pyrogenic & visible particulate contamination must be maintained through out the shelf life of the product.
- Products must be compatible with I.V diluents, delivery systems & other drug products co-administered.
- Products should be isotonic although strictness of isotonicity depends on the route of administration products to be administered into the cerebro spinal fluid must be isotonic.

Advantages:-

- When rapid onset of action is required parenteral route is selected.
- The dose administration is accurately.
- Prolonged action of the drug can be possible by this route.
- This route is preferred in emergencies.
- This route of administration is an especially useful in treating patients who are uncooperative, unconscious (or) other wise unable to accept oral medication.

Disadvantages:-

- The Parenterals administration is that once the drug is injected there is no retreat.
- The drugs should be administered aseptically.
- It produces the pain at the site of the injection.
- These are more expensive then other dosage forms & it require competent trained personnel for proper administration.

ROUTES OF PARENTERAL ADMINISTRATION:

- Intramuscular Route
- Intravenous Route
- Subcutaneous Route

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

- Intra Dermal Route
- Hyperdermolysis.
- Intra Abdominal Route(Intra Peritoneal Route)
- Intra Arterial Route
- Intra Articular Route
- Intra Cardiac Route
- Intra Cisternal Route

The primary Routes of Parenteral administration are commonly employed Intramuscular Route, Subcutaneous Route, and Intravenous Route.

- These routes are satisfying to a large extent the four principles reasons for administering Parenterals.
- For therapy
- For prevention
- For diagnosis
- for temporally altering tissues functions in order to facilitate other forms of therapy

PRIMARY ROUTES:-

Intramuscular Route:

- In this method "Injection directly into the body of a relaxed muscle". In this aqueous (or) oily Suspensions can be given through the intramuscularly.
- The dose is 1-2ml.
- The intramuscular route is one of the most popular & convenient routes available both for the administrator & for the patient & especially for a child whenever it is possible & practicable this route is used.
- The intramuscular route provides a means for a "prolonged release of drugs formulated as aqueous or oily solutions or suspensions". The intramuscular route is preferred over the Subcutaneous Route. When a rapid rate of absorption is desired & over the intravenous route when for one reason (or) another the drug cannot be administered directly into the vascular compartment.
- Various muscle sites are available for delivery including the "Gluteal", "triceps", "pectoral" muscles in Subcutaneous Route lying immediately under the skin is a layer of fat , the superficial fascia that tends it self to safe administration of a great variety of drugs.
- Injections are made into the strained muscle fibers that lie beneath the Subcutaneous layer the usual volumes injected range from 1.0 – 3.0 ml with volumes up to 10.0ml sometimes being given in

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., 531162

divided dosage in the gluteal or thigh areas,Needles used in administering I.M injections range from 1-11/2 & 22 gauges.

- The major clinical problem arising from I.M injections is muscle (or) Neural damage. The damage occurs with nearly all classes of drugs. The injury normally results from faulty technique rather than the medication. Most injectable products can be given in IM these are numerous dosage forms available for this route of administration solutions, oil-in-water emulsions, suspensions (Aqueous or oily base) colloidal suspensions.
- Drugs commonly injected by IM route those are Lidocaine , cephalosporin , amino glycosides diazepam's insoluble salts of Penicillin-G , Corticosteroids Narcotics , Narcotic antagonists.
- Eg: Acepromazine, Benzathene penicillin.

Intravenous Route:

- In Intravenous Route the medicaments is injected directly into a vein either to obtain an extremely rapid & predictable response or to avoid irritation of other tissues
- Large proximal veins such as those located inside the forearm are most commonly used for IV administration due to rapid dilution in the circulating blood & general insensitivity of the venous wall to pain, the IV route may be used to administer drugs that would be too irrigating or caustic to give by other routes provided that proper dosing procedures are employed.
- In the Intravenous administration of the drugs, an aqueous solution is injected directly into the vein at a rate commensurate with efficiency, safety, comfort to the patient & the desired duration of drug response. Intravenous injection allows the desired blood level of drug to be achieved in an optimal & quantitative manner IV injections are usually made into the veins of the forearm &are especially useful in emergencies when immediate drug response is desired.
- IV injections Normally ranges from 1-100ml & are given with either a 20-guage or 22-guage , 11/2-inch needle with an injection rate of 1 ml per 10 sec. for volumes up to 5 ml & 1 ml per 20 sec. for volumes over 5 ml.

Subcutaneous Route:

- In this route the injections into the loose connective & adipose tissue beneath the skin (dermis)
- Subcutaneous injections are generally given in the fore arm, upper arm. Thigh or buttocks lying immediately under the skin is a layer of fat, the superficial fascia that tends it safe administration of a great variety of the drugs.
- if the patient is to receive frequent injections , it is best to alternate injection sites to reduce tissue irritation after injection the drug comes into the immediate "vicinity of blood capillaries & permeates them by diffusion or filtration

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

- Care must be taken to ensure that the needle is not in vein this is done by lightly pulling back on the syringe plunger (aspiration) before making the injection
- If the needle is in adherently located in a vein blood will appear in the syringe & the injection to facilitate drug absorption.
- Drugs given by this route will have a slower onset of action than by IM (or) IV routes, and total absorption may also be less.
- Body sites are suitable for subcutaneous administration include most portions of the arms, legs plus the abdomen when a daily (or) frequent administration is required the injection site can and should be continuously changed (or) rotated, especially by diabetic patients self-administering insulin.

Intra Dermal Injections:-

- Intradermal injections are administered into "corium of the skin" usually in volumes of about "0.1ml". The common sites for injections are "Arm"& the back
- The drugs administered by this route are "allergy test materials" the intradermal drugs are normally given for diagnostic purposes it is important that product per non-irritating
- These volumes are normally given at 0.05mlper dose & the solutions are isotonic
- This medication is usually administered with 1/2-inch or 5/8-inch & 25-guage, 26 – gauge needle inserted at an angle nearly parallel to the skin surface "the site should not be massaged after injection of allergy test materials.

Hyperdermolysis:-

- The subcutaneous route of administration for infusion of large volumes of solution into the subcutaneous tissue is called Hyperdermolysis.
- A slightly larger needle is used than that of normal subcutaneous injections. The site of injection usually chosen is at the interior (or) lateral portion of the thigh, although in infants the best site in subcutaneous tissue at the base of either scapulae the rate of infusion depends on how well the fluid is absorbed an enzyme hyaluronidage may be injected concomitantly to hasten absorption.

Intra Abdominal route (Intra peritoneal route):-

- In this route the injection or infusion directly into the peritoneal cavity via a needle or directly into an abdominal organ such as the liver, kidney and bladder.
- This route may be used to treat local or widespread Intra abdominal disease due to infection or tumor to dialysis & remove various cumulative toxic substances from the body when severe renal failure prohibits removal.
- The aseptic preparation of the skin 16 or 18 – gauge stainless steel needle is inserted through the anterior abdominal wall just lateral to the rectum muscles.

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

- If ascities is present there is little risk of bowel puncture however the peritoneal cavity is "dry" puncture of the bowel may occur it may be avoided by shallow punctures & With drawing on the plunger while advancing the needle.

Intra arterial route:-

- In this the injection or infusion into an artery which leads directly to the target organ.
- This route is employed generally for diagnostic purposes such as injecting radio opaque substances for "Roentgen graphic" studies of the vascular supply of various organs or tissues.
- The Intra arterial route for treatment purpose is in frequent & limited generally to organ-specific chemotherapy such as treating certain localized cancers.
    - Ex: - Malignant melanomas of the lower extremities.
- The suitably sized, smoothed bore, stainless steel needle or a short flexible, plastic catheter is surgically inserted into the desired artery or lengthy catheter is guided over a stylet or needle through a percutaneous entry site until the desired artery may be punctured directly & the needle then inserted into the artery
- The method used in strict aseptic technique is practiced & appropriate occlusive & non occlusive dressing are employed.

Intra Articular Route:-

- In this Intra articular route the injection or infusion into the synovial sacs of various accessible in joints.
- The antibiotics, lidocaine &corticosteroid esters may be administered into body joints for the treatment of injections, pain, inflammation, or other problems resulting from inflammatory diseases some drugs are administered in single injections & some antibiotics via continuous infusion & bathing the joint it is approach utilized when no more than one or two joints are involved.
- These injections are easily accomplished in the knee. Ankle, wrist, elbow, shoulder, sterno clavicular joints.

METHOD:

Roentgen graph of the joint into be entered should be studied prior to injection the entry should be at the point where the synovial cavity is most superficial &free of large vessels & nerves the site of skin entry cleaned & prepared with ant surgical procedure procaine infiltration is often unnecessary.

A sterile 19-22 Gauge stainless steel needle attached to a syringe is inserted in to the synovial cavity fluid is first removed to ensure that the needle is within the joint space the syringe is changed & one containing material to be injected is attached. If more than light pressure on the plunger is necessary, the needle is probably not in the joint space.

Joints deformed by any disease process may be more difficult to enter & inject.

Intra cardiac route:-

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

In Intra cardiac route the injection directly into the chambers of the heart

In cardiac arrest in which drugs may have to reach the myocardial activity may have to be stimulated or controlled following cardiac standstill or ventricular fibrillation.

The needle gauge 18-21, 4-6inch long stainless steel is used. An electrode nay be attached to the needle to indicate when the myocardium is reached in emergency situations this luxury may not be available.

Intra Cisternal route:-

The injection directly into the cisternal space surrounding the base of the brain.

The route is employed in diagnostic purpose. It is used when intracranial pressures are elevated & the risk of herniation of the brain exists if fluid is removed from the lumbar sac.

VEHICLES:-

The most liquid injections are quite dilute; the component present in the highest proportion is the vehicle.

The vehicle of greatest importance for parenteral products is water.

Water of suitable quantity for compounding & rinsing product contact surfaces may be prepared either by distillation or by reverse osmosis process, water for injection.

Vehicles are two types those are

Water miscible vehicles.

Non-aqueous vehicles.

WATER MISCIBLE VEHICLES:-

- A number of solvents that are miscible with water been used as a portion of the vehicle in the formulation of parenterals. These solvents are used primarily to solubilize certain drugs in an aqueous vehicle & to reduce hydrolysis.
- The most important solvent in this group are ethyl alcohol, liquid polyethylene glycol & propylene glycol.
- Ethyl alcohol is used particularly in the preparation of solutions of cardiac glycosides & the glycols in solutions of barbiturates, certain alkaloids &antibiotics such preparation usually given in IM formulation scientists needing to use on or more of these solvents must consult the literature & toxicologists to ascertain the maximum amount of co-solvents allowed for their particular product

NON-AQUEOUS VEHICLES:-

- The most important group of Non-aqueous vehicles is Fixed oils.

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

- The USP provides the specifications for such vehicles, indicating that the fixed oils must be vegetable origin so that they will be metabolized, will be liquid at room temperature & will not become rancid readily.
- The USP also specifies limits for the free fatty acid content, iodine value, saponification value.
- The oils most commonly used are Corn oil, cottonseed oil, peanut oil & sesame oil.
- Fixed oils are used particularly as vehicles for certain hormones & vitamin preparation
- Hormones like - Progesterone.
- Testosterone.
- De-oxy carticosterone.
- Vitamins like - Vitamin-k,Vitamin- E
- The label must be state the name of the vehicle so that user bewares in case of known sensitivity or other reactions to it.

Buffers:-

- These are used to stabilize the solution against chemical degradation or especially for proteins, physical degradation that might occur if ph changes.
- Buffer systems employed should normally have as low a buffering capacity as feasible so as not to disturb significally the body's buffering systems when injected.
- Buffer components are known to catalyze degradation of drugs the acid salts most frequently employed as buffers are citrates, acetates, & phosphates.

Tonicity factors:-

- Tonicity agents are used in many Parenterals & Ophthalmic products to adjust the tonicity of the solution.
- Parenteral preparations should be isotonic with blood serum or other body fluids to reduce irritation & pain of injection in areas with nerve endings the isotonicity of a solution may be adjusted by adding sodium chloride , borax etc.. In suitable quantities but these materials should non toxic & must be compatible with other components of the formation.
- The products administered by all other routes, especially into the eye or spinal fluid must be isotonic injections into the subcutaneous tissue & muscles also should be isotonic to minimize pain & tissue irritation.
- The agents most commonly used are electrolytes & mono saccharides or disaccharides.

Solubilizing agents:-

- The solubilities of insoluble or poorly soluble in water can be increased by co-solvents, Complex formation or by adding surfactants like Tweens, Poly sorbets etc .which act by micellar solubilization.

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

- The solubility of a substance at a given temperature is defined quantitatively as the concentration of the dissolved solute in a saturated solution. To enhance the solubility of drugs in addition to using organic solvents that includes salt formation & prodrugs, capable of greatly enhancing solubility.

TERM	RELATIVE AMOUNT OF SOLVENT TO DISSOLVE ONE PART OF SOLUTE
Very soluble	<1
Freely soluble	1-10
Soluble	10-30
Sparingly soluble	30-100
Slightly soluble	100-1000
Very slightly soluble	1000-10,000
Practically insoluble or Insoluble	>10,000

- Drug solubility can be increased by the use of surface active agents such as sorbtian mono oleate & poly oxyethylene sorbitan mono oleate.

Solutes:-

- The physical & chemical purity of solutes used for sterile preparations care must be taken in selective active pharmaceutical ingredients & exipients to ensure that their quality is suitable for Parenteral administration the contaminants entering a product with a solute have the same effect as if they entered via vehicle even small traces of contaminants may be determined to products.
- In addition solutes should be free from microbial & pyrogenic contamination this entails not only proper quality of the chemical procured but storage conditions designed to prevent contamination, particularly after a container has been opened.

Added Substances:-

Substances added to a product to enhance its stability are essential for almost every product such substances include Solubilzers , Anti oxidants , Chelating Agents , Buffers , Tonicity factors , Anti Microbial Agents , Anti Fungal Agents , Anti Foaming Agents for Specialized purposes.

At the same time these agents must be prevented from adversely affecting the product.

These agents must be selected with great care & they must be evaluated as to their effect upon the entire formulation.

Anti bacterial agents:-

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

These agents bacteriostatic concentration must be included in the formulation of products packaged in multiple dose vials & are often included in formulations to be sterilized by marginal processes

The requirements of activity, stability & effectiveness of antibacterial agents.

Anti oxidants:-

These are required frequently to preserve products because ease with which many drugs are oxidized.

Ex: - Ascorbic acid,
Sodium bi sulfate,
EDTA.

The conventional process for removing oxygen from liquids & containers do not absolutely remove all oxygen the only approach for completely removing O2 is to employ isolator technology where the entire atmosphere can be recirculating nitrogen or another Non-oxygen gases.

Stabilizers:-

Stability of a drug also can be defined as the time from the date of manufacture & packaging of the formulation until its chemical or biological activity is not less then a predetermined level of labeled potency & its physical characteristics have not changed appreciably or deleteriously.

Oxidation & hydrolysis takes place more rapidly in drugs when they are in solution form therefore they must be suitably protected from Oxidation & hydrolysis to prevent oxidation either a suitable anti oxidant is added or the product is sealed n an atmosphere of nitrogen or carbon dioxide , so has to replace oxygen in the product thus minimizing oxidation.

Wetting & Suspending & Emulsifying Agents:-

In a Parenteral suspension a wetting agent is used to reduce the interfacial energy between the solid particles & the liquid so as to prevent the formation of lumps.

They also act as antifoaming agents to subside the foam produced during shaking of the preparation these agents are used or Tween & sorbitol

Suspending agents
Methyl cellulose
Carboxy Methyl cellulose
Acacia,
Gelatin.

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

Emulsifying agents are used in Sterile emulsions for this purpose Lecithin is used.

SUBSTANCES	USUAL CONCENTRATIONS (%)
Anti Microbial Agents	
Benzylkonium chloride	0.1
Benzyl Alcohol	1-2
Chloro butanol	0.25-0.5
Phenol	0.5
Chlorocresol	0.1-0.3
Thiomersol	0.01
Anti oxidants	
Ascorbic acid	0.1
Cysteine	0.5
Glutathione	0.1
Acetone sodium bisulfate	0.2
Sodium bisulfate	0.15
Buffers	
Acetic acid & salt Ph 3.5-5.7	1-2
Citric acid & salt Ph 2.5-6	1-5
Glutamic acid –Ph 8.2-10.2	1-2
Tonicity Adjustment	
Dextrose	4-5.5
Sodium chloride	0.5-0.9
Sodium sulfate	1-1.6

Manufacturing of Parenteral preparations:-

Washing & cleaning of containers, closures & Equipment.

Collection of materials.

Compounding the preparation.

Filtration.

Distributing the preparation in final containers.

Sealing the containers.

Sterilization.

Labeling & packaging.

Evaluation of Parenteral preparations

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

1. Washing & cleaning of containers, closures & Equipment:-

All the containers, closures & glass equipments required in Parenteral preparations are thoroughly cleaned with detergent then washing with free flowing water followed by rinsing it with water for injection as far as possible the various components of the apparatus should be separated & cleaned.

For small number of items washing can be done manually but on large scale automatic washing machines are used.

2. Collection of materials:-

The materials required for the formulation of Parenteral preparations are weighed & collected in the preparation room the Medicaments , vehicles& additives used should be of the highest purity water is to be used as vehicle, water free from pyrogens must be used.

3. Compounding the preparation:-

Mixing & compounding a set procedure must be followed before mixing the formulator must decide the order of mixing & the should have clean picture in his mind that what type of preparation will be obtained i.e. regarding its colour , viscosity etc..

4. Filtration:-

The solutions so formed are then passed through a suitable filter media to remove all the foreign materials. If the solution are required to sterilized by means of bacteria proof filters then they are passed through suitable bacteria proof filter for this purpose sintered glass , asbestos or porcellin filters are used now a days membrane filters composed of cellulose ester or poly carbonate are commonly used for filtering the Parenteral solutions.

5. Distributing the preparation in final containers:-

After filtration & sterilization the solutions are distributed into final containers like ampoules, vials, bottles, which are previously cleaned &sterilized.

Ampoules are used for filling single doses where as vials are used for filling multi doses.

On small scale filling can be carried out manually with the help of hypodermic syringes attach with long needles.

At the time of filling the ampoules care should be taken that the solution should not be touch the neck of the ampoule & it should be filled below the constriction of the neck.

6. Sealing the containers:-

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

Sealing the containers should be done as soon as possible to prevent the contamination of the contents the rubber closures are fitted on the vials & bottles & sealed by crimping the aluminum caps which may be done manually or by mechanically.

On small scale the ampoules are sealed manually by rotating the neck of the ampoule in the flame of Bunsen's burner or blast burner to soften the glass which ultimate the fuses to close the ampoule this is known as Tip sealing But this is not a sure method of sealing because leakage generally occurs.

The neck of the ampoule is constantly rotated in the Bunsen's flame & when the glass is soften the tip is held firmly.

With a forceps or any other devise & pulled quickly away from the body of the ampoule which is still rotated a small capillary tube is formed which is closed by twisting this method is known as Pull sealing this is slow process but the seals are more perfect than tip sealing.

7. Sterilization:-

Depending on the nature of products they may be sterilsed by any suitable method.

A product must be sterilized by the most reliable method.

Thermo stable preparations are sterilized by autoclaving at a temperature of 115*c for 30 min. or at 121*c for 20min. Oily injections can be sterilized by hot air oven at 160*c for 2 hours, 170*c for 1 hour.

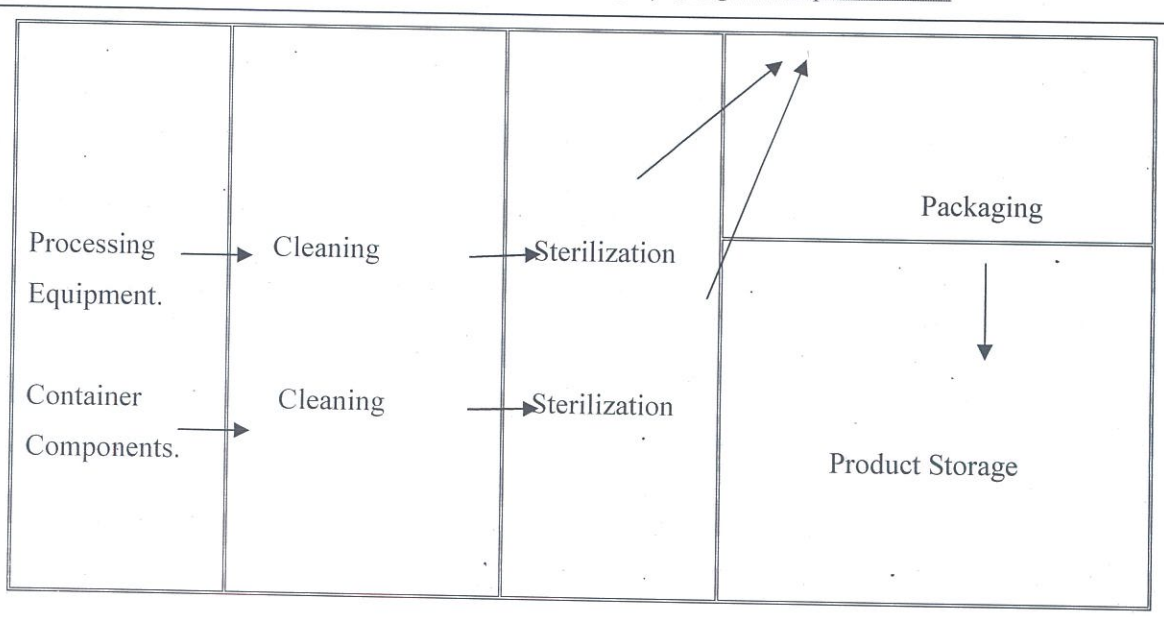
8. Labeling & packaging:-

All the containers , ampoules , vials & Bottles should be properly labeled with name of preparation , quantity , batch number , lot number , date of manufacture , date of expiry , storage conditions , retail price & manufacturing addresses.

The labeled containers should be packaged in cardboard or plastic containers so that there is no breakage during transportation or handling of ampoules should be packed in partitioned bones.

Supply Storage	Controlled clean environment	Aseptic area	Clean area
Ingredients Vehicles, Solutes. →	Compounding Of Product → Filtration of Solutions		Filling → Sealing

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162



Production procedures:-

The process required for preparing sterile products constitute a series of events initiated with the procurement of approved raw materials EX: drugs, excipients, vehicles& primary packaging components EX: containers, closures& ending with the sterile product sealed insets dispensing packaging.

Each step in the process must be controlled very carefully so that the product will have its required quality.

A) Cleaning containers & Equipment:-

Cleaning & equipment coming in contact with Parenteral preparations must be cleaned meticulously It should be obviously that even new, unused containers & equipment will be contaminated with such debris as dust, fibers, chemical films, other materials arising form such sources as the atmosphere, cartons the manufacturing process& human hands

A variety machines are available for cleaning new containers for parental products these vary in complexity from a small, hand located, and rotary rinser to large automatic washers capable of processing several thousand containers per hour.

Validation of cleaning procedures for equipment is another "hot topic" with respect to CGMP regulatory inspections inadequate cleaning processes have been a frequent citing by FDA& other regulatory inspectors when inspecting both active ingredient& final product manufacturing facilities

B) Treatment Cycle:-

The cycle of treatments to be employed will vary with the condition of the containers to be cleaned in general loose debris can be removed by vigorous ringing with water

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

Thermal-shock sequence in the cycle usually is employed to aid, by expansion & contraction, loosening of debris that may be adhering to the container wall sometimes only an air rinse is used for new containers if only loose debris is present.

Only new containers are used for parenterals improvements have been made in maintaining their cleanliness during shipment from the manufacturer through tight, low-shedding packaging, including plastic blister packs

C) Machinery for Containers:-

The machinery available for cleaning containers embodies the above principles but varies in the machines by which it is accomplished In manual loading type, the jet tubes are arranged on arms like the spokes of a wheel which rotate around a center post through which the treatment are introduced

A continuous automated line operation capable of cleaning hundreds of containers an hour The vials are feel into the rotary rinser in the foreground transferred automatically to the covered sterilizing tunnel in the center conveyed through the wall in the background & discharge in to the clean room

D) Handling after Cleaning:-

The wet clean containers must be handled in such way that contamination will not be reintroduced A wet surface will contaminants much more readily than will a dry surface

Doubling the heating period generally is adequate also to destroy pyrogens

EX: increasing the dwell time at 250*c from 1-2hr but the actual time temperature conditions required must be validated.

E) Closures:-

The rough, elastic &convoluted surface of rubber closures renders then difficult to clean In addition any residue of lubricant from molding or surface bloom of inorganic constituents must be removed The normal procedure calls for gentle agitation in a hot solution of a mild water softener or detergent The closures are removed from the solution &rinsed several times or continuously for a prolonged period with filtered WFI

The equipment used for washing large numbers of closures is usually an agitator or horizontal basket type automatic washing machine the final rinse always should be with low particulate WFI an example of a modern closure processor that washes , siliconizers , sterilizes & transports closures directly to the filling line.

F) Product preparation:-

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

A master formula would have been developed & be on file each batch formula sheet should be prepared from the master & confirmed for accuracy all measurements of quantities should be made as accurately as possible & checked by a second qualified person.

Care must be taken that equipment is not wet enough to dilute the product significantly or in the case of anhydrous products to cause a physical in compatibility.

Parenteral dispersions, including colloids, emulsions& suspensions, provide particular problems. In addition to the problems of achieving & maintaining proper reduction in particle size under aseptic conditions, the dispersion must be kept in a uniform state of suspension throughout the preparative transfer & subdividing operations.

ASEPTIC PROCESSING:-

Aseptic processing used as a synonym for sterile processing but the latter is misnomer Aseptic processing of diagnostic products requires strict components & product.

GMP (Good manufacturing process) are a set of FDA regulations describing methods used in, that facilitates & controls used for the Manufacture, packaging, storage & installation of all finished products i.e. drugs, biologics & medical devices.

Sterility: sterile biological products as those products that free from viable contaminating micro-organisms as determined by the tests.

Sterility assurance: The total manufacturing process which includes the facility design, installation &qualification of manufacturing equipment & process validation.

The end product must be consistently produced & must meet a Specified Sterility Assurance Level (SAL) as determined by a manufacturer.

The sterilized products an appropriate SAL may be 10* to 3* or less for aseptically filled diagnostic product has been considered.

Validation: It is documented evidence which provides a high degree of assurance that a specific process will consistently product a product meeting is predetermined specifications & quality attributes.

Aseptic manufacturing process:

Manufacturing of diagnostic products are challenged today with increasing domestic & international competition the challenge in today's market is to produce products of the highest quality possible ,in compliance with CGMP & at competitive prices.

Manufacturing controls for the production pf sterile IVD products should be defined & validated by the manufacturer the level to which a firm validates aseptic processing & sterilization should be based.

Facility design:-

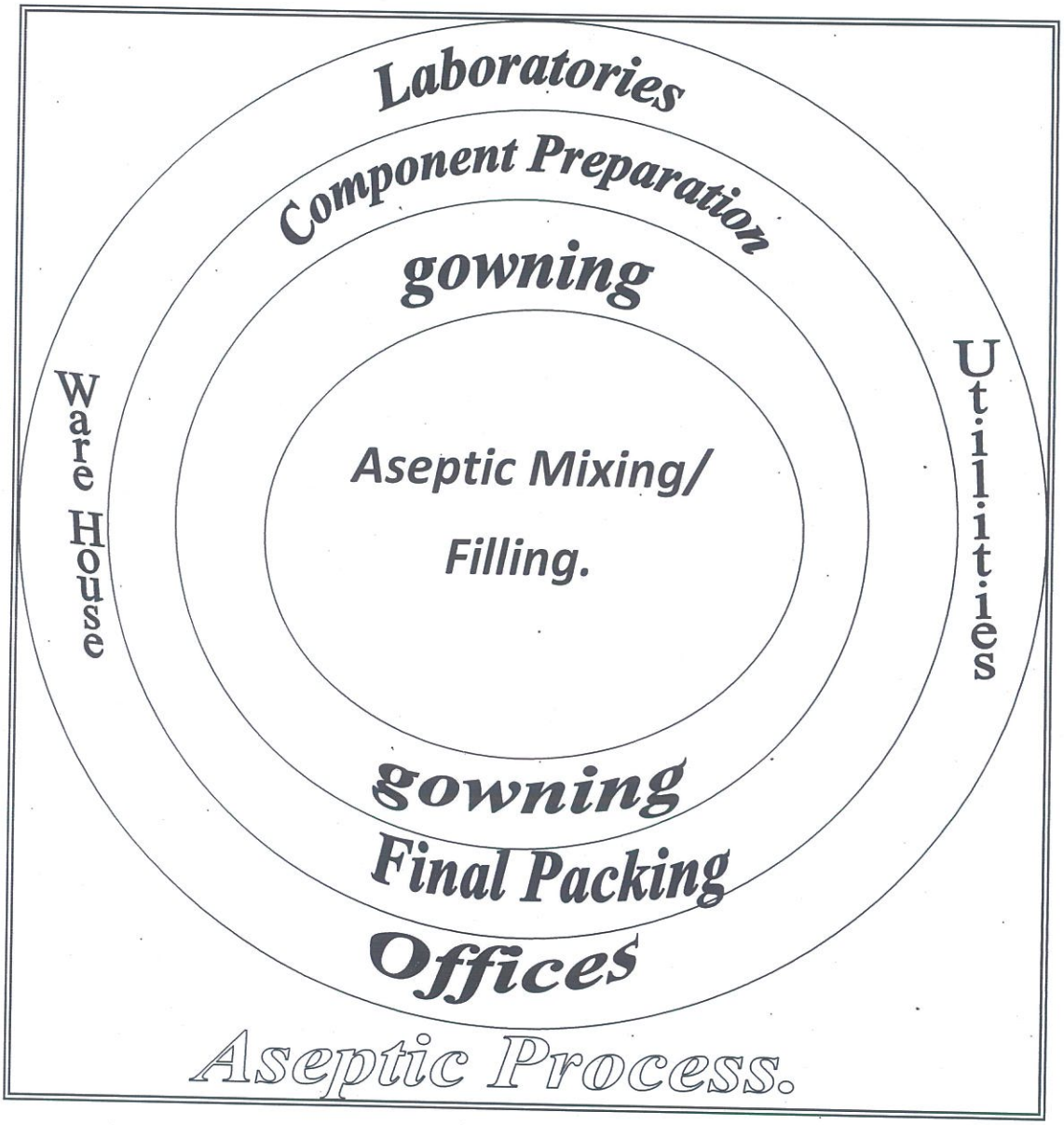
PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

The Manufacturing facility should be evaluated for its design, construction; materials which have a direct influence on environmental control the facility should have in place an adequate environmental control system that can be qualified for following.

Air pressure differential between the controlled & non controlled areas.
Airflow patterns over aseptic filling lines to minimize the influx of air born particulates.
Adequate air flow velocity over aseptic filling lines, Total air born particulates.
Total air born particulates.
Viable air born counts, Surface viable counts.

For new equipment installed & qualified for use. The associated instruments are calibrated at that time at prerequisite for variation studies. In order to maintain the confidence of the validated piece of equipment the associated instruments will need to be checked periodically whether it be on an each use, daily, monthly, yearly basis.

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162



Aseptic process

Environment control systems:-

The environment control system is ultimately tied into facility design & operation but it is a system it self should be carefully designed & evaluated.

The Heating Ventilation & Air Conditioning (HVAC)

That make up system will control the quality of particulates, air born viable, temperature, air flow direction & air pressure.

Special High Efficiency of Particulate Air (HEPA) filters are used in these systems.

PRINCIPAL
Avanthi Institute of Pharmaceutical Science
Cherukupally (V), Bhogapuram Manda
Vizianagaram Dt., - 531162

HEPA filters must be verified that the air flow pattern directly over the product exposure area is a single pass not turbulent & the pressure differential is greater in the aseptic processing area than in adjacent less controlled areas.

<_100 total particle counts ft CUBE 3 of air in areas of product exposure.

<_0.1 Colony Forming Units (CFU) per feet CUBE 3 of air in areas of product exposure.

<_2 CFA s per contact agar plate per sampling size.

0.05 inches of water pressure differential aseptic fill area is positive to surrounding areas.

Process Equipment & Instrumentation:-

The equipment used in sterilization or aseptic processing will need to be selected based on it's compatibility with the product & its ability to be qualified for internal use.

Certain types of autoclaves & Dry heat ovens cannot be adequately validated following FDA, Parent Drug Association (PDA) or Health industry Manufactures Association (HIMA) Guidelines.

The instrumentation identified with the process equipment will need to be calibrated on a routine schedule.

It includes Temperature, pressure, timers.

Sterilization process:-

The process by which components, containers, equipment, &final products are sterilized should be validated to assure a level of sterility appropriate for products.

The sterilizing equipment should first be qualified& calibrated prior to start of the validation study the qualification phase is necessary in order to demonstrate & document that the equipment is capable of meeting appropriate specifications, such as temperature, pressure & vacuum.

Sterile filtration is one of the more common methods of sterilizing diagnostic products the process should be validated to demonstrate that the end product is sterile prior to aseptic filling. A validation process should include this information.

Equipment compatibility

Vendor certification of filters

Filter sterilsation sop

Filter integrity test sop

Validation sop

Bioburden studies

Documentation results

Summary of the study with signatures of validation committee.

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

The selection of appropriate filters for sterilizing product is very important the nitro cellulose filter material has been found to absorb proteins & that may be determined to the end product Nylon or Teflon has been used to prevent this problem.

Lyophilization:-

Sterile IVD products that are lyophilized should have that process validated separately. If the product is transported from the fill area to the Lyophilize through a less controlled environment then transportation process should become pare of the validation study.

Evaluation of the Lyophilization process for the introduction of environmental containments is but one of the several aspects involved in the total validation study.

Materials

-Formulation

-Containers

-Closures

-Containers / Closure seal

Process

-Formulation

-Filling

-Closure application

-Freezing

-Drying

-Chamber sterilization

-Lyophilization loading

Equipment

-Filling machine

-Drying trays

-Closure placement equipment

-Vacuum freeze dryer

Instrumentation

-Qualification

-Calibration

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

Sanitization:-

The firm should develop appropriate SOPs to define qualified disinfectants to be used. The frequency of sanitization & step-step procedures. The viable surface micro-organisms should be part of the quality assurance program to monitor the effectiveness of the process.

Aseptic filling:-

The process for aseptic filling must be validated the validation study will tie together all of the above controls into an actual simulated product fill.

The procedure should be defined in a validation SOP & should be performed under conditions similar to those normally carried out with the excepients of adding more people or time to the process these additional factors can be considered as stress full to the process which may satisfy a "worst case" scenario.

In the procedure a sterile liquid medium such as Trypticase soy broth or another appropriate growth medium is passed through the dispensing equipment & into the final product container & the container closure is applied.

The product is then incubated under controlled temperature conditions 20-25*c & 30-35*c for predetermined time no less than 14 days & visually evaluated to determine a rate of percentage of contamination.

Containers:-

Containers are intimate contact with the product. No container presently available is totally non reactive, particularly with aqueous solutions.

Both the chemical &physical characteristics are given primary consideration in the selection of a protective container.

Plastic Containers:-

Plastic Containers are used mainly because they are light in weight, are non breakable & when low in additives have low toxicity & low reactivity with products most polymers are adversely affected by the elevated temperatures required for thermal sterilization & have a relatively high permeability for water vapor significant permeation of gases, including oxygen, may occur with some materials, polystyrene Having by far the highest level of permeation of those listed.

The USP has provided test procedures for evaluating the toxicity of plastic materials essentially the tests consist of the three phases,

Implanting small pieces of the plastic material intramuscularly in rabbits.

PRINCIPAL
Avanthi Institute of Pharmaceutical Science
Cherukupally (V), Bhogapuram Manda
Vizianagaram Dt., - 531162

Injecting eluates sodium chloride injection with or with out alcohol, IV in mice & injecting eluates using polyethylene glycol 400 &same oil Intra peritoneally in mice.

Injecting all four eluates subcutaneously in rabbits the reaction from test samples must not be significantly greater than non reactive control samples.

Glass containers:-

Glass is still the preferred material for containers for injectable products. Glass is composed principally of the Silicon dioxide, Tetrahydron, modified physicochemically by such as oxides as those of Sodium, potassium, Calcium, Magnesium, Aluminum, Boron, Iron.

The two general types of glass are Soda lime, Borosilicate.

The glass is more resistant chemically is composed almost entirely of Silicon dioxide, but it is relatively brittle & can only be melted & molded at high temperatures. Boric oxide some what modifies the above characteristics as it enters the structural configuration.

Glass flakes are also sometimes produced as a result of the action of the solution. These interactions are markedly accelerated during the elevated temperature required for marketing.

Sealing:-

All the containers must receive a primary seal in sterile area immediately after filling. In addition some containers require a secondary to assure the user that the primary seal has not been opened.

Sealing ampoules:-

Ampoules are unique in that the primary & secondary seal are the same. These are sealed by melting a portion of the glass in a flame. These are two types of seals.

Pull seal

Tip seal

Pull seal – It is made by heating the neck of an ampoule below the tip to molten state & then pulling the top of neck away from the ampoule body. A small twisted capillary forms which is easily melt-closed by the heat oh he flame.

Tip seal – It is made by heating the top of the neck of rotating ampoule to form a molten bead that seals the ampoule on cooling.

Sealing Bottles, Cartridges & Vials:-

These containers have a primary seal consisting of tight-fitting rubber or plastic closure & a secondary seal that holds the primary seal in place.

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

The secondary seals are usually Aluminum caps that are crimped on to a thread less container or Aluminum or plastic screw cap which is maintained in place by a semi perforated crimp or plastic strink band.

Sealing syringes:-

Syringes are unique in regard to sealing characteristics due to the needed for venting the sterile packaging when applying rubber seal some types of vacuum or sterile venting procedure is required to insert the plunger/stopper after filling the syringe one can use analogy of trying to fit a cork into very full bottle.

The air has to be evacuated or displaced before the cork will remain the bottle due to the back pressure generated by compressing the air that remains.

Rubber closures are held in place by means of Alluminium caps cover the closure & are crimped under the tip of the vial or bottle to hold them in place.

The single layered Alluminium caps may be applied by means of a hand crimper known as "Ferm press"

Double or triple layered caps require greater forces for crimping therefore, heavy duty mechanical crimpers are required.

Packaging:-

The packaging should provide ampoule protection for the product against physical damage from slipping handling & storage as well as protecting light-sensitive materials from ultraviolet radiation.

The USP includes certain requirements for the packaging & storage of injections.

The volume of injection in single dose containers is designed as that which is specified for Parenterals administration at one time & is limited to a volume of 1 liter.

Parenteral is intended for Intraspinal, Intracisternal. Peridural administrations are packed in single dose containers.

Injections are intended for veterinary use are exempt from the packaging & storage requirements concerning the limitation to single dose containers & to volume of multiple dose containers.

Labeling:-

The Labeling of an injection must provide the physician or other user with all of the information needed to ensure the safe & proper use of the product.

PRINCIPAL
Avanthi Institute of Pharmaceutical Scienc
Cherukupally (V), Bhogapuram Mand
Vizianagaram Dt.; - 531162

The Labeling designates all labels & other written, printed or Graphic matter upon an immediate container or upon or in, any package or wrapper in which it is enclosed with the exception of the outer shipping container.

The label must be indicating the name of the Manufacturer or distributor & carry an identifying a lot number. The lot number is capable of providing access to the complete Manufacturing history of the specific package including each single Manufacturing step.

Preparations labeled for use as dialysis, Haemo -filtration or Irrigation solutions must meet the requirements for injections other than those relating to volume & also must bear in the label statements that they are not intended for IV infusion.

Manufacturing of large volume Parenterals:-

Large volume of injections as products in containers labeled as containing more than 100 ml of a single dose injection intended for administration by Intravenous infusion.

LVP s is usually regarded as providing water, Electrolytes or Nutrients.

Density:-

The density of a substance defined as the ration of mass per unit volume is a fundamental property of matter

Density = Mass / Volume

Relative Density = Density of the substance.

Density of water at same temperature.

Heat transfer:-

Conduction:-

Conduction is the mechanism for transferring heat by transferring vibrational energy of individual atoms or molecules without mixing. In liquids conduction is limited to those thin layers adhering to solid surfaces when the kinetic energy is transferred from one point to another conduction in solids, especially metals may occur by the movement of free electrons transfer into a container occurs through the container wall by conduction.

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

Convection:-

During convection heat is transferred by actually mixing warm parts of the system with cooler parts. This process only occurs in fluids. In natural convections the mixing currents are caused by local differences produced in the density of the fluid when temperature gradients appear. In forced convection, turbulent flow is induced by applying force to allow current to carry the heat across the system.

Radiation:-

It is the term used to describe the movement of energy through the empty space by means of Electromagnetic waves.

Water: The Essential Raw Material

The US pharmacopoeia contains two monographs for bulk water supplies for purified water; water for injection purified water is obtained by Distillation, for exchange treatment reverse osmosis or other suitable process.

Water for injection is water purified by distillation or

By reverse osmosis & containers no added substances water processed by distillation or reverse osmosis, even through prepared in a properly designed & maintained system, is dependent on the design, installation & sanitization holding tanks & the controls exercised over the quality of the immediate environment.

Pretreatment:-

The incoming water must be adequately pretreated to ensure its uniformity &to promote constant quality & high efficiency of subsequent treatments

Chlorination or treatment with Ozone to suppress microbial growth through out the system

Prefiltration through the depth filters to remove iron & salts.

Water softening by for exchange to remove the alkaline

An Earth ion, Calcium, Magnesium, thus minimizes the formation of scale deposits.

Ph adjustments to the range 6.0 - 5.0 to reduce scale deposits.

Reverse osmosis:-

It is defined as the process for the separation of solutes from water by applying pressure on a more concentrated solution in contact with a semipermiable membrane to produce a less concentrated solution the solutes may be charged or essentially neutral.

Membrane integrity may be tested by use of selective molecular dyes, but these methods is more effective in testing large leaks ion exclusion tests measure membrane performance for ionic

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

Distillation:-

It is the continuous process of heating water to its boiling point is a confined environment so that the steam formed can be passed through a separator.

Water has a specific heat so that it requires approximately 80 k.cal to raise water free from temperature to 100*c but an additional 540 k.cal to change the water to steam at the same temperature.

Potable water of suitable quality may be used as feed water to distillation units. However softened, De-ionised or RO-treated water is normally utilize to minimize mineral scale build up, particularly Calcium carbonate scale, on the heat transfer surfaces.

An advantage with distillation is that water passes through a phase into steam at a temperature in excess of 100*c at atmosphere pressure this aids in killing any living micro organisms & in preserving the sanitary nature of the system.

Ram material:-

Water for injection is the universal solvent for LVP products. The range of drug substances used as solutes in the manufacture of LVP is fairly broad carbohydrates such as

Mono saccharides-Dextrose &Fructose

Di saccharides - Sucrose, Maltose.

Poly saccharides - Dextran

Polyols that are employed may include glycerol, sorbitol & Mannitol.

Sorbitol is used in irrigation products but it is less commonly used to provide nutrition in LVP products mannitol is not metabolized but plays a specific role as an osmotic agent.

Qualification & stability:-

The quality of the starting materials & solutes is critical to the finished LVP product. An appropriate program is needed to qualify each material used

The following general primary guidelines will aid in relating chemical types to environmental stability factors.

Organic materials are generally more sensitive to heat

Natural fats & oils usually contain double bonds that react with oxygen to form peroxides

Hydrated substances may deliquesce or effloresce.

Basic materials may absorb Co2 from the air.

Receiving:-

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

Materials should be received covered or in closed containers. All containers should be inspected for signs of damage that the contents may have been subjected to conditions that could possibly affect quality, identity, strength or purity.

Storage /Quarantine areas:-

All materials associated with the final drug product containers, closures, drug substances, & must be sampled, distributed to laboratory functions &tested for conformance to written specifications. These tests may be a physical, chemical, biological nature.

All raw materials should bear the release data in addition to the stock number, location code. Lot number, quantity, conditions for storage & expiration date if required efforts should be made to group similar items & numbers.

Batch mixing:-

Simple solutions:-

A typical LVP electrolyte solution is lactated ringer's 5% dextrose injection USP

All LVP are formulated on a weight per unit volume basis employing the metric system. Each catalog list number should have its specification setting forth the formula indicating &any special requirements.

Lipid emulsions:-

Exception to LVP s being clear aqueous solutions are the oil-in-water emulsions containing from 10% - 30%w/v oil phase. The production of lipid emulsions is a highly specialized process.

A typical formula of a 10% emulsion system is provided

Fractionated soy oil	10.0mg
Fractionated egg phosphate	1.2mg
Glycerol USP	2.5mg
Water for injection	to 100ml

Filtration:-

The separation of undissolved particles from a liquid by passing a solution through a septum or porous medium that allows the liquid to pass but retains the particles the filtration of liquids is one of the most important operations in pharmaceutical technology.

*Visible particles [50 μm& larger in diameter or Length]

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

*Invisible particles [less than 50µm to approximately 1µm]

Particles as small as 0.2µm which includes the bioburden of fungi &bacteria.

Cleaning process equipment & lines:-

Water systems:

The drug substances, water & the environment in a manufacturing facility are not sterile, although the final product must be growth of micro organisms is suppressed by recalculating the water hot (70-80*c) through the system free flowing steam also be employed & is a more effective sanitizing agent but it is more hazardous to the plat personnel & increases the relative humidity of the work environment if not confined care should be taken to ensure that the steam is free flowing.

Mixing & Filling equipments:-

The water system carries only water for injection & the primary concern is the suppression of micro-organisms by cleaning & sanitization as previously described.

Mixing tanks, lines, filling equipments may be employed to produce a variety of products over a given period of time.

Production planning:-

The planning can minimize the risk of between batch contaminations, reduce the extent of flushing required & reduce the need to tear down the filter housings.

Compressed Gasses:-

Compressed air is the gas most routinely generated in-house & is the simplest system to describe. The controls exercised on air are equally applicable to the other gases, particularly the requirements for final filtration.

Nitrogen, Co2 & air must be used during the processing of an LVP nitrogen is most frequently used to protect product from air in bulk storage or in the final container carbon dioxide may be employed to displace air or Ph adjustments.

Containers & Closures:-

Glass containers have been employed for LVP s Type-II glass is routinely employed

Type-I glass is much more expensive & usually reserved for specially products with a high pH.

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

Filling:-

Highly accurate fills are not necessary with LVP s filling a generally UN complicated rigid glass & semi rigid plastic containers are typically filled to a predetermined level on a high conveyor system.

Container size, shape, plus fill level determines volume.

Sealing:-

All containers must receive a primary seal in sterile area immediately after filling. In addition some containers require a secondary to assure the uses that the primary seal has not been opened.

Labeling:-

The label must be indicating the name of the Manufacturer or distributor & carry an identifying a lot number. The lot number is capable of providing access to the complete Manufacturing history of the specific package including each single Manufacturing step.

Labeling of the LVP product must conform to the many USP & FDA requirements. The product labeling contains information detailing solution composition &Ph, batch number & expiration dating period of the product storage requirements & specific precaution statements are also included.

Final product testing:-

It is carried out as the last stage in the manufacture of LVP products

Physical evaluation may include but not limited to visual inspection of solution for visible particulates & inspection of over punched units for tears or in complete seals in the over punch.

Biological testing is required to ensure the sterility & lack of pyrogens.

Chemical testing to ensure that the solutes & other solution attributes meet the required the specification limits.

Processing of small volume or Parenterals:-

Planning &Scheduling
Materials management
Personnel management
Documentation control
Preparation of facilities
Preparation of equipments
Standard operating procedures
Equipment & Facilities management

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

Preparation of packaging equipments

a) Planning &Scheduling:-

Planning & Scheduling activities are the key to the successful production of small volume of parenterals once the decision is made to a manufacture a given product, four groups of personnel materials management , personnel management ,equipment & facilitates maintenance & documentation control set the manufacturing process in motion & provide the necessary goods , equipment, personnel & facilitates for the production departments.

b) Materials management:-

The group of personnel is responsible for providing the materials necessary to manufacture the product materials management. Personnel coordinate the activities of chemical stock, package components, ware house, printing & purchasing. So that there are sufficient supplies of chemicals, package components, printed components to keep up the needs of production & makes certain that supplies are available in timely manner.

c) Personnel Management:-

The personnel must be attentive to the minute details & have a special commitment to perform a good job. The production must be enjoy doing the work &should be motivated by a sense of responsibility & accomplishment.

The production personnel are the "Priceless Ingredients" in an operation & they must be carefully selected for the job.

d) Documentation control:-

Documentation is the control & verification of the critical activities in a pharmaceutical process. Production & control cycle. From a manufacturing stand point; Documentation is necessary to keep an accurate record of the entire history of the manufacturing process & if done properly, enhances the ability to produce high quality products batch after batch.

Master file
Batch records
Standard operating procedures
Validation records
Environmental records
Stability records

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

Process logs

Material logs

Distribution records

Complain files

Retain sample storage area records

Returned goods records.

The master file is a perpetual recode of the production & control cycles on all batches of a particular product.

The batch record is the complete record of the manufacture, control & distribution of a single batch of a product.

Formulation identification number

Formulation name & concentration of active ingredients.

Identify & quantity of each component.

Mixing equipment to manufacture the bulk product

Filtering equipment to clarify & or sterilize the product.

Storage tanks to hold the bulk product prior to subdivision.

Filling or subdividing equipment.

Terminal sterilizing equipment.

e) Preparation of facilities:-

Before the raw materials are assembled & before the equipment & the package components are prepared for the manufacture of a small volume parenteral product the facility must be cleaned. This cleaning operation must be planned in advance to eliminate or reduce the potential of cross contamination. This service area must be cleaned first the clean room next &the sterile area is cleaned last the cleaning sequence proceeds from the ceiling to the floor.

f) Preparation of equipments:-

Preparation like planning is a vital part of the manufacturing process preparation of equipment entails the cleaning, sanitizing, assembling & in many cases sterilizing & or depyrogenating of equipment. The equipment includes such diverse items such as tanks, filtration assemblies, mixers, transfer lines, homogenizers, filling assemblies, viral trays, stopper containers & the work area in general.

Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., 531162.
PRINCIPAL

Stock or control numbers for each component together with quality control, approval & hazardous material labeling for appropriate chemicals.

Starting & completion time for each operation.

Chemical weight check &quality assurance counter check.

Identification of all processing equipment.

In process sampling procedures & test requirements, such as chemical purity, sterility, fill volume, pyrogen &safety testing

Material accountability.

g) Standard operating procedures:-

It describes how each operation is performed with a company. These documents contain the following elements.

Definition

Purpose

Responsibility

Scope

Frequency

h) Equipment & Facilities management:-

The process type & size of equipment must be made available for each particular processing step. These are several types of equipment that are used in the over all processing of small volume of Parenteral products.

i) Preparation of packaging equipments:-

A sterile package consists of primary & secondary packaging components. Secondary packaging components are not in direct contact with a sterile product.

The function of the product or secondary component is to aid in the shipment, identification or market appeal of a product. The primary packaging components are in direct with the sterile product are designed to protect the product from loss of sterility & provides an environment that minimizes physical & chemical decomposition.

Manufacturing of Small volume Parenterals:-

The sterile solution is the most common small volume of parenteral dosage form. The preparation of a solution involves the dissolution of all the ingredients in to an appropriate solvent system. The most common solvent is water co solvent systems such as aqueous / Glycerol mixture have been used when

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

water alone lacks sufficient solvent power to dissolve the active drug occasionally non-aqueous systems such as vegetable oils are used when aqueous & co solvent systems are found to be inadequate to dissolve the active drug solutions are the Parenteral dosage form of choice because they offer convenience in their diversity of end use & contain uniformity is easily obtained during manufacture &administration

In addition to the soluble drug, a sterile solution may contain one or more of following agents.

Osmotic pressure adjusters (NaCl or Mannitol)
Bacteriostatic agents are required for multiple dose containers
Buffering agents such as phosphates, acetates
Ph adjusters-NaOH or Hcl
Anti oxidants-bisulfate, ascorbate
Chelating agents-EDTA.

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

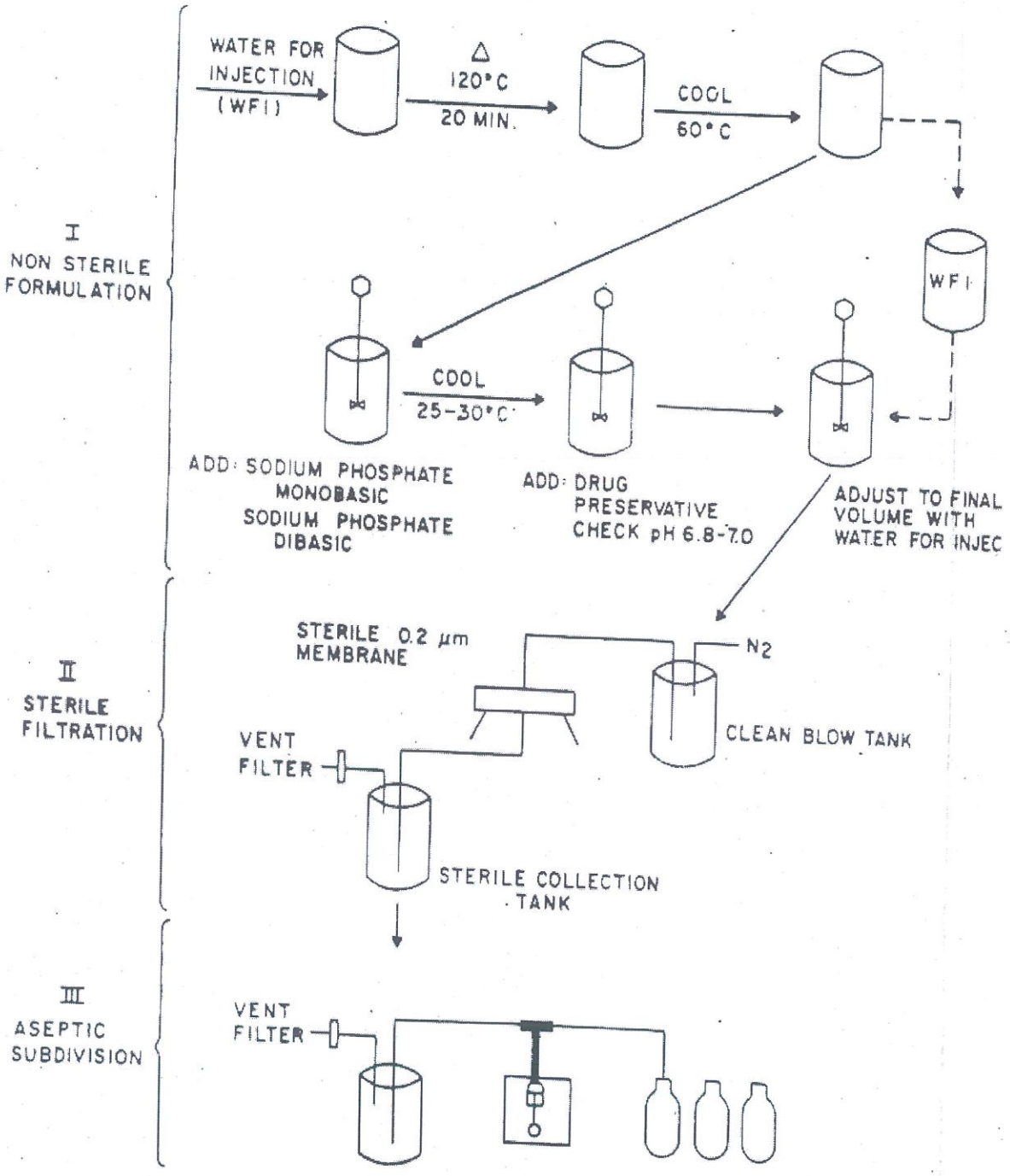


Figure 12 Production of a sterile solution.

Operation I-Non sterile formulation:

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., 531162

Place water for injection into a clean, vented, stainless steel pressure tank. A starting volume in excess of 10% of the final container volume is recommended to cover losses due to evaporation during heating.

Heat the water for injection to 121*c &maintain 20 min. while gradually releasing tank pressure then cool to 60*c

Remove & place in separate vented stainless steel container of suitable capacity a quantity of water for injection equal to 30% of final formula volume

To remaining water for injection at 60*c from step-ii add & dissolve with stirring the sodium potassium mono basic & sodium phosphate dibasic care must be taken the phosphates salts are all dissolved.

Allow the solution from step-4 to cool to room temperature (25-30*c) then add & dissolve the water soluble drug & preservative.

Bring the bulk to final volume with water for injection &mix well.

Operation II sterilization:-

Sterilize the bulk solution from operation-I (vi) by filtration through a sterile sterilizing membrane.

Collecting the sterile filtrate membrane directly from the sterilizing membrane via sterile tubing into a sterile cleaned, vented, stainless steel tank or glass vessel.

Operation III sterile Subdivision:-

Aseptically subdivide the bulk solution into an appropriate sterile container.

Visually inspect all units for defects & particulates against a will lighted black & white back ground.

Submit samples to the QC laboratory for release assays.

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

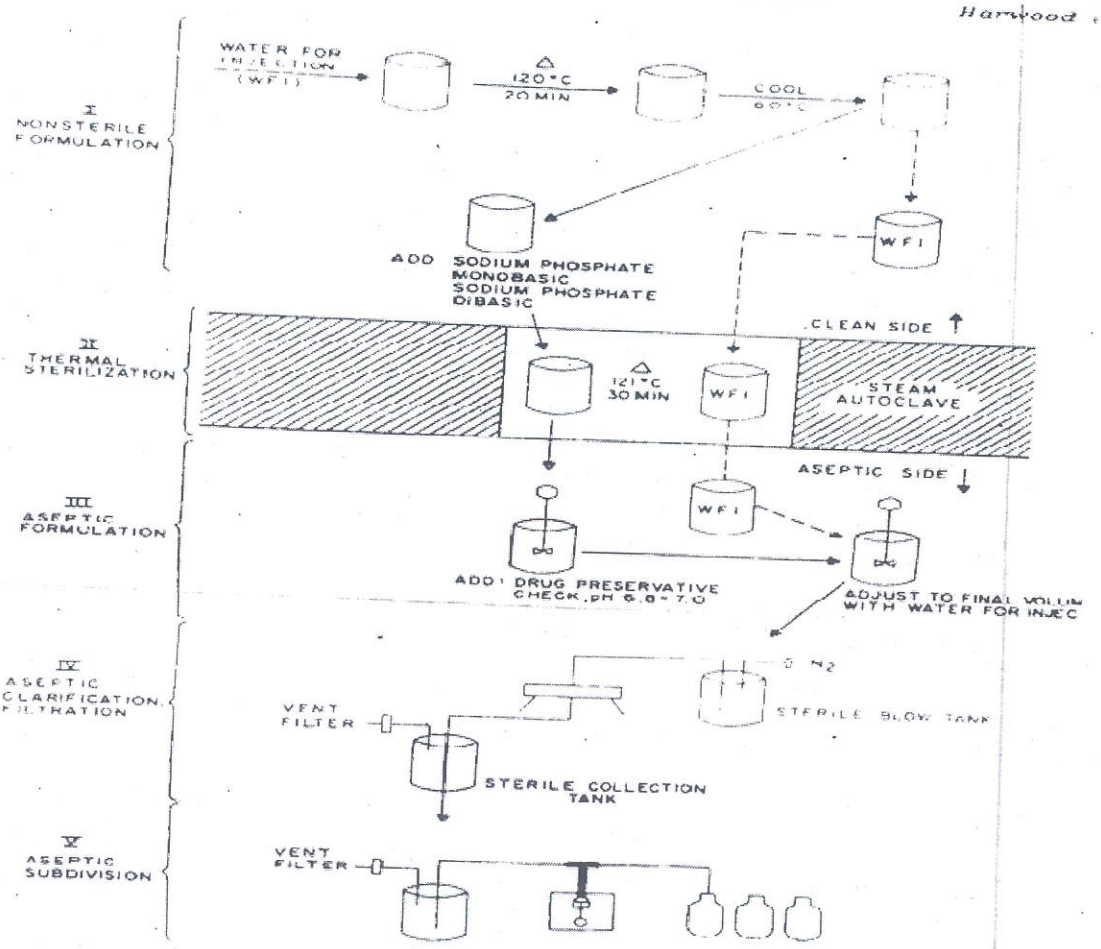


Figure 13 Production of a sterile solution by an alternative sterilization process.

Operation I-Non sterile of the vehicle:-

Place water for injection into a clean, vented, stainless steel pressure tank. A starting volume in excess of 10% of the final container volume is recommended to cover losses due to evaporation during heating

Heat the water for injection to 121*c &maintain 20 min. while gradually releasing tank pressure then cool to 60*c

Remove & place in separate vented stainless steel container of suitable capacity a quantity of water for injection equal to 30% of final formula volume &save for final adjustment

To the remaining water for injection at 60*c from step-ii add & dissolve with stirring the mono hydrates & anhydrous forms

Seal the pressure tank for autoclaving.

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

Operation II- Thermal sterilization of the vehicle:-

Autoclave both of the vessels from operation-I, steps 3-4 for 30 min. at 121*c timed at product temperature.

Operation III- Aseptic formulation of the active & Preservative:-.

Cool the sterile vessels operation-II to room temperature then aseptically add dissolve the water soluble drug &preservative.

Aseptically bring the bulk to final volume with WFI

Operation IV- Filtration:-

Filter the bulk solution from operation-III step iii through a sterile membrane.

Collect the sterile filtrate directly from the membrane via sterile tubing into a clean, closed, vended, stainless steel tank or glass vessel.

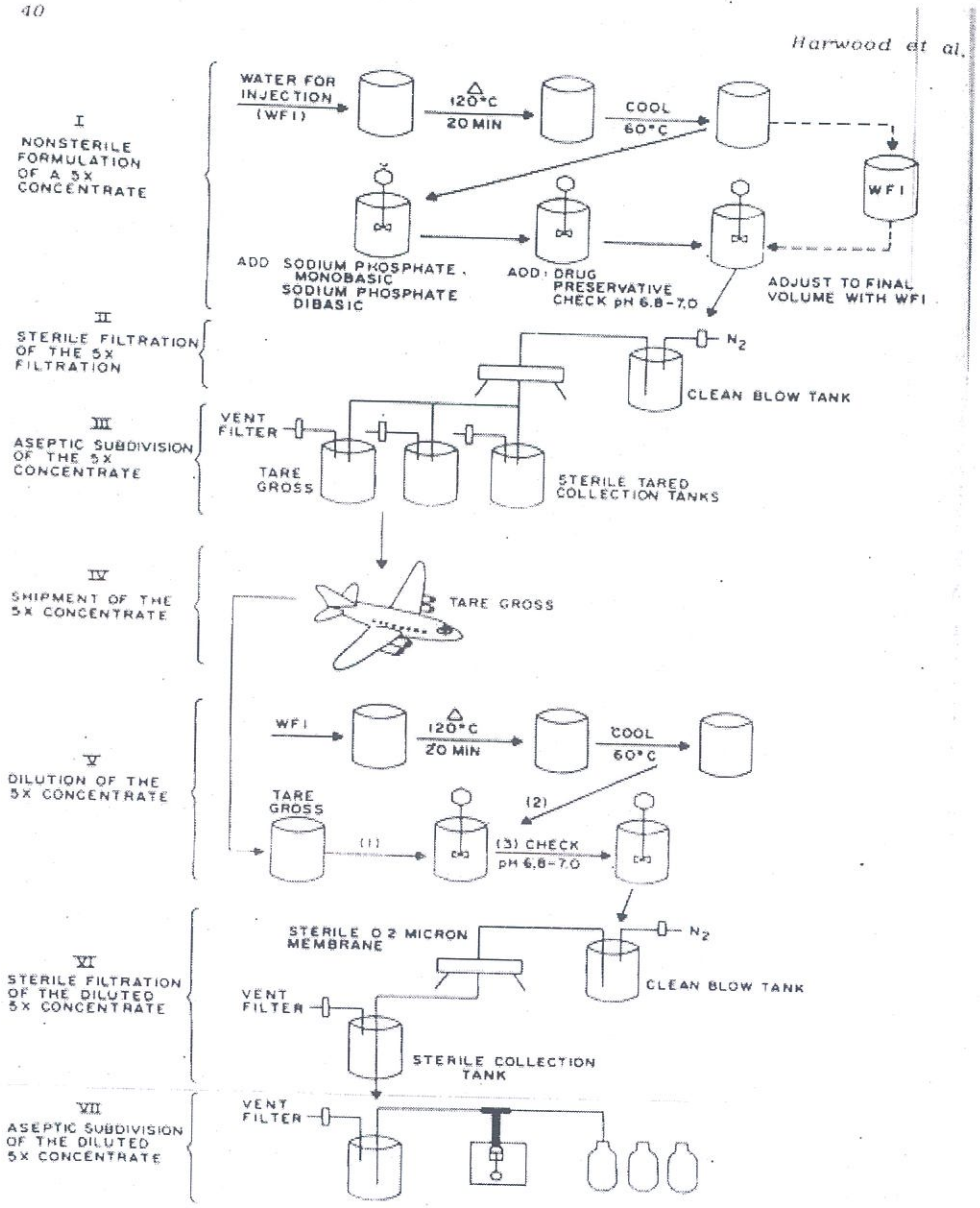
Operation V Sterile subdivision:-

Aseptically subdivide the sterile bulk solution in to an appropriate sterile container.

Heat the water for injection to 121*c &maintain 20 min. while gradually releasing tank pressure then cool to 60*c

Remove & place in separate vented stainless steel container of suitable capacity a quantity of water for injection equal to 30% of final formula volume & seal the vessel &save for final adjustment.

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162



Production of Sterile solution via 5X concentration.

Operation-I Non sterile formulation of a 5X concentrate:-

Place water for injection into a clean, vented, stainless steel pressure tank. A starting volume in excess of 10% of the final container volume is recommended to cover losses due to evaporation during heating & seal the pressure tank.

To remaining water for injection at 60*c from step-ii add & dissolve sodium phosphate monobasic & sodium phosphate dibasic.

Allow the solution from step-4 to cool room temperature (25-30*c) adjust the Ph to 6.8-7.0 required with approximately 1N NaOH solution.

Bring the bulk to final volume of the concentrate with water for injection mix well

Operation-II, III, IV-Sterilization

Sub division, shipment of 5X concentrate:-

Sterilize the bulk solution from operation I, step-vi, by filtration through a sterile sterilizing membrane.

Collect the sterile filtrate in a clean, ventilated, sterile, tightly sealable stainless vessel for shipping & also collect samples for assay& sterility testing.

Record the empty tare weight &gross weight of filled shipping vessel on the vessel prior to shipping.

Operation V Dilution of 5X concentrate to provide a bulk solution:-

Place water for injection into a clean, vented, stainless steel pressure tank. A starting volume in excess of 10% of the final container volume is recommended to cover losses due to evaporation during heating & seal the pressure tank.

Heat the water for injection to 121*c &maintain 20 min. while gradually releasing tank pressure then cool to 60*c

Remove & place in separate vented stainless steel or glass container of suitable capacity about 15%of water for injection

Seal the vessel & save for final volume adjustment.

Cool the remaining 85% of WFI from step-ii to room temperature.

Bring bulk to final volume adjustment is obtained from a portion of material saved from step-3.

Operation VI sterile formulation of the diluted 5X concentrate:-

Sterilize the bulk solution from operation III, step-6 by filtration through a sterile sterilizing membrane with an appropriate non scheduling Pre clarification filter pad.

Collect the sterile filtrate directly from the sterilizing membrane via sterile tubing & siphon into a clean, sterile, vented, stainless steel tank or glass vessel.

Operation VII aseptic subdivision of the dilute 5X concentrate:-

Aseptically subdivide the sterile bulk solution into an appropriate sterile container.

Aseptically apply the sterilized closure systems & seal.

Sample across the filling operation at intervals determined by the local QC director for sterility tests & volume fill checks.

Visually inspect all units for defects & particulates against a well lighted Black &white back ground.

Submit samples to the QC laboratory for release assays

Typical small volume of parenteral sterile solution formulations which may be processed

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

Packaging & Labeling:-

The packaging should provide ampoule protection for the product against physical damage from shipping handling & storage as well as protecting light-sensitive materials from Ultra violet Radiation.

The packaging should provide ampoule protection for the product against physical damage from slipping handling & storage as well as protecting light-sensitive materials from ultraviolet radiation.

The label must be indicate the name of the Manufacturer or distributor & carry an identifying a lot number. The lot number is capable of providing access to the complete Manufacturing history of the specific package including each single Manufacturing step.

Sealing:-

All containers must receive a primary seal in sterile area immediately after filling. In addition some containers require a secondary to assure the uses that the primary seal has not been opened.

Sealing ampoules:-

Ampoules are unique in that the primary & secondary seal are the same. These are sealed by melting a portion of the glass in a flame. These are two types of seals.

Pull seal

Tip seal

Pull seal: - It is made by heating the neck of an ampoule below the tip to molten state & then pulling the top of neck away from the ampoule body. A small twisted capillary forms which is easily melt-closed by the heat oh he flame.

Tip seal: - It is made by heating the top of the neck of rotating ampoule to form a molten bead that seals the ampoule on cooling.

Sealing Bottles, Cartridges & Vials:-

These containers have a primary seal consisting of tight-fitting rubber or plastic closure & a secondary seal that holds the primary seal in place.

The secondary seals are usually Aluminum caps that are crimped on to a thread less container or Aluminum or plastic screw cap which is maintained in place by a semi perforated crimp or plastic stink band.

Sealing syringes:-

Syringes are unique in regard to sealing characteristics due to the needed for venting the sterile packaging when applying rubber seal some types of vacuum or sterile venting procedure is required to

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

insert the plunger/stopper after filling the syringe one can use analogy of trying to fit a cork into very full bottle. The air has to be evacuated or displaced before the cork will remain the bottle due to the back pressure generated by compressing the air that remains.

Inspection of the final container:-

One important part of the production scheme is the inspection of the units for a variety of defects such has cracked glass , no stopper , no cap ,poor seal , crimp or visible particulate matter such as black speaks ,white speaks, fibers , rubber particles & lack of clarity.

Many manufactures are beginning to use sophisticated electronic inspection devices which work either by light scattering reflection or by video recording imagery.

The biggest problem has been in setting limits i.e. "How clean is clean". The sensitivity of many of the electronic is so much greater than that of human eyes that limits could be set in the machine that would make all units fail. The ideal is to set the machine to duplicate the standard efficiency of the human inspectors.

QUALITY CONTROL OF PARENTERALS

Quality control and quality assurance are important to all pharmaceutical dosage forms.

Quality control is generally divided into 3 areas –

Raw materials

In-process controls

Product specifications

The quality control tests for parenterals are done in three general areas, incoming stock, manufacturing process and finished product.

The incoming stock quality control tests include pyrogen tests on water for injection, glass test on containers, identity tests on rubber closures, microbial load test.

The manufacturing process control tests include conductivity measurement for water for injection, filling of containers, temperature of sterililization, final assay, and identity of label for product.

The quality control tests are as follows:

LEAKER TEST:

Ampoules provide hermetical sealing of container for single dose of the product. If any pores or cracks are present micro organisms may enter or contents may leak and spoil the package.

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., 531162

For leakage tests, sealed containers are dipped in colored solution of 0.5 to 1.0% methylene blue and vacuum is applied. A negative pressure is produced in container and the release of vacuum forces the colored solution inside leaked ampoules and shows colour. This test is effective when the ampoules are immersed in a bath of dye during autoclaving.

DISADVANTAGES:

Capillaries of 15microns in diameter or smaller cannot be detected.

The leakage test for vials is done by applying spark tester probe to outside of bottle.

CLARITY TEST:

The parenterals preparations should be free from particulate matter in the range of 30-40 micrometers and larger sized particles.

USP states that all containers should be visually inspected for visible particles & if present they are discarded

In large volume parenterals the USP states a limit of fifty particles of 10 micro meters & larger; and particles of 25 micrometers and larger per ml.

Parenterals for I.V use should be free from insoluble particles.

The clarity is tested by visual inspection of containers under light and viewed against a black and white background. Heavy particles are tested by inverting the container.

Instrumental methods of evaluation are based on the principles of light scattering, light absorption and electrical resistance which are used to count particle and particle size distribution.

The methods used for monitoring particulate matter are as follows:

Visual method:

In this the filled containers are viewed against strong illuminated screen and the container with particles is rejected.

Coulter-counter method:

It is based on the resistance observed between the particles and used for the determination of particles below 0.1 micro meters.

Filtration method:

This method is based on counting particles collected on the surface of the filter under microscope.

Light blockage:

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

It is based on the blockage of path of light based on size of particles.

The equipments used for measurement of particulate matter are microscopy, x-ray diffraction, mass microscopy, scanning electron microscopy,

Permitted limits of particulate matter as per IP,

PARTICLE SIZE IN MICROMETER EQUAL OR LARGER THAN	MAXIMUM NUMBER OF PARTICLES PER ML
10	50
25	5
50	Nil

Pyrogen testing:

Pyrogen testing is done to check the presence or absence of pyrogen in all aqueous parenteral preparations.

Pyrogens are the metabolic products of microorganisms and are mostly produced by gram negative micro organisms.

Pyrogens are polysaccharides and are thermo stable. They are soluble in water and can pass through bacterial proof filters. They are unaffected by bactericide.

Principle:

The test involves the measurement of the rise in body temperature of rabbit following I.V injection of a sterile solution of a substance being examined.

Three healthy adult rabbits of either se, each weighing not less than 1.5 kg are taken and are fed on complete and balanced diet so that they does not show any loss in body weight during the proceeding week of test.

Rabbits having a temperature higher than 39.8^0 c and showing a temperature variation greater than 0.2^0 c between two successive readings in the determination of initial temperature should not be used.

Procedure:

Dissolve the substance in pyrogen free saline solution. The volume of injection should not be less than 0.5 ml per kg and not more than 10 ml per kg of body weight.

Clinical thermometer is inserted into the rectum of the rabbit for recording the body temperature. Two normal readings of rectal temperature should be taken prior to the test injection at an interval of half an hour and its mean is calculated, which is the initial temperature of the rabbit.

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

The solution under the test is injected slowly through an ear vein in a volume of 0.5 to 10 m/kg of body weight. Record the temperature of each rabbit in an interval of 30 minutes for three hours after the injection. The difference between the initial temperature and the maximum temperature recorded for a rabbit is taken to be its response. When this difference is negative, the result is counted as a zero response.

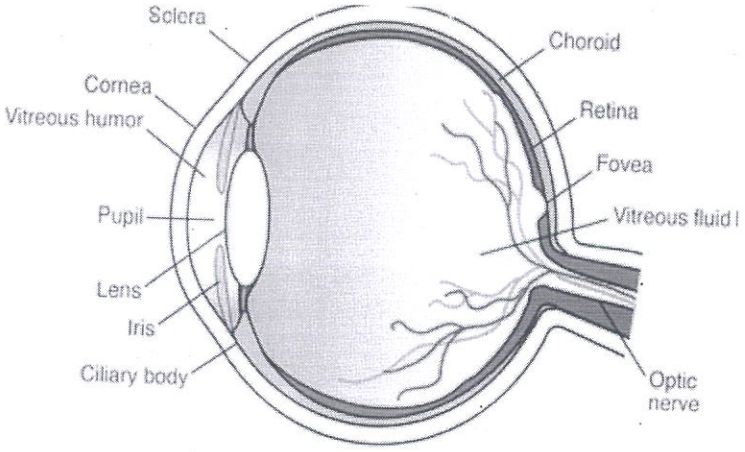
PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

UNIT-6
OPHTHALMICPREPARATIONS:-

Introduction;

Ophthalmic preparations (eye preparations) are sterile, liquid, semisolid, or solidpreparations that may contain one or more active pharmaceutical ingredient(s) intended for application to the conjunctiva, the conjunctival sac or the eyelids. The choice of base and any excipients used for the preparation of ophthalmic preparations must be proven through product development studies not to affect adversely either the stability of the final product or the availability of the active ingredients at the site of action. The most commonly employed ophthalmic dosageforms are solutions, suspensions, and ointments.But these preparations when instilled into the eye are rapidly drained away from the ocular cavity due to tear flow and lachrymal nasal drainage.

Eye is the most easily accessible site for topical administration of a medication. Ideal ophthalmic drugdeliverymustbeabletosustainthedrugreleaseandtoremaininthevicinityoffrontofthe eyefor prolongperiod.The newestdosage formsforophthalmic drug delivery are:gels,gel- forming solutions, ocular inserts, intravitreal injections and implants.



Anatomyofthehumaneye.

Formulation considerations:-

a) **Tonicity and Tonicity-Adjusting Agents:** The tonicity of aopthalmic solution should be adjust correctly(urge a osmotic pressure equal to that of tear fluids, generaly agreed to be equal to 0.9% NaCl) a range of 0.5-2.0% NaCl equvivalency does not causė a marked pain and range of about 0.2-0.7% sholud be acceptable for most persons. Common tonicity adjusting ingridient are: NaCl, Kcl, Buffer salt, dextrose, glycerine, propylene glycol and mannitol.

b) **pH Adjustment and Buffers:**pH adjustment is very important as pH affects:
- To render the formulation more stable

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

- Toenhancethedrugbioavailability
- To maximize preservative efficacy Ideally every product buffered to a pH of 7.4(The normal physiological pHof tear fluid) If buffersare required, theircapacity is controlledto be as low as possible.
- ToenablethetearstobringthepHoftheeyebacktothephysiologicalrange
- To avoid effect of buffers on tonicity. Examples of buffer vehicles used:-Boric acid vehicle: pH ofslightly below 5-Isotonic phosphate vehicle: pH ranges from 5.9 -8.

c) **Viscosity-ImpartingAgents:**

Polyvinyl alcohol, methylcellulose, hydroxyl propyl methylcellulose, hydroxylethylcellulose and carbomers are generally used in parentral preparation as viscosity imparting agent. They increase the ocular contact time thereby they decrease the drainage rate, increase the mucoadhessiveness and increase drugbioavilability.

d) **Stabilizers&Antioxidants:**

Stabilizers are the ingredients, which makes the preparation to decrease the rate of decomposition of active ingredient. Antioxidants are principle stabilizers added to some opthalmic preparation, primarily those containing epinephrine, and other oxidizable drugs.Example: Sodium bisulphite or metabisulphite are used in concentration up to 0.3% in epinephrine hydrochloride and bitartrate solution.

e) **Surfactants:**

The order of surfactant toxicity is anionic>cationic>>non-ionic. There are several non-ionic surfactant are used in low concentration to add in dispersing steroid in suspensions and to achieve or improve solution clarity. Some of the surfactant which are principally used are sorbiton ether esters of oleic acid (polysorbate or tween 20 and 80).

f) **Preservatives:**

Preservatives are included in multiple-dose eye solutions formaintaining the product sterilityduringuse.Preservatives not included inunit-dosepackage.Theuseof preservativesisprohibitedinophthalmicproductsthatareusedattheofeyesurgery because, if sufficient

Concentration of the preservative is contacted with the corneal endothelium; the cells can become damaged causing clouding of the cornea and possible loss of vision. The most common organism is Pseudomonas aeruginosa that grow in the cornea and cause loss of vision. Examples: benzalkonium chloride, 0.004% to 0.01%;benzethonium chloride, 0.01%; chlorobutanol,0.5%; phenylmercuric acetate, 0.004%; phenylmercuric nitrite, 0.004%; and, thimerosal, 0.005%to 0.01%.

Formulation of eye drops:

Ophthalmic solutions are sterile solutions intended for instillation in the eye. In addition to sterility, these dosage forms require the careful consideration of such other pharmaceutical factors as the need for antimicrobial agents, osmolarity, buffering, viscosity, and proper packaging.

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

An eye drop formulation comprises of the following:

a) Activeing redients to produce desired therapeutic effect.
b) Vehicle (AquousorOily).
c) Inertantimicrobialpreservativestopreventmicrobialcontaminationandtomaintainsterility.
d) Inert adjuvants for adjusting tonicity, Viscosity and PH to increase the stability of active ingredients.
e) Suitable container to maintain the preparation in a stable form and provide protection against contamination during preparation, storage and use.
f) Multi dose eye drops are added with an effective antimicrobial preservative system(a single substancecannotbesuccessfullyusedasapreservative inophthalmic solution)thatshould pass the test for efficacy of antimicrobial preservative. Thisensures that the eye drops aresterile and non-contaminated.

FormulationofEyeOintments:

Ophthalmic ointments must be sterile. Like suspensions, ointments can be more difficult to manufacture in sterile form. They can be terminally sterilized, or, alternatively, they must be manufactured from sterile ingredients in an aseptic environment. Filtration through a suitable membrane or dry heat sterilization is often used.

- The ointment base selected for an ophthalmic ointment must be non-irritating to the eye and must permit the diffusion of the active ingredient throughout the secretions bathing the eye.
- Ointment bases utilized for ophthalmics have a melting or softening point close to body temperature.
- Ophthalmicointmentshavealongerocularcontacttimewhencomparedtomanyophthalmic solutions.
- Ointmentbaseissterilizedbyheatandfilteredwhilemoltentoremoveforeignparticulate matter.
- It is then placed intoa sterile steam jacketed tomaintain the ointment in amolten stateandexcipients are added.
- One disadvantage to ophthalmicointmentsis the blurred vision that occurs as the ointmentbase melts and spread across the lens.
- Thebaseslike;yellowsoftparaffin,liquidparaffinandwoolfatcanbeusedforthe preparation of eye ointment.

FormulationofEyeLotions:-

Eyelotionsareundilutedaqueoussolutions,appliedtoaneyebath,whichforfirstaid purposes. It is may allow a large volume of fluid to flow quickly over the eye.
Itisiso-osmotictotears,becausecomparedtoeyedrops,lotionscausemuchgreaterdilutionof thelachrymalfluid,hencecausediscomfortifnotadjusted.e.g.Sodiumchloride(NaCl)eyelotion B.P.C.isusedtoremoveforeignsubstancefromtheeye.

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

Thus these preparations should be very simple as wellas the mostcommon eye lotionconsists ofsterile normal saline. This preparation demonstrate the requirements of an eye lotion which are:

- Sterileaswellasusuallycontaining nopreservative.
- Isotonictolachrymalfluid
- NaturalpH
- Largevolumebutnotgreater than200ml
- Non-irritanttoocular tissue.

MethodsofPreparation:

1) PreparationoftheSolution:Theaqueouseyedropsvehiclecontainingsuitablepreservative ,antioxidant ,stabilizer, tonicitymodifier , viscositymodifier,orbuffershouldbe prepared,andaddedwith theactiveingredientandthevehicleto makeupthe volume.
2) Clarification:sinteredglassfiltersormembranefiltershaving0.45-1.2µmporesizes shouldbeused.Theclarified solution is either fillieddirectly intothefinalcontainers whicharesealedbeforeheatsterilisationoristemporarilyfilledintoasuitable containerbeforefiltration.Clarifiedcontainersvehicleisusedtoprepareeyedrop suspensionsfilledintofinalcontainersandsealed beforesterilisation.
3) Sterilisation: Thiscan beachievedby autoclavingat115°Ctemperature for30minutesor 121°Ctemperaturefor15minutes .Filtration into sterile containers through a membrane filter having 0.22µm pore size is also a suitable method for sterililisation.Dry heat sterilisation at 160°C temperature for 2 hours is best suited for non-aqueous preparations such as liquid paraffin eye drops.
4) After sterilisation, the eye drop containers should be covered with a readily breakable seal to distinguish between opened and unopened containers.

Labeling:-

Thelabelshouldinclude:

(1) Thenameofthepharmaceuticalproduct;
(2) Thename(s)oftheactiveingredient(s);InternationalNonproprietaryNames(INN)shouldbe used wherever possible;
(3) The concentration(s) of the active ingredient(s) and the amount orthe volume of preparation inthe container;
(4) Thebatch(lot)numberassignedbythemanufacturer;
(5) Theexpirydate,theutilizationperiod,and,whenrequired,thedateofmanufacture;
(6) Anyspecialstorageconditionsorhandlingprecautionsthatmaybenecessary;
(7) Ifapplicable,theperiodofuseafteropeningthecontainer;
(8) Directionsforuse,warningsandprecautionsthatmaybenecessary;
(9) The name and address of the manufacturer or the person responsible for placing the product onthe market;

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

(10) If applicable, the name(s) and concentration(s) of antimicrobial agent(s) and/or antioxidant(s) incorporated in the preparation; and
(11) Thestatement"Thispreparationissterile".

Storage:

Ophthalmic preparations should maintain their integrity throughout their shelf-life when stored at the temperature indicated on the label. Special storage recommendations or limitations are indicated in individual monographs.

Containers:

Traditionally, ophthalmic liquid products were packed in glass containers fitted with an eye dropper. Today, glass containers have limited use where product stability or compatibility issues exclude the use of flexible plastic containers made of polyethylene or polypropylene. Most liquid ophthalmicproductsonthemarketarepackagedinplasticcontainersfittedwithnozzlesfrom which, by gentle squeezing, the contents may be delivered as drops.

- Plastic containers have several advantages over the glass-dropper combination such as minimizing the risk of the contents being contaminated with microorganisms by the replacement of the dropper which may have become contaminated by touching the infected eye or any other surfaces. Also, plastic containers are cheap, light in weight, more robust to handle and easier to use than glass-dropper type containers.
- Some plastic materials such as polyethylene can absorb some antimicrobial preservatives(e.g. benzalkonium chloride), or some drugs. They may also leach plasticizers into the product, or printing inks from the label can migrate through the plastic into the product.
- The challenge is to develop a packaging system for preservative-free products that maintains the sterility of the product throughout its shelf-life and during use.
- Unit-dose systems offer the easiest technical solution to this problem but have the disadvantage of higher cost of manufacture and of not being as compact as a multidose product containing equivalent doses.
- An alternative approach is to develop a multidose preservative free system. The container is required to be collapsible, and the suck-back of air, which could contain bacteria, has to be avoided. Containers are being developed that contain a valve mechanism to achieve this
- Plastic containers can also be permeable to water vapor and oxygen over prolonged periodsof storage. This can lead to gradual loss of liquid product or oxidation of an unstable drugover time.
- Polyethylene containers are not able to withstand autoclaving and are usually sterilized by ethylene oxide or by irradiation before being filled aseptically with pre-sterilized product. Polypropylene containers can be autoclaved, but are not as flexible as polyethylene for eyedropper use.

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., 531162

- Semi-solid products have been traditionally packed in collapsible tin tubes. Metal tubes are a potential sourceof metal particles in ophthalmic products, and so the tubes have to becleaned carefully prior to sterilization.
- Collapsible tubes made from laminates of plastic, aluminum foil and paper are good alternative to tin tubes. Laminate tubes fitted with polypropylene caps can be sterilized by autoclaving.

Evaluationofophthalmicpreparations:-

Ophthalmicpreparationsareevaluatedasfollows:

1) **Sterility:** The ophthalmic products should meet the standard requirements. If the ingredients used do not lend themselves to routine sterilization, ingredients that meet the sterility requirements should be used. The container for ophthalmic preparations should be sterilizedat the time of filing and closing. They should be sealed and tamper-proof to maintain their sterility.
2) **Antimicrobial preservatives:** These should be added to multiple-dose containers, unless there are different directions provided in the individual monograph for multiple productwithdrawal, the substance contains a radionuclide with a physical half of less than 24hours,he product itself is sufficiently microbicidal, or the added ingredients meet the requirementsof antimicrobial agent content. Thus, acceptance criteria for the content of antimicrobial preservative in multiple-unit products should be established.
3) **Uniformity of Dosage Units**: This test should be performed for single-dose containers to evaluate the mass of dosage form as well as the content of the drug substance(s) in thedosages form. The test is performed by either content uniformity or weight variation.
4) **Uniformity in Containers:** Semisolid drug products undergo physical separation during manufacturing and /or during the storage period. To ensure the drug product integrity, the uniformity of the finished product at the time of batch release and throughout its shelf-life should be evaluated.
5) **Leachable and Extractables:** The packaging system and the preparation should not undergo any physical or chemical interaction to alter the strength, quality, or purity of the drugproduct. The packaging system should meet the requirements in elastomeric closures for injection, and glass or plastic containers.
6) **Container Closure Integrity:** The packaging system should be closed or sealed to prevent contamination or loss of contents. It should also be tamper-proof. Validation of container integrityshoulddemonstratenopenetrationofmicrobial,chemicalorphysical contaminants.

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

7) **Viscosity:**The residence time of the product in eyes increases in viscosity;but the diffusionofdrugfromtheformulationintotheeyeisinhibited.Theophthalmicointmentshavea very high viscosity to prolong their residence time in the eyes.
8) **Antioxidant Content:** The content of antioxidants (if added in the drug product) should be established unless oxidative degradation can be detected by another test method such as impurity testing. Acceptance criteria for antioxidant content should also be established based on the levels of antioxidant required to keep the product stable throughout its shelf-life.
9) **ParticleSizeand Particle Size Distribution:**The potential for any changes in the particle sizeof ophthalmic suspensions and emulsions should be evaluated through stability testing. the drop size for ophthalmic drops ranges from 20-70µm.However,the drop size should be controlled and maintained throughout the product shelf-life. Suitable substances should be added to the ophthalmic products to increase their stability, provided they do not cause any harm in the amounts administered and do not interfere with the therapeutic efficacy or responses to the specified assays and tests.

References:

1) Introduction to Pharmaceutical Dosage Forms. Ansel, HC— 4th ed. Philadelphia: Lea & Febiger; 1985:321–336.
2) Industrial pharmacy-I by KL Senthilkumar, AS Mundada and RS Kankate: Ist ed.Thakur Publication, pg. no.163-204.
3) Pharmaceuticaldosageforms:parenteralmedicationsofindustrialpharmacy,Lachmann/ Lieberman's, 4th edition, pg.no. 864-871.
4). DispensingpharmacybyRMMehta,pg.no.303-311.
5). Thescience&practiceofpharmacy,Remington,21stedition,pg.no.1367-1374.

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

ESTD : 2005

AVANTHI INSTITUTE OF PHARMACEUTICALSCIENCES
(Approved by A.I.C.T.E, PCI, Recognized by the Govt. of A.P. & Affiliated to JNTU-Kakinada)
Cherukupally (Village), Chittivalasa (SO), Bhogapuram (Mandal), Vizianagaram (Dist.) -531162.
www.avanthipharma.ac.in, principal@avanthipharma.ac.in

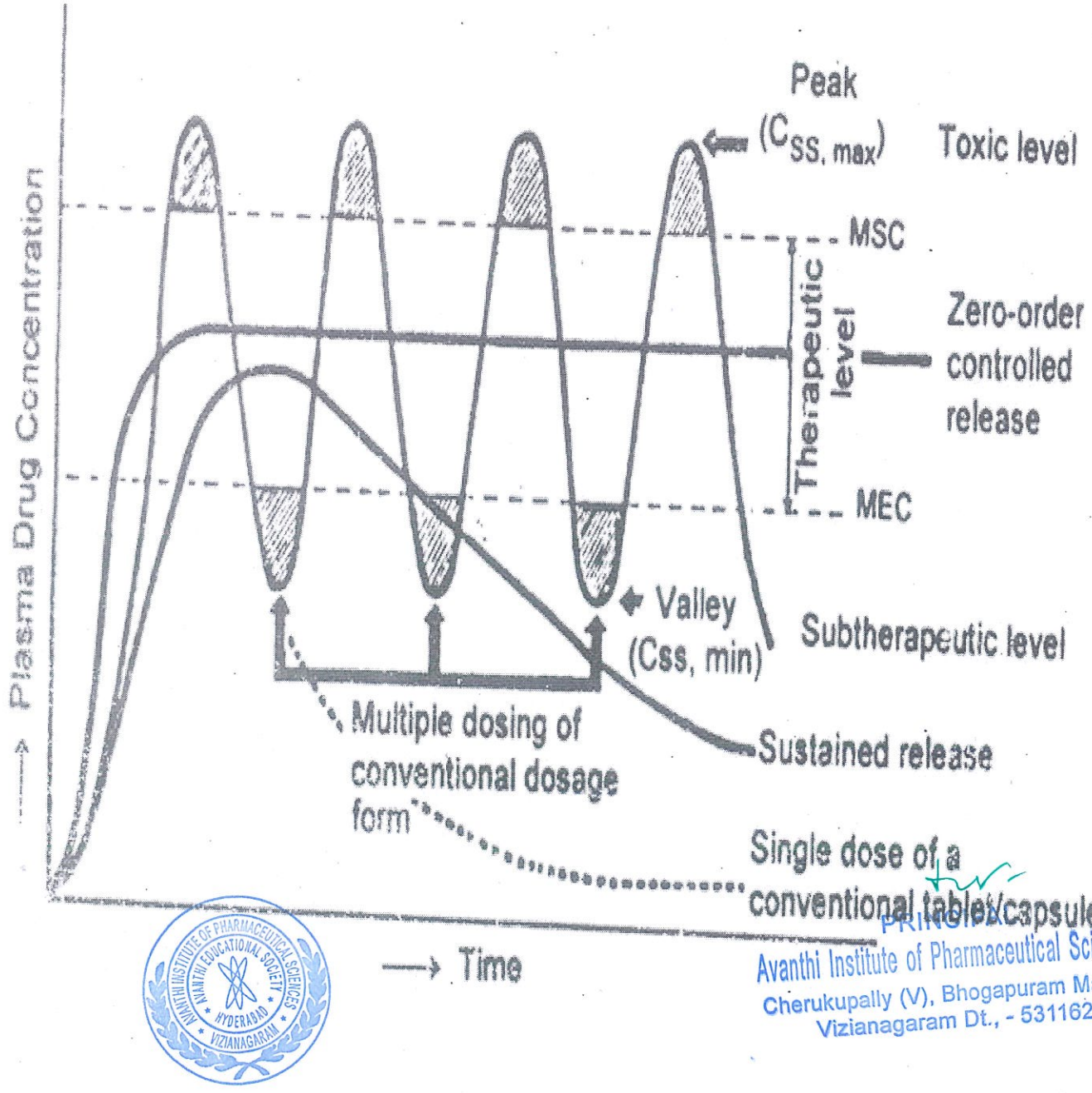
UNIT -7

CONTROLLED RELEASE ORAL DRUG DELIVERY SYSTEM

INTRODUCTION:

- Controlled drug delivery is one which delivers the drug at a predetermined rate, for locally or systemically, for a specified period of time.
- Continuous oral delivery of drugs at predictable& reproducible kinetics for predetermined period throughout the course of GIT.

Plasma concentration time profile:



PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

- Development of drug delivery system:
- Delivering a drug at therapeutically effective rate to desirable site.
- Modulation of GI transit time: Transportation of drug to target site.
- Minimization of first pass elimination
- **Advantages:**
- Total dose is low.
- Reduced GI side effects.
- Reduced dosing frequency.
- Better patient acceptance and compliance.
- Less fluctuation at plasma drug levels.
- More uniform drug effect
- Improved efficacy/safety ratio.

Disadvantages:

- Dose dumping.
- Reduced potential for accurate dose adjustment.
- Need of additional patient education.
- Stability problem.

Mechanism aspects of Oral drug delivery formulation:

1. Dissolution: 1.Matrix
   2. Encapsulation
2. Diffusion : 1.Matrix
   2. Reservoir

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

3. Combination of both dissolution & diffusion.

4. Osmotic pressure controlled system

5. Ion exchange Resins

6. PH independent formulations

7. Altered density formulations

a) High density approach

b) Low density approach

Dissolution:

- Solid substances solubilizes in a given solvent.
- Mass transfer from solid to liquid.
- Rate determining step: Diffusion from solid to liquid.
- Several theories to explain dissolution–
  Diffusion layer theory (imp)Surface renewal theory
  Limited salvation theory.

Noyes Whitney Equation:

$dc/dt = kD.A\ (Cs - C)$ dc/dt
$= D/h\ A.\ (Cs - C)$ $dc/dt =$
Dissolution rate.

k=Dissolution rate constant (1^{st} order).

D=Diffusion coefficient/diffusivity

Cs=Saturation/maximum drug solubility. C =Con. Of drug in bulk solution.
Cs-C=concentration gradient.

h=Thicknessof diffusion layer.

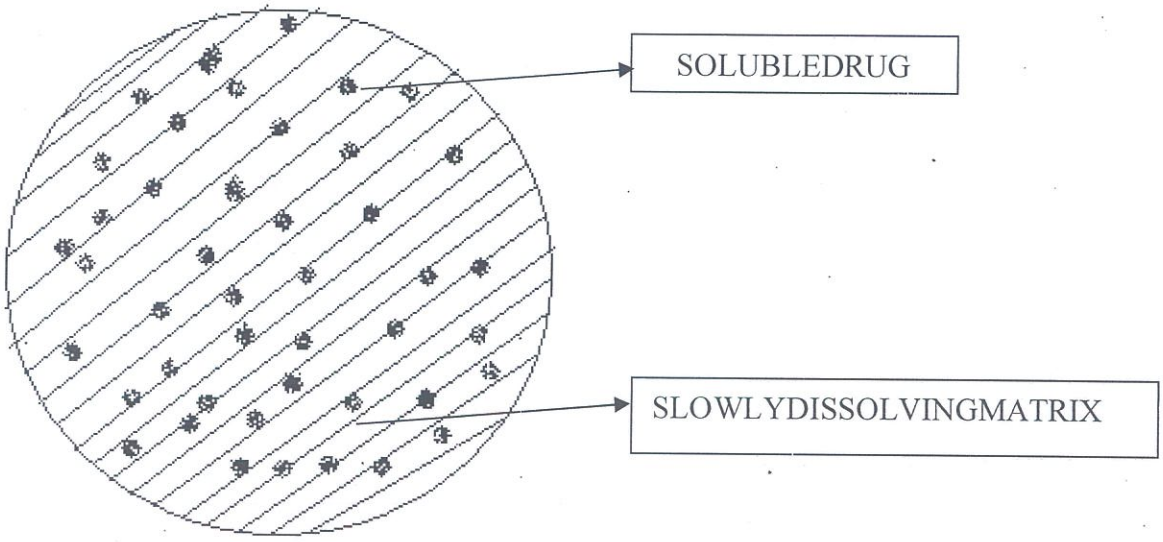
PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., 531162

1. MatrixType:

- Also called as Monolith dissolution controlled system.
- Controlled dissolution by:
  1. Altering porosity of tablet.
  2. Decreasing its wettebility.
  3. Dissolving at slower rate.
- First order drug release.
- Drug release determined by dissolution rate of polymer.

Examples: Dimetaneextencaps,Dimetappextentabs

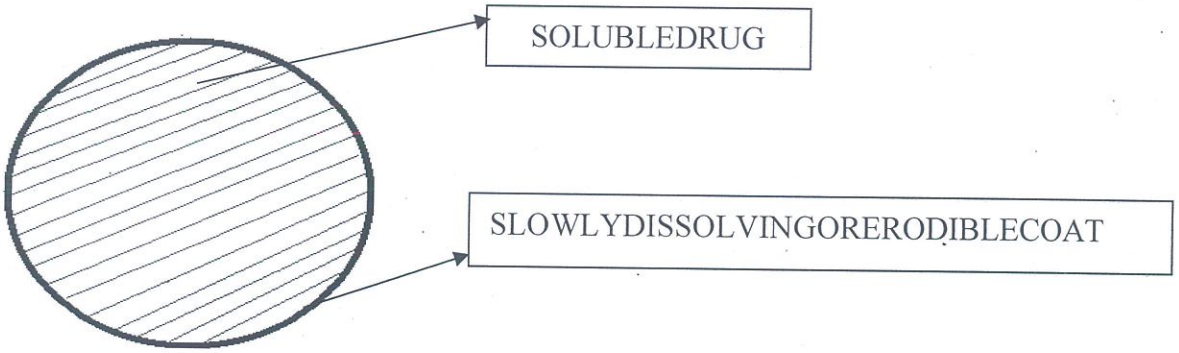
PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162



2. Encapsulation:

- Called as Coating dissolution controlled system.
- Dissolution rateof coat depends upon stability&thicknessofcoating.
- Maskscolour,odour,taste,minimizing GIirritation.
- One of the microencapsulation method is used.

Examples: Ornadespansules,ChlortrimetonRepetabs



PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., 531162

Diffusion:

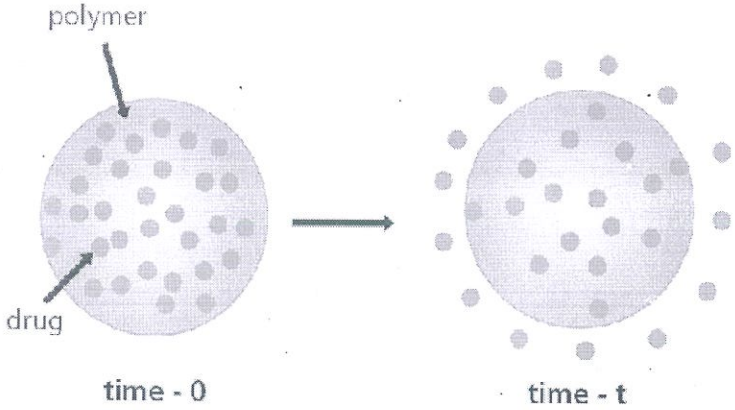
- Major process for absorption.
- No energy required.
- Drugmoleculesdiffusefromaregionofhigherconcentrationtolowerconcentration until equilibrium is attainded.
- Directly proportional to the concentration gradient across the membrane
    - **Matrix DiffusionTypes:**
- **Rigid Matrix Diffusion**:

Materials use dare insoluble plastics such as PVP&fatty acids.

- **Swellable Matrix Diffusion**:

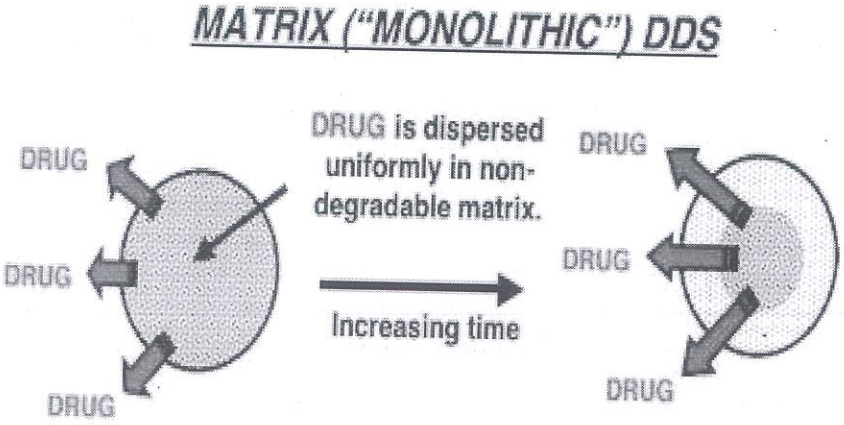
1. Also called as Glassyhydrogels.Popularforsustaining the release of highly water soluble drugs.
2. Materials use dare hydrophilicgums.

Examples: Natural-Guargum,Tragacanth.
Semisynthetic-HPMC,CMC,Xanthumgum. Synthetic - Polyacrilamides.
Examples: GlucotrolXL,ProcardiaXL



PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., 531162

Matrixsystem



Ratecontrolling step:

- Diffusionof dissolveddrugin matrix.

HiguchiEquation:

$Q= DE/T(2A.ECs)Cs.t)^{1/2}$

Where,

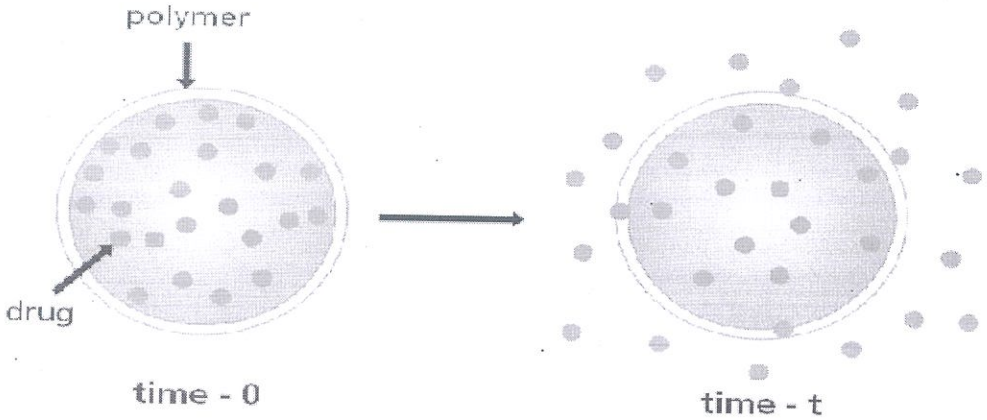
Q=amt of drug release per unit surface area at time t. D=diffusion coefficient of drug in the release medium. E=porosity of matrix. Cs=solubility of drug in releasemedium. T=tortuosity of matrix.
A=concentration of drug present in matrix per unit volume.

2. Reservoir System:

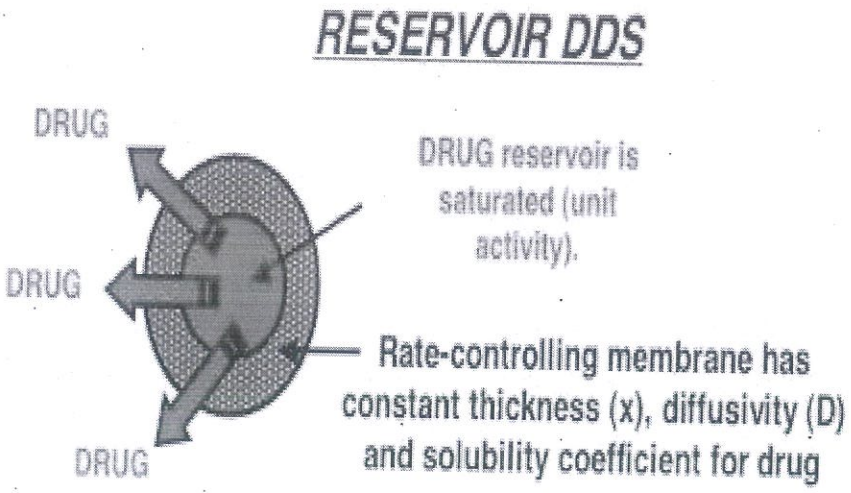
- Also called as Laminated matrix device.
- Hollowsystem containing an inner core surrounded in water insoluble membrane.
- Polymer can be applied by coating or microencapsulation.
- Rate controlling mechanism- partitioning in to membrane with subsequent release into surrounding fluid by diffusion.

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

- Commonly used polymers -HPC,ethylcellulose & polyvinylacetate.



ReservoirSystem



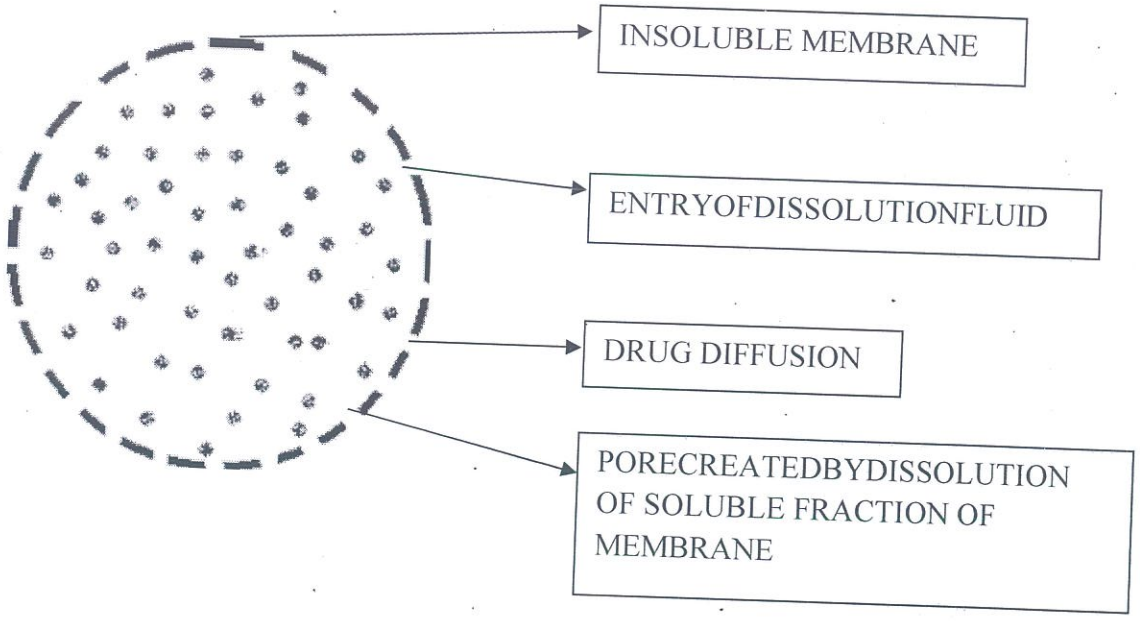
Rate controlling steps:

- Polymericcontentincoating,thickness of coating,hardness of microcapsule.

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

Dissolution&Diffusioncontrolledreleasesystem:

- Drug encased in a partially soluble membrane.
- Pores are created due to dissolution of parts of membrane.
- It permits entry of aqueous medium into core& drug dissolution.
- Diffusion of dissolved drug out of system.
- Ex-Ethylcellulose& PVP mixture dissolves in water &create pores of insoluble ethyl cellulose membrane.



PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt. - 531162

OsmoticPressureControlledDrugDeliverySystem:

Osmosis:

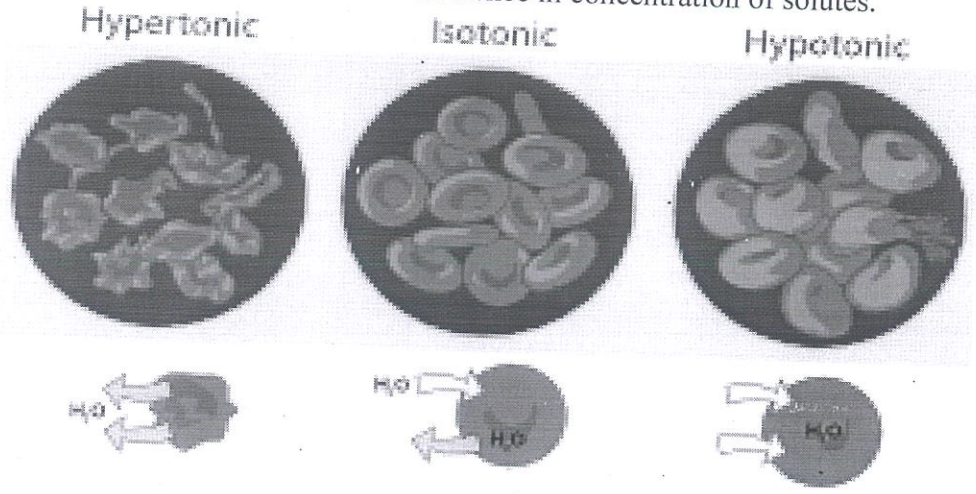
- Movement of solvent from lower to higher concentration.
- The passage of solvent into a solution through semipermeable membrane.

Semipermeable Membrane:

- Molecules are permitted only to one component(Water).

Osmotic pressure:

- It is the hydrostatic pressure produced by a solution in a space divided by a semipermeable membranedue to difference in concentration of solutes.

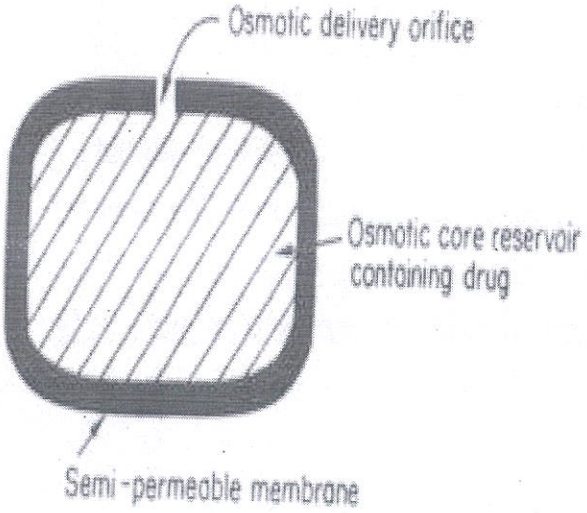


PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

OsmoticPressureControlledSystem:

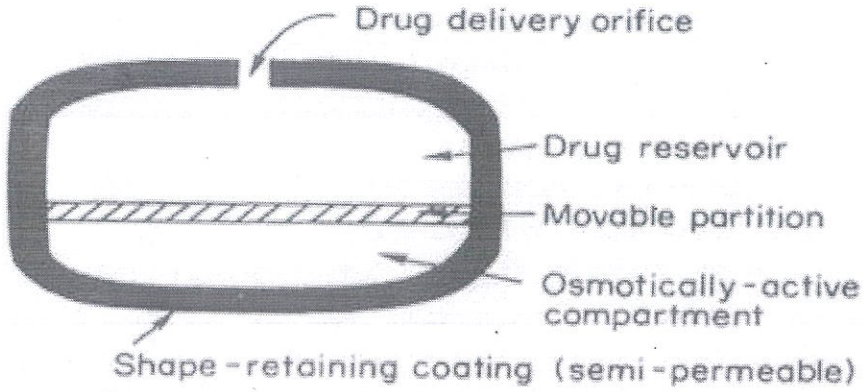
- Provides zero order release
- Drug may be osmoticallyactive, or combined with an osmotic allyactive salt (e.g., NaCl).
- Semipermeable membrane usually made from cellulose acetate.
- More suitable for hydrophilic drug.

Examples:GlucotrolXL,ProcardiaXL,



ELEMENTARYOSMOTICPUMP

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162



OSMOTICPRESSURE-CONTROLLEDDRUGDELIVERYSYSTEM WITH COMPARTMENTS SEPARATED BY A MOVABLE

Modifications:

1. Immediate release system.
2. Osmotically active compartment system

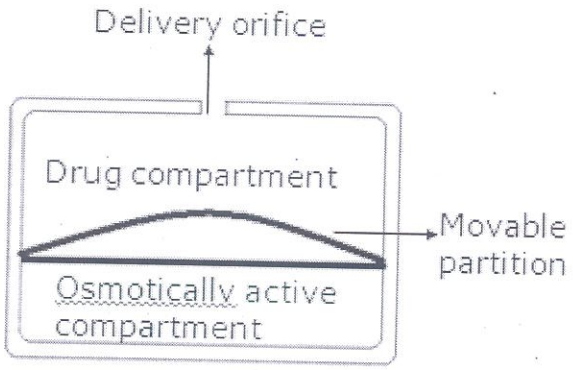
Immediate Release System:

- Activation of system is done.
- Dividing a dose into two parts.
- One third immediate release.
- Two third controlled release.
- Encapsulated into semipermeable membrane.e.g. :Phenylpropanolamine

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

Osmotically active system:

- Two compartments separated by movable partition.
- Osmotically active compartment absorbs water from GIT.
- Create s osmotic pressure.
- Partition moves upward&then drug releases.Ex:Nifedipine

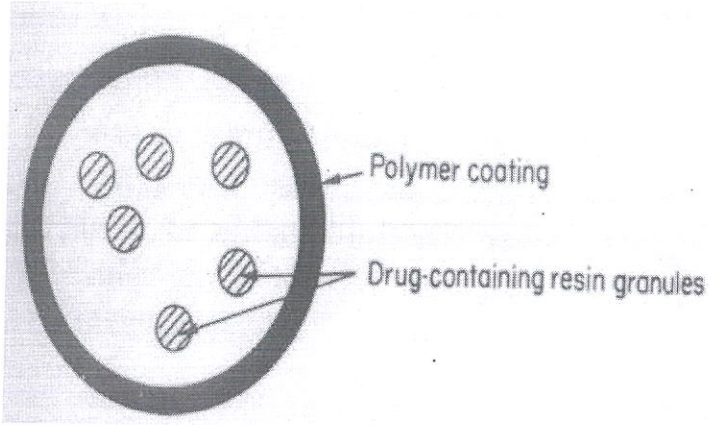


Ion exchange Resins:

- Resins are water insoluble materials containing anionic or cationic groups in repeating positions on the resin chain.

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

- The drug-charged resin is prepared by mixing the resin with drug solution either by repeated exposure of the resin to the drug in a chromatographic solution or by keeping the resin in contact with solution for extended periods of time.



POLYMER-COATEDDRUG-RESINDESIGN

PH independent formulations:

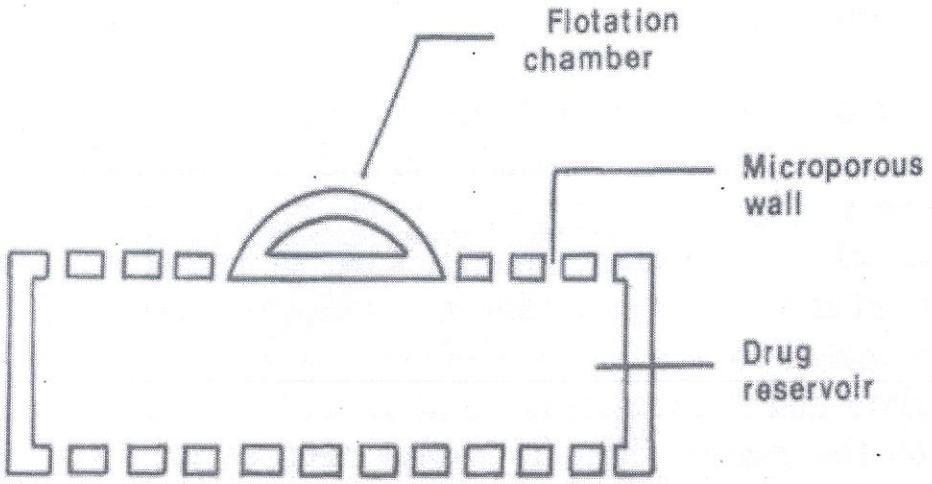
- Thegranulesaredesignedfortheoralcontrolledreleaseofbasicoracidic drugs at a rate that is independent of PH in the GI tract.
- They are prepared by mixing a basic or acidic drug with one or more buffering agents, granulating with appropriate pharmaceutical exicipients and finally coating with a GI fluid permeable film-forming polymer.
- When the GIfluid, permeates through themembrane,the buffering agents adjust the fluid inside to a suitable constant PH, there by rendering a constant rate of drug release.

Altereddensityformulations:

- It is reasonable to expect that unless a delivery system vicinity of absorption site until most,if not all of its drug contents is released,it would have limited utility.
- Theotherapproachistoaltertheformulationsdensitybyusingeitherhighor low density pellets.
- It includes two approaches. They are

a) High density approach
b) Low density approach

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162



DRUG DELIVERY SYSTEM WITHFLOATATIONCHAMBER

Typesoftablets:

1. Matrixtablets
    a. Hydrophilicmatrices
    b. Plastic matrices
    c. Fat wax matrices
2. Ion exchangeresintablets
3. Filmc oated tablets
4. Floatin gtablets
5. Entericcoated & delayedreleasetablets

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

6. Osmotic release tablets
7. Muco adhesive tablets
8. Swellable tablets
9. Multiple unit tablets
10. Microcapsules&Microspheres

Evaluation:

Dissolution rate assessment:
Invivo Bioavailability data:

A. General
B. Specific

1. Fasted single-dose studies
2. Post prandial study
3. Multiple dose study state

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

References:

- Novel drug delivery system ,volume50,Y.W.Chien
- Thetheory& practiceofindustrial pharmacy,LeonLachman,HerbertA. Lieberman,Joseph L.Kanig, 3 rd edition.
- The Eastern pharmacist, November 1993.Sustained release drugs, V R.Gudsoorkar & D.Rambhau Page 27-32
- Biopharmaceuitics&pharmacokinetics,DM.Brahmankar&SunilB.Jaiswal.

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

ESTD : 2005

AVANTHI INSTITUTE OF PHARMACEUTICAL SCIENCES

(Approved by A.I.C.T.E, P.C.I, New Delhi, Recognized by the Govt. of A.P. & Affiliated to JNTU-K Kakinada)
Cherukupally (Village), Chittivalasa (SO), Bhogapuram (Mandal), Vizianagaram (Dist) -531162.
www.avanthipharma.ac.in, principal@avanthipharma.ac.in

III Pharm D I MID Examinations PCI, May-2023

Subject: FORMULATIONS **Branch: Pharm D**

Time: 120 min. **, Max. Marks: 30 M** **Date of exam: 06/11/2021**

S. No	Questions	Blooms Taxonomy Level	Course Out Come	Marks
	Answer any THREE question			
1.	a. Write the Quality control test performed for tablets. b. Explain the formulation of tablets.	Apply understand	CO1	10
2.	a. What are the factors affecting stability of suspensions. b. Explain the theories of Emulsions. c. Write the difference between flocculated and deflocculated suspensions.	Remember apply	CO1	10
3.	a. Write the classification of dosage forms. b. Explain the reasons for in stability for Emulsions.	Understand apply	CO2	10
4.	Write A note on problems Involved in Production of Tablets	Apply understand	CO2	10

B. Pujasree

Signature of the faculty

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

SCHEME OF EVALUATION

1. a. Write the Quality control test performed for tablets.

Weight and variation - 1M

Hardness test - 1M

Friability test - 1M

Disintegration test -1M

Dissolution test -1M

b. Explain the formulation of tablets.

Binders -1M

Diluents -1M

Disintegrents -1M

Lubricants -1M

Guidant's - 1M

2. a. What are the factors affecting stability of suspensions.

Factors each factors 1M

b. Explain the theories of Emulsions.

Theories each theory 1M

c. Write the difference between flocculated and deflocculated suspensions.

2 Differences each 1M

3. a. Write the classification of dosage forms.

Classification according to state 2M

Classification according to usage 2M

Classification according to application 2M

b. Explain the reasons for in stability for Emulsions.

Instability of emulsions 4m

4. Write a note on problems Involved in Production of Tablets

10 problems each one 1m

B. Reja Sree

Signature of the faculty

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

AVANTHI INSTITUTE OF PHARMACEUTICAL SCIENCES

Cherukupally (V), Near Tagarapuvalasa Bridge, Vizianagaram (Dist.) A.P. - 531162.
(Approved by AICTE, PCi & Govt.of A.P. Affiliated to JNTUK, Kakinada)

ESTD : 2005

SUBJECTIVE TEST

Mid I

JNTUK Reg. No. : 19751T0014
Student Name : P. Prasanna
Year : 3rd
Branch : B. Pharm / Pharm D. / Pharm D. (P.B) / M. Pharm
Specialization :
Subject Name : Pharmaceutical formulations
Marks Secured : 29/30

Date : 6/11/21
Sem :
Time :
Total Marks :
Invigilators Signature :

1a)	Explain the quality control tests for tablets	6M
b)	Explain the formulation of tablets	4M
2a)	What are factors affecting Stability of Suspension.	4M
b)	Explain the theories of emulsification	4M
c)	Write the differences between flocculated & deflocculated	2M
3a)	Write the classification of dosage forms	6M
b)	Explain the reasons for instability of emulsions	4M

1a) Tablets are the unit solid dosage form in which drug and excipients are embeded and formed into compact mass.

Evaluation of tablets :-

→ General appearance
→ Weight variation test
→ Hardness
→ Thickness
→ friability
→ Disinte
→ Dissolutio
→ Content uniformity test

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

→ The prepared tablets are evaluated before dispersing to check the Stability.

General appearance :-

→ Tablet appearance Should be observed.
→ Any rough surfaces are present or not.
→ Any cracks / depressions are present or not.
→ Colouring is uniform or it shows motling.
→ Polishing of tablet is smooth or not.
→ odour and taste of tablet also evaluated.

Weight variation test :-

→ It shows any weight variation in the tablets.
→ Take 20 tablets and weigh them.
→ Each tablet is weighed individually and average of twenty tablets is calculated.
→ Then % deviation is calculated by the formula

$$\% \text{ deviation} = \frac{\text{Avg. wt of tablets} - \text{weight of tablet}}{\text{Average weight of tablets}} \times 100$$

Avg Weight of tablet	% deviation
< 130 mg	10
130 - 324 mg	7.5
> 324 mg	5

→ Any two tablets showing more deviation than the normal range then the weight variation test of tablets was failed.

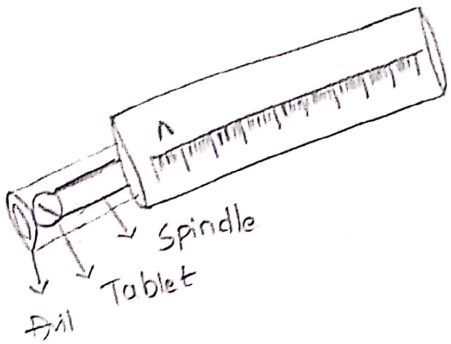
$$SD = \sqrt{\frac{(x - \bar{x})^2}{n-1}}$$

x = weight of tablet
$\bar{x}$ = Average weight of tablet
n = no. of tablets taken.

Hardness:

→ It is the force applied to break the tablet
→ It indicates the tablet strength.
→ The tablets should have 4 - 8 kgs
→ It is determined by monsanto hardness tester.

Monsanto hardness tester



→ Three tablets are taken and average hardness is determined.
→ It should be ± 5% of hardness

Thickness:

→ It is the amount of filling in the tablet.
→ It is determined by vernier callipers.
→ It is measured in cm.
→ Three tablets are taken and average thickness is determined.

friability:

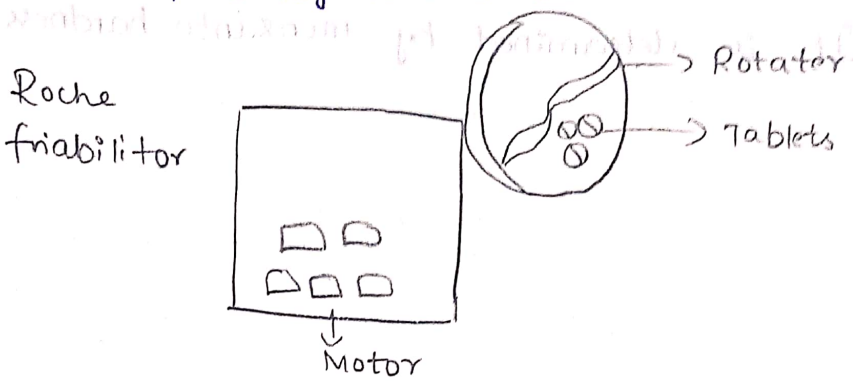
→ It tells the strength of the tablet
→ It is determined by roche friabilator.
→ first take 6 tablets and weigh them.
→ The tablets are placed in friabilators and start rotation.
→ Rpm maintained - 25 rotations per minutes
→ It is done for 4 minutes i.e 100 revolutions

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

$$\% \text{ friability} = \frac{\text{Initial weight} - \text{final weight}}{\text{Initial weight}} \times 100$$

→ Remove them and weigh the tablets

→ The % friability should be < 1%



Disintegration:-

→ The time required to break the tablet into pieces is called as disintegration time.

→ It is done by disintegration apparatus.

→ A beaker in which six tubes are placed

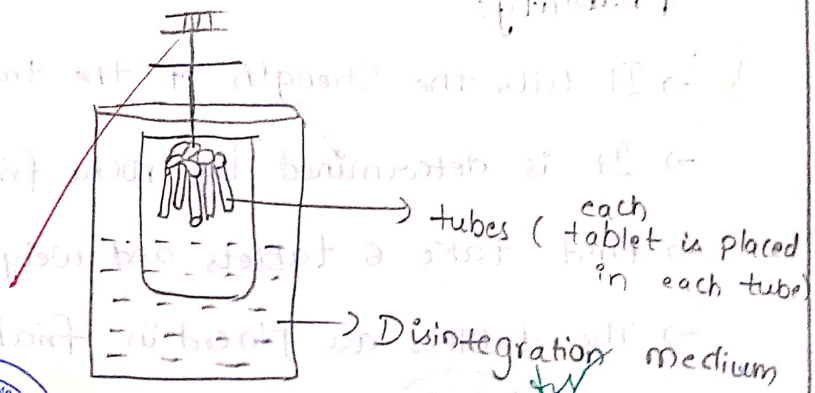
→ In that tubes the base is filled with mesh.

→ The disintegration is takes place.

→ Disintegration time for uncoated tablets upto 30min

→ Disintegration time for enteric coated => 2 hrs

→ Disintegration time for antaacid 30 - 60 mins.



→ Temperature :- 37 ± 2°C

→ RPm maintained :- 30 cycles) min.

→ Average disintegration time of tablets is calculated.

Dissolution:

→ It is the measure of amount of drug dissolved in the dissolution medium. (1) 2

→ It is measured by dissolution apparatus.

→ It contains cylindrical beaker with two holes.

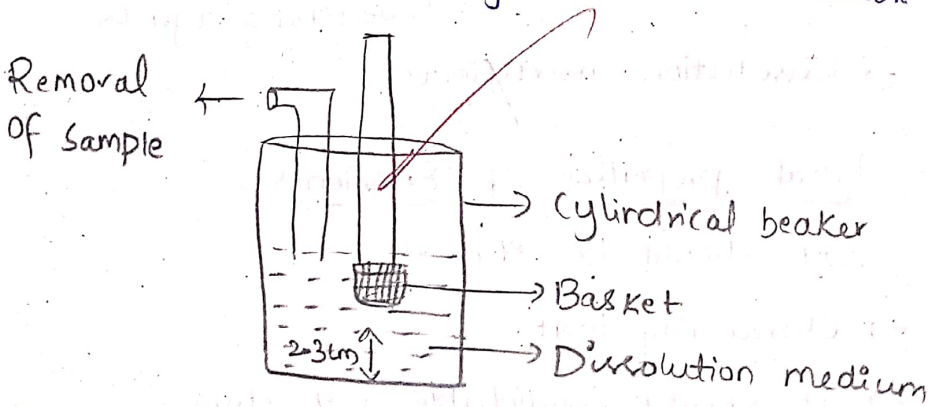
→ In which the cylindrical tube with attached basked is place in one holes.

→ other holes for removing the Sample.

$$\%CDD = \frac{\text{Sample absorbance} \times \text{Std Conc} \times DF \times \text{vol of DF} \times 100}{\text{Standard absorbance} \times \text{wt of tablet} \times 1000}$$

DF = Dilution fluid

CDD = Cumulative drug dissolved or release.



→ Basket may be replaced by paddle.

→ Temperature maintained 37 ± 5°C

→ Rpm maintained = 125 - 150 rpm

Content uniformity test:

→ It gives about the Content in the tablets.

→ Low dose drug (Digoxin) Less than 85% or greater than 115%

→ High dose drugs Less than 85% not more than 105%

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

These are the quality control tests for tablets

Formulation of tablet:

The tablet is formed by the addition of drug (active pharmaceutical ingredient) and the excipients

The Excipients used in tablet formation are:-

→ Diluents
→ Binders
→ Disintegrants
→ Surfactants/wetting agents
→ Lubricants
→ Glidants
→ Adsorbents
→ organoleptic agents → flavouring agents
→ colouring agents
→ Sweetening agents
→ Dissolution modifiers.

Ideal properties of Excipients:

→ It should be stable.
→ Chemically inert
→ It should compitable with drug.
→ It should be soluble in solvents.
→ It should not show any effect to other ingredients in the formulation.
→ It shows only the property to increase patient acceptance.
→ It is used for elegant appearance.

PRINCIPAL
Avanthi Institute of Pharmaceutical Scienc
Cherukupally (V), Bhogapuram Man
Vizianagaram Dt., - 531162

Diluents

→ These are agents used to increase the bulkyness of the tablets.

→ It increases weight of tablet by 50%.

Organic :- Methyl Cellulose, hydroxy propyl methyl Cellulose

Inorganic :- Dibasic Calcium phosphate
Tribasic Calcium phosphate

Natural :- Cellulose, Starch, lactose

Synthetic :- Sprayed dried lactose ⇒ Anicel 101, 121

Binders:

→ These are the agents used to increase Cohesiveness between the particles of the tablets.

→ They also known as granulating agents.

→ They add by two methods.

Method 1 :- Binder added first to other excipients

Method 2 :- Half amount is added and then next half amount of binder is added after granulation

→ Natural - Tragacanth, acacia

→ Synthetic - HPMC, PVP

Surfactants / Wetting agents :-

→ These are used for wetting of granules.

Ex Sodium lauryl Sulphate, tweens, Spans

Disintegrants

→ These are agents that are used to prevent the aggregation of particles in tablets.

→ They show capillary action and swelling nature.

→ When they come in contact with body fluids it undergoes break down.

Ex Methyl Cellulose, Corn Starch

Super disintegrants

→ They swells upto 8 folds than normal.

Ex Cross povidine, Croscellmulose

Lubricants:

→ These are the agents used to prevents the friction of granules on die cavities.

→ They improves flow property of tablets.

Ex Magnesium Stearate, Stearic acid

Glidants:

→ They increase the flow property of tablets.

Ex Talc, Kalin.

Adsorbants:

→ These are agents which are used to absorb the water content in the formulation.

→ They maintain residual moisture content in the tablet.

Ex $CaCO_3$, $MgCO_3$.

organleptic agents:

Colouring agents :- These are used to increase the Patient acceptance & for elegant appearance of tablets

Ex dyes; lakes (Caretenoids, Chlorophyll)

flavouring agents :- These are added to increase the patient acceptance and to mask the bad odour.

Ex Terpentine oil, pippermint oil

Sweetening agents :- These are used for the mask the bad taste.

Ex Saccharin, aspartame.

Dissolution modifiers:-

→ These are used to increase or decrease the dissolution of tablet.

Ex Shellac, Zein.

Thus, these are ingredients used in the formulation of tablet.

a) factors affecting Stability of Suspension :-

→ Sedimentation Velocity (v)

→ Sedimentation volume (F)

→ Degree of flocculation (β).

→ Zeta potential

→ Brownian movements.

Sedimentation Velocity:-

$$v = \frac{2d^2(\rho_1 - \rho_2)g}{18\eta}$$

v = velocity of Sedimentation cm/sec

ρ_1 = Density of dispersed phase g/cm^3

ρ_2 = Density of dispersed medium g/cm^3

η = viscosity of dispersed medium cps

g = acceleration due to gravity.

d = diameter of dispersed phase (cm)

→ Velocity of Sedimentation is directly proportional to diameter of radius of dispersed phase

→ More size of dispersed phase velocity of Sedimentation is more.

→ velocity of Sedimentation is directly proportional to difference in density. $(\rho_1 - \rho_2)$

$\rho_1 > \rho_2$ Rapid Settling occurs

$\rho_2 > \rho_1$ Dispersed phase floats on medium

$\rho_1 = \rho_2$ It forms Stable Suspension

→ So density difference decreased by using the thickening agents.

→ velocity of Sedimentation is inversely proportional to viscosity of medium.

Sedimentation volume: (F∅)

→ It is the ratio of ultimate volume of Suspension to initial volume of Suspension.

$$f = \frac{V_u}{V_i}$$

→ f value should be 1 then it form Stable Suspension

→ f = 0.25 then 25% of dispersed phase forms the Sedimentation.

Degree of flocculation: (β)

→ It tells about the rate of flocculation.

$$\beta = \frac{f \text{ flocculated}}{f \text{ deflocculated}} = \frac{V_u \text{ flocculated}}{V_u \text{ deflocculated}}$$

$$= \frac{V_u \text{ flo}}{V_i \text{ flo}} \times \frac{V_i \text{ def}}{V_u \text{ def}}$$

→ $\beta = 1$ if initial volume is same.

Brownian movements:

→ It is the movement between loosely bound layer to neutral layer.

→ Movement of dispersed particles

$$d = \frac{RTt}{\pi N_3 r \eta}$$

d = distance travelled by brownian movements

T = Temperature

t = time

N = Avagadro number

r = radius of dispersed phase

η = viscosity of dispersed medium.

Zeta potential:

→ It is measurement of potential difference between the ions which are moving.

→ It is determined by Zeta meter.

0 ± 10	Instability
10 ± 30	Incipient Stability
30 ± 40	fair
40 ± 60	Good stability
> 60	Excellent

2-b) Theories of Emulsification:

→ Surface tension theory
→ Ostwald orient wedge theory
→ Electric double layer
→ Monomolecular
→ Multimolecular
→ Solid adsorption
→ Phase volume theory

Surface tension theory:

→ Emulsifying agents are used to decrease the surface tension.
→ In the emulsion, at the interface imbalanced forces are present thus tension is created called surface tension theory.
→ It decreases the size of dispersed phase.

Orient wedge theory:

→ It tells about the use of emulsifying agents for o/w or w/o type emulsion.
→ o/w emulsifying agents are used for o/w emulsion and vice versa.
→ It has polar and non polar end.
→ Polar end tends to aqueous phase.
→ Non polar end leads to oil phase.

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

Electric double layer theory:

→ Both oil and water has negative charges

→ The oil negative charges bound a layer towards OH^- of water.

→ Again another layer of phase is occuring thus it is known as double layer

Monomolecular theory:

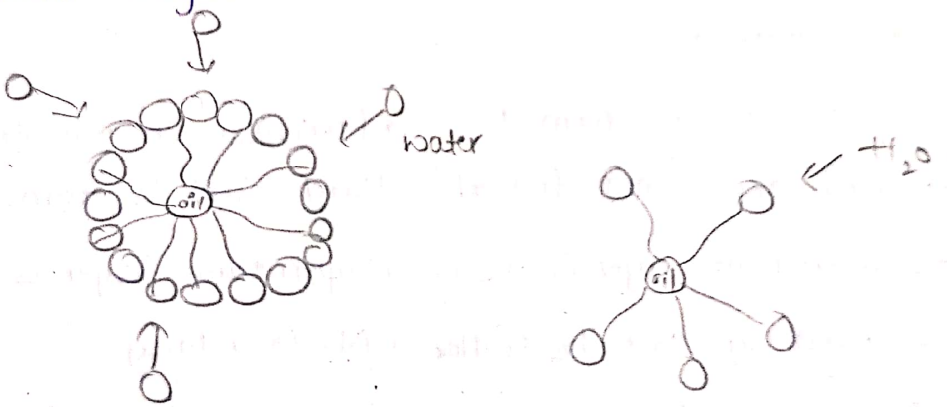
→ Emulsifying agents are added to prevents the Coalescence

→ Polar ends moves to water (Hydrophilic)

→ Non polar ends moves to oil (Hydrophobic)

→ Tightly bound layer indicates Stable emulsion

→ Loose layer indicates unstable emulsion



Tightly bound (Stable) loose (unstable

$$R_{o/w} = C_{o/w} e^{-W_{o/w}/RT}$$

R = Rate of Coalescence

C = Collision factor

W = Energy barrier.

$R_{o/w} > R_{w/o}$: it forms w/o emulsion

$R_{w/o} > R_{o/w}$: it forms o/w emulsion

Multimolecular theory:

→ Hydrocolloids are used

→ Many layers are formed

→ Tightly bounded.

→ Prevents Coalescance.

Solid adsorption theory:

→ If wetting is done by water then it is o/w type

→ If wetting is done by oil then it is w/o type.

Flocculated	deflocculated
→ The solid particles are dispersed and loose aggregates are formed.	→ The solid particles exists as separate entities
→ floccules are formed	→ floccules are not formed
→ Hard Cake is not formed	→ Hard cake is formed
→ Supernatant layer is clear	→ Supernatant layer is Cloudy
→ Boundary exits b/w two phase	→ No boundary.
→ Sedimentation rate is fast	→ Sedimentation rate is slow.
→ All the particles move equally	→ Large molecules moves fast Small molecules moves slowly
→ unpleasant odour	→ pleasant odour
→ Sticking to bottles	→ NO Sticking.
→ Redispersions can be seen upon shaking	→ Redispersion cannot be seen
→ shows plastic and pseudoplastic property	→ It shows dilatant property

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt. - 531162

→ widely used	→ rarely used.

3a Dosage form is the suitable form in which the drug and excipients are incorporated.

Dosage form Classification

- Based on Physical State
  - → Solids
  - → Liquids
  - → Semisolids
  - → gases
- Based on use
  - → Internal
  - → External
- Based on ROA
  - → Oral
  - → Parenteral
  - → Rectal
  - → Nasal
- Based on site of application
  - → Ears
  - → Eyes
  - → Skin
  - → Nose
  - → Vagina

Dosage forms

- Solids
  - Unit dosage form
    - → Tablets
    - → Capsules
    - → Pills, powders
  - Bulk
    - Internal
      - → fine powders
    - → Snuffs
- Liquids
- Semi Solids
- gases

→ granules → Insufflations
↙ ↘ → Tooth powders
Effervesent Non → Dusting powders
effervesent

Liquid dosage forms

- Monophasic
  - Internal
    - → Solutions
    - → Syrups
    - → Elixirs
  - External
    - → Nasal Sprays
    - → Ear drops
    - → Eye drops
    - → lotions
    - → Liniments
- Biphasic
  - Suspensions
    - flocculated
    - deflocculated
  - Emulsions
    - o/w
    - w/o

Semi Solids

- Internal
  - → Suppositories.
  - → pessaries
- External
  - → ointments
  - → pessaries
  - → Jellies
  - → Creams

PRINCIPAL
Avanthi Institute of Pharmaceutical Sc
Cherukupally (V), Bhogapuram
Vizianagaram Dt., - 5311

Based on internal use

Internal	External
→ Tablets	→ Insufflations
→ Capsules	→ Dusting powders
→ pills	→ Tooth powders
→ powders	→ Ear drops
→ Solutions	→ lotions
→ Syrups	→ Liniments
→ Elixirs	→ Creams
→ Suppositories	
→ Suspension	
→ Emulsion	

Based on ROA

oral	Parenteral	Rectal	Nasal
→ Tablets	→ Emulsions	→ Suppositories	→ Sprays
→ Capsules	→ lotions	→ pessaries	
→ pills	→ Liniments		
→ Solutions	→ Ear drops		
→ Syrups	→ Eye drops		
→ Suspension	→ Tooth powders		

PRINCIPAL
Avanthi Institute of Pharmaceutical Science
Cherukupally (V), Bhogapuram Mand
Vizianagaram Dt., - 531

Tablet :- It is unit solid dosage form in which drug and excipients are pressed into compact mas

Capsule :- It is unit solid dosage form in which drug and excipients are filled in shells → Soft gelatin → Hard gelatin

Pills :- These are fine powder like encorporated into capsules.

Powders :- These are unit dosage form in which the drug is finely divided.

Effervescent granules :- These are bulk solid dosage form when contact with body fluids release Co_2.

Non effervescent :- Do not release Co_2.

Dusting powders :- These are used for surgical purpose.

Tooth powders :- These are used for cleansing the tooth

Solutions :- The drug dissolved in solvent to form soln

Syrups :- These aire soln prepn in which sweetening and flavouring agents are used.

Elixirs :- These are aromatic alcohols with sweetening agents.

Lotions :- These are applied topically with smooth rubbing

Liniments :- These are applied without friction.

flocculated Suspension :- The biphasic liquid dosage form in which solid particles in dispersed and form aggregates (floccules)

Deflocculated Suspension :- It is biphasic liquid dosage form in which solid particles are exists as separate entities.

Suppositories :- These are semi solid prepn that are used.

Ointments :- These are semi solid DF and applied on skin. Creams also same application of site.

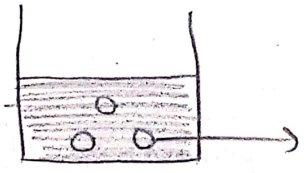
Hence these are different dosage forms that are available to increase the patient acceptance.

3b Instability of emulsion :-

→ flocculation
→ creaming → upward
→ Downward
→ phase inversion
→ Breaking / cracking of emulsion
→ Coalescence

Flocculation:-

→ flocCules are formed.
→ It depends upon the
Reasons :- i) Size of globule ie dispersed phase (uniform)
ii) viscosity of dispersed medium
iii) volume of dispersed phase
→ These three factors should be maintained



→ Size of globule decreased by emulsifying agent.
→ viscosity is enhanced by thickening agents.

Creaming :-

→ The dispersed phase forms creaming

Reason :- Difference in densitity

$$R = \frac{2d^2(\rho_1 - \rho_2)g}{18\eta}$$

ρ_1 = density of dispersed phase

ρ_2 = density of dispersed medium

$\rho_1 > \rho_2$ ⇒ downward creaming ←

$\rho_2 > \rho_1$ ⇒ upward creaming ←

→ densities difference should be (negligable) maintained less.

Phase inversion:

Reason :-

→ All the globules should have same size (Spherical)

→ 12 spheres are bounded.

→ Thus dispersed phase should be 74% of total volume.

→ > 74% then it leads to phase inversion.

→ Correct emulsifying agent should be used.

Cracking :-

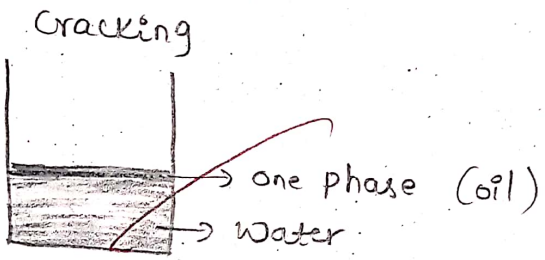
→ Separation of liquid and solid particles completely is known as cracking or breaking

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., 531162

Reason :-

→ It is due to lack of addition of oil, water, gum in proportions.

		O : W : G ratio
fixed oils	Castor oil Cod liver oil Arachis oil	4 : 2 : 1
Volatile oil	pippermint oil Terpentine oil	3 : 2 : 1
Mineral oil	liquid paraffin	2 : 2 : 1



Coalescence :-

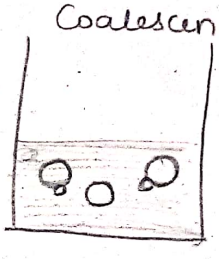
→ The small particles adhere to large molecules and forms instability to emulsion.

Reason :- Lack of uniform size of globules

→ It should be maintained by emulsifying agent

o/w emulsifying agent → o/w emulsion

w/o emulsifying agent → w/o emulsion.



PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Manda
Vizianagaram Dt., - 531162

ESTD : 2005

AVANTHI INSTITUTE OF PHARMACEUTICAL SCIENCES

(Approved by A.I.C.T.E, P.C.I, New Delhi, Recognized by the Govt. of A.P. & Affiliated to JNTU-K Kakinada)
Cherukupally (Village), Chittivalasa (SO), Bhogapuram (Mandal), Vizianagaram (Dist) -531162.
www.avanthipharma.ac.in, principal@avanthipharma.ac.in

III Pharm D II MID Examinations PCI, May-2023

Subject: FORMULATIONS **Branch: Pharm D**

Time: 120 min. **Max. Marks: 30 M** **Date of exam: 29/1/2022**

S. No	Questions	Blooms Taxonomy Level	Course Out Come	Marks
	Answer any THREE question			
1.	a) Explain filling techniques of capsules b)Write a note on quality control tests of capsules	Apply understand	CO3	10
2.	a)Write a note on formulation of parenterals b)Describe quality control test for parenteral	Remember apply	CO3	10
3.	Write in detail about formulation & preparation & evaluation of ointments	Understand apply	CO4	10
4.	a) Write a note on formulation of eye drops. b) Write a note on adsorption of bases.	Apply understand	CO4	10

B Reja Sree
Signature of the faculty

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

SCHEME OF EVALUATION

1. a. Explain filling techniques of capsules

Filling techniques- 1M

b. Write a note on quality control tests of capsules

2. a. Write a note on formulation of parenterals

formulation of parenterals-5M

b. Explain the formulation of tablets.

Binders -1M

Diluents -1M

Disintegrents -1M

Lubricants -1M

Guidant's - 1M

3. Write in detail about formulation & preparation & evaluation of ointments

formulation of ointments-4M

preparation of ointments-4M

evaluation of ointments-2M

4. a) Write a note on formulation of eye drops.

Formulation of eye drops-5M

b) Write a adsorption of bases.

Types of adsorbents -5M

B. Raja Sree

Signature of the faculty

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

AVANTHI INSTITUTE OF PHARMACEUTICAL SCIENCES

Cherukupally (V), Near Tagarapuvalasa Bridge, Vizianagaram (Dist.) A.P. - 531162.
(Approved by AICTE, PCi & Govt.of A.P. Affiliated to JNTUK, Kakinada)

ESTD : 2005

SUBJECTIVE TEST

JNTUK Reg. No. : 1 9 T 5 1 T 0 0 2 3 Date : 29/1/2022

Student Name : V. Syam kumar Year : 3rd year Sem : 6th

Branch : B. Pharm / Pharm D. / Pharm D. (P.B) / M. Pharm

Specialization : pharm-D Time :

Subject Name : Formulations Total Marks : 28/30

Marks Secured : Invigilators Signature :

① b) Quality control test for parentrals :-

i) Uniformity in content

weight the total weight of the cap ampule noted as w_1

↓

Remove the contents from the ampule and weighi the empty bottle weight is w_2

↓

Difference between w_1 & w_2 is the weight of the content in the bottle.

→ Should not above & below 75 - 125%

ii) Leakage test :-

Take ampule & Immersed In Inverted position in methyl blue solution.

↓

If any colour of solution entered in to the ampule then leakage will present in ampule.

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

iii) Pyrogen test :- If any pyrogens present (or) not conduct pyrogen test.

< Piliminary Test (sham test)
  main test

Take (3) rabbits
↓
check temprature
↓
Give the sample solution to ear vein
↓
After three hours check the temprature
↓
if any increase in temprature again do on (5) rabbits

→ In main test n.of Rabbits & time period are increased.

Note → Temprature difference of one rabbit is 0.4°c
for three rabbits doesnt >1.6°c.

iv) Sterility test < Membrane filtration method
membrane filtration method. < cup-Disk method.
→ Take soyabean casine media / Fluid thioglycolate then placed on petriplate

→ place whatman filter paper a grade with pore size should be 0.3mm.
→ then the sample solution is added to the medium
→ Incubate for 14 days
→ After (14) days see the zone of inhibition.

cup & Disk method
→ In [illegible] method. FTM/SCM are taken in cups along with sample see the zone of inhibition.

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., [illegible]

v) particular matter test :- eyepiece microscope used to measure particals.

→ scale contain range 0-100

→ particals dosent have >100.

vi) Endotoxin test :-

→ G-ve organisms release endotoxins

→ LAL test

* Limulus Amoebocyte lysate test :-

This test is performed by use horseshoe crabs.

↓

collect the blood from pericardium of the crabs

↓

centrifuge & collect Amoebocytes

↓

Amoebocytes are treated with sample solution

↓

If any gel formation occur endotoxins are present

↓

measured by gel electrophoresis.

* Turbidometric method :- Take sample & saline solution.

→ Add Amoebocytes in each of them

→ observe turbidity if turbidity present in sample endotoxins present

* Chromogenic method

→ Take [illegible] & added to [illegible]

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

① a) Formulation of parenterals :-

In the formulation of parenterals vehicles or additives are used

i) Vehicles :- These are aqueous or non-aqueous vehicles.

→ Aqueous vehicles :- most commonly used vehicles

eg:- water for Injection
sterile water for Injection.

→ Non-Aqueous vehicles { oils, Alcohols

Oils → oils are Arachis oil & almond oil.
In the formulation of Dermacropol Arachis oil is used as vehicle

Alcohols → Ethyl Alchol used as vehicle in Hydrocortisone Injection
→ Propylene glycol used as vehicle in Digoxine Injection

ii) ~~Ab~~ Additives :- Increase Quality of formulation.

a) solubalising agents → These are increase the solubility of the drug
→ increase surface Activity of tweens.

b) Stabilising agents :-

Antioxidants → prevent oxidation for oily preparations

Aqueous eg:
non-aqueous

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dist. 1162

→ For hydrolytic preparation pH adjustment is necessary.

c) Buffers :- which can resist the pH of the solution

eg:- Citrate Buffer
Borate Buffer

d) Chelating agent :- Form complex with metal ions & solubilise them

eg:- EDTA.

e) Emulsifying, suspending & wetting agents

→ suspending agents used to increase viscocity. eg:- Acacia.

→ Emulsifying agents used in sterile emulsions

→ wetting agets eg:- Lecithin

∝ Decreas interfacial tension blw solid & liquids.

f) Tonicity adjustifiers :-

→ maintain same osmotic pressure with blood pH 7.4

eg:- Dextrose
mannitol.

* Preparation of parentrals :-

→ parentrals are prepared under GMP conditions

① cleaning of containers & closures.

containers wash ē detergents & then with tap water.

Again wash with distilled water & dry with water for Injection.

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Gantyada(V), Bondapuram Mandal
Vizianagaram Dt., - 531162

→ Incase of rubber closures treated with sodium pyro-posphate then wash with distilled water and rins with water for Injection.

(2) preparation of solution:- Industrial pharmacist add excipi-ents in according to order to prepare solution.

(3) Sterility

for thermostable substances Hot air oven at 115-116°c 30 min
Autoclave 160°c for 60 min

for thermoliable heated method preferred.

(4) Filling & Sealing

→ solution fill in Ampules (for single dose), vials (for multidose).

→ Filling of Ampules small scale by mannual & large scale by Automatic.

(5) Evolation test:-

→ evaution test is performed.

(6) packing & labelling

Name of the product
Quantity of product
Mfg dt
Expdt
Mfg lic. NO
Batch. NO
Price
Manfature Address

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Kapuppally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

Areas are.

(1) A clean up area
(2) Aseptic preparation Area.
(3) Aseptic Area
(4) Quarantine Area
(5) packing Area.

2) b) Quality control test for capsules

* In process quality control tests.

% purity of gelatin
Iron content NMT
Blood strength
Viscosity of mixture
Length of body & cap.

*

(1) Appearence :- Appearence of capsule should be elegance in appearence & easily accepted by consumer.

(2) size & shape :-

→ size of the capsule should not go beyond 0 to 5

→ check If any flaw present or not.

(3) Identification marks :-

→ any label or name are printed in order to identify easily.

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

(4) uniformity in weight:-

weigh an capsule weight (ω_1)

↓

Remove the content & wash with ethanol until the flavour of capsule is removed

↓

then weigh empty capsule weight (ω_2)

↓

then difference ($\omega_1 - \omega_2$) is the weight uniformity.

↓

Average doesnt go beyond the stadards

Average w.t.	Deviation
Result=300	10
>300	7.5

(5) uniformity of content :- done for tablet weight 10 mg (or) <10mg

→ done as in manuals & result should be

→ no one should be present <75 (or) >125%.

→ If any are there again do for 20 capsules.

(6) Disintegration test:-

→ take the solution in test tubes & place capsule close with stainless steel plate then disintegration time is measured.

(7) uniformity of Drug

take 10 tablet

↓

Assay performed

↓

Average should be ±15%

↓

if any deviation of average test failed

(8) Dissolution Test

Performed on USP dissolution apparatus

→ Take capsule in basket then fit the basket in dissolution solution

→ close with the glass plate.

→ Then check the dissolution

S.No	Quality	Qty
S_1	6	Q +5%
S_2	6	Q -15%
S_3	12	Q -25%

(1) a). Filling Techniques of Hac

i) manual filling :- it is done by mixing all the ingredients on paper

→ Then ~~remove~~ separate cap & Body of capsules

→ Add the contents with the help of spatula.

→ Then again seal the capsule.

ii) Hand filling

→ machine consist of Bed 200-300 holes, power plate loading plate 200-300 pins, ~~lower~~ cap holder

Initially loading tray fill with capsules

↓

Then loading tray placed on bed

↓

capholder separate caps from body

↓

power plate & Drug is place above loading plate

↓

contents are fill

↓

pin plate & 200-300 pins are once tap all the contents go down

↓

Again power tray fill the contents

↓

then caps are attached to the Body.

iii) Semiautomatic

→ It consist of the plates & then loading tray also present

→ All the contents are first fill automatically & then caps are attached to the body.

Q3 → same as Hand filling process.

iv). Automatic :-

→ In the automatic process tapped process is applied with 50 to 150 N Apply.

→ Product bed placed on the capsules & then capsules are filled accordingly to the formation of them.

→ Dosator Disc are present

(4)

(3) Ointment bases :- These are body of the ointment.

i) Hydrocarbons :
→ saturated hydrocarbons
→ obtained from petroleum
→ s/m hydrocarbons are used to produce ointment.

eg: Hard paraffin, yellow soft paraffin.

ii) Absorption Bases :
→ The term absorption persist the water absorption (or) emulsifying property of these bases.
→ Anhydrous

- Non-emulsifying — w/o emulgent eg: simple ointment
- Emulsifying — Already o/w. eg: Hydrous wool alcohol emulsion & Absorb H_2O.

iii). Water miscible Bases
→ Miscible with water contain o/w emulgent.
→ Also called as water washable bases
→ surfactants present acts as emulgents

eg:
- cationic — cationic emulgents paraffin
- Anionic — Anionic salts, cetostearyl alcohol, Hard paraffin.
- Non-Ionic — Non-Ionic salts

iv) Water soluble Bases

→ dosent have oil
→ water contents present as basic moiety & more polar group.
→ PEG <600 colourless solution
>1000 solid.
600-1000 semi solid.

* Preparation ⟨ fusion method.

* Evaluation test :-

① Physical methods ② Microbiological Method.

a) Rate of Absorption $\left(\frac{dQ}{dt}\right)$.

→ Apply ointment on skin & enters into systemic circulation
→ Then take the urine(or) blood sample to identify the rate of Absorption.

b) Irritation test :-

→ Done on 24 people
→ Apply ointment on each of people in 21 days
→ If any Irritation occur.
↓
will fail.

c) Rate of Drug Release

method I

take one test tube internally coated with the sample.

↓

Add saline water to test tube

↓

And then identify the saline solution to drug release.

method II

take cellophan tube attached to distal opening

↓

Invert the ointment & identify the rate of Drug release.

d) Rheological Identification:-

→ By using viscometer to identify the viscosity of the ointment.

→ medium viscous & easy removable from tube is necessary.

e) content uniformity: weight 10 ointments & then note of them are near the weight as labelled on the pack.

If any one

(2) Test for micro organisms :-

a) For psudomonous Aeguroca.

→ cytochrome oxidase enzyme present in psudomon species

Take test tube with nutrient broth. it taken

↓

Add sample along with 0.2 ml α- napthol.

↓

Identify the colour

↓

if blue colour is observed Indicate the presen of psudomonous species.

→ if blue colour dosent appear free from psudous.

b) for staphylococus species

Take the sample

↓

collect the rabbit plasma 0.5 ml

↓

Added to the mixture.

↓

if turbidity present

↓

staphylococus species are present

c) Test for preservative efficacy.

→ Require Aspergillus species
TAT Broath.

Initially TAT Broath & sample are taken

↓

Add Aspergillus to the above mixture.

↓

Then Incubate for (14) days

↓

After (14) days the microbes growth is not exceed 0.1% & decrease growth

↓

After (28) days no microbiological present.
i.e preservative efficacy is better.

PRINCIPAL
Avanthi Institute of Pharmaceutical Science
Cherukupally (V), Bhogapuram Mand
Vizianagaram Dt., - 531162

ESTD : 2005

AVANTHI INSTITUTE OF PHARMACEUTICAL SCIENCES

(Approved by A.I.C.T.E, P.C.I, New Delhi, Recognized by the Govt. of A.P. & Affiliated to JNTU-K Kakinada)
Cherukupally (Village), Chittivalasa (SO), Bhogapuram (Mandal), Vizianagaram (Dist) -531162.
www.avanthipharma.ac.in, principal@avanthipharma.ac.in

III Pharm D III MID Examinations PCI, May-2023

Subject: FORMULATIONS **Branch: Pharm D**

Time: 120 min. **Max. Marks: 30 M** **Date of exam: 23/04/2022**

S. No	Questions	Blooms Taxonomy Level	Course Out Come	Marks
	Answer any THREE question			
1.	a. Explain the factors affecting the design of CRDDS. b.Write in detail about advantages and disadvantages of CRDDS.	Apply understand	CO5	10
2.	What are occuserts. Explain formulation, design occuserts.	Remember apply	CO5	10
3.	Explain in detail about parenteral CRDDS.	Understand apply	CO6	10
4.	How can deliver the drugs in controlled manner through rectal administration?	Apply understand	CO6	10

B. Peja Sree
Signature of the faculty

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

SCHEME OF EVALUATION

1. a. Explain the factors affecting the design of CRDDS.

factors affecting the design of CRDDS-5M

b. advantages and disadvantages of CRDDS.

Advantages of CRDDS-5M

Disadvantages of CRDDS-5M

2. What are occuserts? Explain formulation, design occuserts.

Occuserts-2M

Formulation, design occuserts-8M

3. Explain in detail about parenteral CRDDS-10M

4.How can deliver the drugs in controlled manner through rectal administration - 10M

B. Reja Sree
Signature of the faculty

AVANTHI INSTITUTE OF PHARMACEUTICAL SCIENCES * AVANTHI EDUCATIONAL SOCIETY * HYDERABAD * VIZIANAGARAM *

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

AVANTHI INSTITUTE OF PHARMACEUTICAL SCIENCES

Cherukupally (V), Near Tagarapuvalasa Bridge, Vizianagaram (Dist.) A.P. - 531162.
(Approved by AICTE, PCi & Govt.of A.P. Affiliated to JNTUK, Kakinada)

ESTD : 2005

SUBJECTIVE TEST

Mid - III

JNTUK Reg. No. : 19T51T0014 Date : 23/4/22

Student Name : P. Prasanna Year : 3rd Sem :

Branch : B. Pharm / Pharm D. / Pharm D. (P.B) / M. Pharm

Specialization : Time :

Subject Name : Pharmaceutical formulations Total Marks :

Marks Secured : 29/30 Invigilators Signature :

1 a) CRDDS :- Controlled release drug delivery system

It is novel drug delivery system in which controlled rate of drug is released in a predetermine time period.

factors affecting the design of CRDDS :-

↓

Biopharma-ceutical factors	Pharmaco Kinetic factors	Pharmacodynamic factors
→ Molecular weight	→ Absorption rate	→ Drug dose
→ Aqueous solubility	→ Elimination rate (or) → Half life	→ Therapeutic index
→ lipophilicity	→ Metabolism rate	→ Therapeutic Window
→ Drug pKa	→ Drug index	
→ Drug permeability		
→ Drug Stability		
→ Mechanism of action		
→ Site of absorption		
→ Routes of administration		

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

BIOPHARMACEUTICAL FACTORS :-

Molecular weight :

→ The molecular weight of drug should ≤ 500 dalton.

→ for Spherical molecules mol. wt should be 600dalton

→ for linear molecules molecular weight should be 400 dalton.

→ Molecules like proteins and peptides with >600 dalton molecular weight are not suitable for CRDDS.

Aqueous Solubility :

→ The drugs with optimum aqueous solubility are prefered for design of CRDDS.

→ Drugs with low solubility are less prefered for CRDDS.

Lipophilicity

→ More lipophilic substances are used for CRDDS.

→ It leads to cross the membrane easily and drug will release within time.

Drug pKa :

→ The partition coefficient of drug should be optimum according to its nature.

→ Acidic drug should have pKa value from 3 to 5

→ Basic drugs should have 8 - 11 pKa value.

Drug permeability :

→ Drug should have higher lipophilic characters

→ Drug should have less solubility nature.

PRINCIPAL
Avanthi Institute of Pharmaceutical Science
Narsipatnam Dt. 531162

Drug Stability :-

→ Drugs should be stable

→ unionised drugs are preferable to CRDDs

→ Good permeation leads to more absorption

Mechanism of action :

→ The site and mechanism of action also enables drug selection for CRDDs

Site of absorption :

→ Absorption site also enhances the absorption rate of drug.

ROA :

→ ~~Hence~~ Commonly parenteral routes are preferred

→ oral route.

→ Parenteral - Subcutaneous
Intramuscular

→ These routes enhance the more absorption of drug.

PHARMACOKINETIC FACTORS :

Absorption rate :

→ The drug absorption rate should be optimum or may be low.

→ Due to maintenance of Steady plasma Concentration absorption rate may low

→ Hence drugs with low absorption rate can used for CRDDs

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

Elimination rate & $t_{1/2}$:

→ The elimination rate should be low

→ $t_{1/2}$ of drugs should be 2 - 8 hrs

→ Less the half of life of drugs more amount of dose is required.

→ Half life should be high for drugs which are used for CRDDS

Metabolism rate:

→ The metabolism rate should be maintained optimum.

→ Rate of metabolism is fast then drug release should be more.

Drug index:-

→ The drugs which are used for CRDDS should have drug index of value 1.

→ Drug index should be maintained by drug during the design of CRDDS.

PHARMACODYNAMIC FACTORS:-

Drug dose:

→ The dose of drug for CRDDS is equivalent to 1g.

→ More than 1g is not suitable for CRDDS.

→ Dose of the drug in CRDDS is maintained.

Therapeutical index:

→ Therapeutic index of drugs for CRDDS should be narrow.

Therapeutic Window:

The drugs with narrow Therapeutic window are suitable for CRDDS

11b Advantages of CRDDS:-

→ Increase patient Convenience
→ Decrease frequency of administration.
→ Avoids first pass metabolism.
→ Shorter time period.
→ Improves bioavailability
→ Maximum utilisation of drug
→ Decrease patient compliance
→ Controlled rate of drug is release
→ Enhances the drug concentration.
→ Steady plasma concentration is maintained.
→ Minimise the side effects of drugs
→ Minimise the drug accumulation in Chronic disorders
→ Improves the theeapeutic index.
→ Route of administration enhance acceptance of medicament by patient
→ Subsequent administration of drug avoided.

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

Disadvantages of CRDDS:

→ Low Systemic Concentration
→ Shows first pass metabolism in oral route
→ pH dependent solubility.
→ Improper release
→ Causes irritation
→ In vitro and in vivo Studies are not Correlated.
→ Relevant of drug absorption is not Clear.
→ Does not reach peak plasma Concentration.
→ Drugs with higher molecular weight are not suitable for CRDDS
→ Highly Lipophilic & highly hydrophilic Substances are not suitable

---

③ Parenteral CRDDS:

→ Parenteral Controlled release drug delivery System

Parenteral CRDDS types:-

i) Injectables
ii) Implants
iii) Infusions

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt, - 531162

Parenteral CRDDs

- **Injectables**
  - → Solutions
  - → Colloidal dispersions
    - Liposomes
    - NioSomes
  - → Nano particles
    - Nanosuspension
    - Nanoemulsion
    - Mixed micelle
  - → Solid lipid nanoparticle
  - → Nano lipid Carriers
  - → Lipid Conjugated nano Particle
  - → Microspheres
  - → Microcapsules
  - → Resealed erythrocytes
- **Implants**
  - → Solid
    - Zolader
    - Durin
    - Insitu depot → Thrifthad
    - Thermoplastic
    - Cross linked
    - Thermal induced gelling
    - polymers
- **Infusion**
  - → Osmotic pump
  - → vapour pressure
  - → Battery Powdered

Injectables:

→ These are the preparations given parenterally im, sc., iv.

Solutions:

→ These are the preparations in which the drug and solvent are mixed to produce the solution

→ Aqueous solutions and oily solutions are Prepared.

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

Liposomes:

These are molecules that are formed by self assembling of lipid particles in aqueous medium.

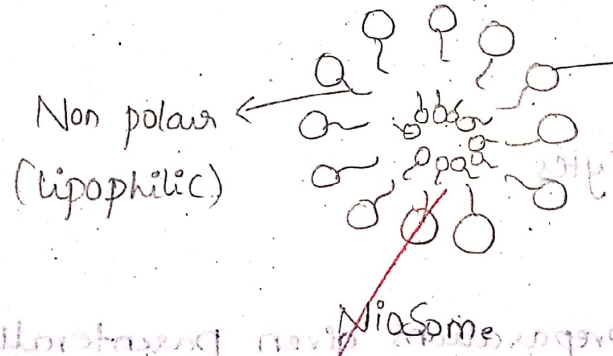
Ex Liposome as anticancer agent Ex Doxarubicin
Liposome as anti infective Ex Amphotericin
Liposome as vaccine adjuvants

→ Now-a-days Liposome used for cancer therapy.

Niosomes:

These are the molecules that are formed by assembling non-ionic surfactants in aqueous medium.

Ex Niosome as anticancer agent Ex Dounorubicin
Niosome vaccine adjuvant



Nanosuspension:

It is heterogenous mixture of dispersed phase in dispersed solvent. But the particle size < 1 µm. Nanosize particles can administer through iv

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

Nanoemulsion

It is heterogenous mixture in which insoluble liquid is dispersed in another solvent. The particle size is nano. Emulsifying agents are used.

Mixed micelle.

Micelle is formed.

Solid lipid nanoparticle

→ The solid lipid molecule is present in the formulation.

→ It is in nano particle size.

Nanolipid Carrier

→ Nanolipid particle is used as carrier.

Microspheres

→ Drug is loss in sphere formation.

→ The size of molecule is micro.

→ Microspheres are formed.

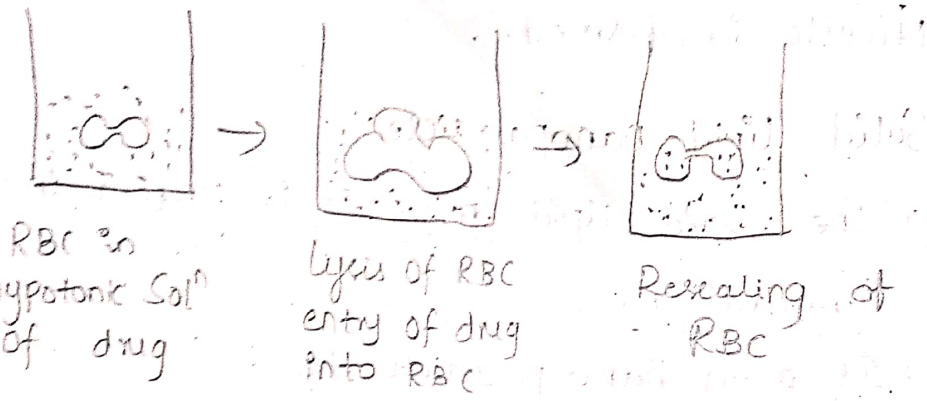
Microcapsules

→ These are the preparations in which drug is encapsulated in the shell of thickness (fine)

→ They are micro size of capsules.

Resealed erythrocytes

RBC are taken and kept in hypotonic solution of drug. Then due to concentration gradient the RBC undergone lysis and haemoglobin comes out. Then drug enters RBC. After the reconstitution the RBC is relead again.



Implants:

These are adhesive preparations that are placed on the skin.

Solid implants: for Steriodal drugs

Ex Zoladex - Norgesterone

Durin - (Biodegradable implant)

- NaloSterone.

Thermoplastic implants

→ The drug undergoes forming depot on cooling at body temperature.

Ex Paclitaxel

Cross linked implant:

→ The drug undergoes formation of gel from solution in presence of Ca^{+2} ion.

Thermal induced gelling implants

→ Due to temperature the drug converts to get when administered.

polymeor implants.

→ The polymeor undeorgo precipitation at the site of administration

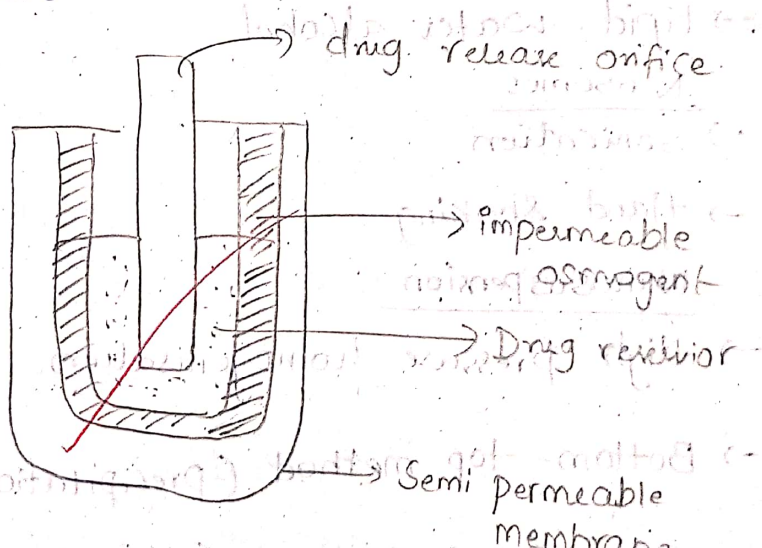
In-situ depot implants:

The implants that forms depot at the site of administration

Osmotic implant:

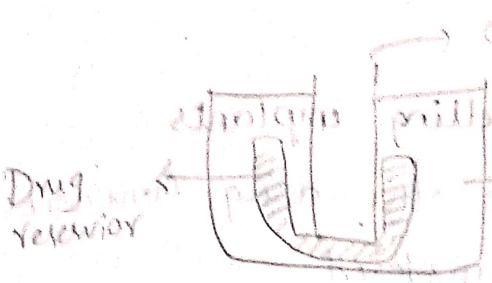
The implant release the drug due to osmotic Pressure caused by tisue fluids when contact with implant.

Alzet :



Vapourised implant:

The drug release when the aerosal in vapour Chambeor comes in contact with body fluids vapour pressure is created and drug is released



Battery powdered

They consist of two compartments.

i) Resiprocating pump

ii) Prestaltic pump

→ Due to movement of these pumps drug is released.

Methods of preparations

Liposomes

→ Sonication

→ Dehydration - rehydration

→ Solid extrudation

→ Lipid - water - alcohol

Niosomes

→ Sonication

→ Hand shaking

Nanosuspension

→ High pressure homogenisation

→ Bottom - top method (precipitation takes place)

→ Top - down method (disintegration)

These are the different parenteral dosage forms that are designed as CRDDS.

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

(5) TDDS:

Transdermal drug delivery System.

Definition:

It is the novel drug delivery system in which the drug is kept in patch to release at controlled rate for longer period of time.

Advantages:

→ Drugs with gastric irritation can be used.
→ Avoid first pass metabolism.
→ Improves bioavailability.
→ Increase patient acceptance.
→ Drugs with bitter taste and odour can be used.
→ used for unconscious and irresponsive patients.

Disadvantages:

→ Drug dose should not be more than 10mg.
→ Non ionic drugs are not suitable.
→ Molecular weight of drugs should be less than 500 dalton.
→ Causes skin irritation.
→ uncomfortable to patient.
→ Leaves some adhesive part on the skin.

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

formulation:

→ polymers

→ penetration enhancers

→ Adhesive

→ Backing membrane

→ Liners

→ Excipients like plasticisiers and Solvents

Polymers

→ It should be inert.

→ Chemically Stable.

→ Non irritant.

→ Non toxic.

→ Compitable with drug.

Penetration enhancers

→ These are the substances used to enhance or increase the penetration rate of drug through the skin.

Polymers → Natural Ex Cellulose
HPMC

→ Semi Synthetic Ex polyethyl esters
elastomers polyethyl butyrate

→ Synthetic Ex polyvinyl Chloride
polyvinyl ether

Adhesive :-

→ These are the substances that are used to adhese to skin to release the drug.

Properties → Compitable with drug
→ Non irritant
→ NON toxic
→ Should be removable

Backing membrane :-

This membrane prevents the release of drug from implant. It provides protection for the drug to the membrane

Lineas

It is used to prevent drug loss during the storage.

Plasticisers :

These are substances used to enhance the plasticity of the implant.

Ex polyvinyl ethylene, tweens

Design

→ Single layer drug in adhesive
→ Multi layer drug in adhesive
→ Reservior
→ Matrix → dispersion
→ diffusion

Single layer drug in adhesive

→ In this single layer of adhesive is present on the drug.

→ It enhance the release of drug by increasing adhesiveness towards skin

Multi layer drug in adhesive

→ In this type two layers of adhesive is present over the drug.

→ They both permeates release of drug into the skin.

Reservior matrix:

→ It consist of both drug reservior and adhesive along with the drug.

→ Matrix also present.

Matrix dispersion:

→ In this the matrix is present in dispersed manner.

→ The backing membrane is present around the matrix.

Evaluation of TDDS:

→ uniformity in drug content

→ folding endurance

→ weight variation

→ Thickness test

→ Moisture content

→ Water absorbing capacity

→ Tensile strength

PRINCIPAL
Avanthi Institute of Pharmaceutical Sc...
Chintalakupally (V), Bhogapuram Mand...
Vizianagaram Dt., - 531162

→ Skin irritation test

Weight variation :

All the patches are weighed and noted. % deviation is calculated.

uniformity of drug content :-

All the implants are weighed for drug content

folding endurance :

The patch is folded several times until it is teased out. It gives strength of patch.

Thickness test :

The thickness of patch measured by Vernies Calliparies

Moisture Content :-

The patches are taken and kept in desicator for 12 hrs at 20°C. Before the patch is weight and after it is reweighed.

$$\text{Moisture content} = \frac{\text{final weight}}{\text{Initial wt}} - 1 \times 100$$

Water absorbing Capacity

The patches are taken and kept in desicator for 24 hr at 40°C. Then water absorbing capacity is calculated by

$$= \frac{\text{Increased in weight}}{\text{Initial weight}} \times 100$$

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

Tensile Strength

The patch is attached to iron foil and it is pulled with thread by adding weight. It tells the Strength of patch.

$$\text{Tensile Strength} = \frac{a}{b} \times l$$

a = weight of patch
b = load added
l = length of thread.

Skin irritation test:

→ The patch is applied to rats by removing hair.

→ Then observe for 24 hrs if any irritation occurs or not.

PRINCIPAL
Avanthi Institute of Pharmaceutical Science
Cherukupally (V), Bhogapuram Ma
Vizianagaram Dt., - 531162

Consolidated Internal Marks Statement

S No	Roll No	Mid -I Marks (30 M)	Mid -I Marks (30 M)	Mid -I Marks (30 M)	Average of best of 2 mids
1	19T51T0001	28	27	28	28
2	19T51T0002	20	0	19	20
3	19T51T0004	25	26	0	26
4	19T51T0005	0	27	28	28
5	19T51T0006	26	24	0	25
6	19T51T0007	24	25	20	25
7	19T51T0008	21	0	14	18
8	19T51T0009	24	25	27	26
9	19T51T0010	23	27	0	25
10	19T51T0011	0	26	27	27
11	19T51T0012	29	27	28	28
12	19T51T0013	26	27	0	29
13	19T51T0014	29	28	29	29
14	19T51T0015	17	24	22	23
15	19T51T0016	17	27	22	25
16	19T51T0017	0	17	19	28
17	19T51T0018	26	22	13	24
18	19T51T0019	12	19	7	15
19	19T51T0020	29	28	28	29
20	19T51T0021	25	27	20	26
21	19T51T0022	27	27	0	27
22	19T51T0023	27	28	0	28
23	19T51T0024	21	26	0	24
24	19T51T0027	29	27	0	28
25	18T51T0001	18	22	0	20
26	17T51T0012	25	0	15	20

B Raja Sree
Faculty

Principal

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Man
Vizianagaram Dt., 531162

External Marks Statement

SL.NO	REGD.NO	Marks
1	19T51T0001	52
2	19T51T0002	44
3	19T51T0004	63
4	19T51T0005	47
5	19T51T0006	53
6	19T51T0007	60
7	19T51T0008	59
8	19T51T0009	62
9	19T51T0010	62
10	19T51T0011	61
11	19T51T0012	61
12	19T51T0013	60
13	19T51T0014	62
14	19T51T0015	62
15	19T51T0016	61
16	19T51T0017	63
17	19T51T0018	58
18	19T51T0019	57
19	19T51T0020	56
20	19T51T0021	47
21	19T51T0022	44
22	19T51T0023	60
23	19T51T0024	45
24	19T51T0027	56
25	18T51T0001	21
26	17T51T0012	20

B. Tejasree
Faculty

Principal

PRINCIPAL
Avanthi Institute of Pharmaceutical Science
Cherukupally (V), Bhogapuram Man
Vizianagaram Dt., - 531162

Result analysis

Total No.of Students appeared = 26

Total No.of Students passed = 24

Pass Percentage = (24/26)*100 = **92.30%**

B. Reja Sree
Faculty

Principal
PRINCIPAL
Avanthi Institute of Pharmaceutical Scienc
Cherukupally (V), Bhogapuram Mand
Vizianagaram Dt., - 531162

AVANTHI INSTITUTE OF PHARMACEUTICAL SCIENCES

(Approved by AICTE, PCI, Recognized by the Govt. of A.P. & Affiliated to JNTU-Kakinada)
Cherukupally (Village), Chittivalasa (SO), Bhogapuram (Mandal), Vizianagaram (Dist) -531162.
www.avanthipharma.ac.in, principal@avanthipharma.ac.in

Faculty: Dr. B Tejasree, Assistant Professor

Course Outcomes

CO3106.1	Know the importance of preformulation studies, excipients in the development and stability of dosage forms.
CO3106.2	Understand the manufacturing techniques, formulation and evaluation methods of Tablets
CO3106.3	Understand the manufacturing techniques, formulation and evaluation methods of Capsules.
CO3106.4	Understand the manufacturing techniques, formulation and evaluation methods of Liquid oral preparations. Gain the knowledge on manufacturing techniques, formulation and evaluation methods of Parenteral and Ophthalmic preparations
CO3106.5	Understand the manufacturing techniques, formulation and evaluation methods of Capsules,Semisolids.
CO3106.6	Understand formulation,design and evaluation of various types of controlled drug delivery systems

CO-PO Mapping

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PSO 1	PSO 2
CO3106.1	3	-	2	2	-	-	-	-	1	1	1	1	1
CO3106.2	3	-	2	2	-	-	-	-	1	1	1	2	1
CO3106.3	3	-	2	2	-	-	-	-	1	1	1	2	1
CO3106.4	3	-	2	2	-	-	-	-	1	1	1	2	1
CO3106.5	3	-	2	2	-	-	-	-	1	1	1	2	1
CO3106.6	3	-	2	2	-	-	-	-	1	1	1	1	1
	3	-	2	2	-	-	-	-	1	1	1	2	1.66

B. Teja Sree
Faculty

Principal
PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

	AVANTHI INSTITUTE OF PHARMACEUTICAL SCIENCES
ESTD : 2005	(Approved by AICTE, PCI, Recognized by the Govt. of A.P. & Affiliated to JNTU-Kakinada)
	Cherukupally (Village), Chittivalasa (SO). Bhogapuram (Mandal), Vizianagaram (Dist) -531162
	www.avanthipharma.ac.in, principal@avanthipharma.ac.in

Faculty: Dr. B Tejasree, Assistant Professor

Calculation Standards of Attainment

	1:Low(40%)	*2:Medium(60%)*	*3: High(75%)*
Descriptive (30M)	12	18	22.5

B. Teja Sree
Faculty

Principal

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

AVANTHI INSTITUTE OF PHARMACEUTICAL SCIENCES

Cherukupally(Village), Near Thagarapuvalasa Bridge, Vizianagaram (Dist)-531162

Regulation:PCI(R08) , Subject: Pharmaceutical Formulations Year : III (MID-I)

Calculation standards of attainment

	1:Low (40%)	*2:Medium (60%)*	*3:High (75%)*									
Descriptive (30M)	12	18	22.5									

S.NO	Roll No	CO 1 (10 M)		CO 1 (10 M)		CO 2 (10 M)		CO 2 (10 M)		Final mid I marks	Avg(D/Q/ A) Attainment Level(CO1)	Avg(D/Q/ A) Attainment Level(CO2)
		Q1	Att level	Q2	Att level	Q3	Att Level	Q4	Att Level			
1	19T51T0001	9	3	9	3	10	3	0	0	**28**	3.00	3.00
2	19T51T0002	6	2	5	1	9	3	0	0	**20**	1.00	3.00
3	19T51T0004	6	2	9	3	10	3	0	0	**25**	2.50	3.00
4	19T51T0005	0	0	0	0	0	0	0	0	**0**	0.00	0.00
5	19T51T0006	7	2	10	3	9	3	0	0	**26**	2.50	3.00
6	19T51T0007	9	3	5	1	10	3	0	0	**24**	2.00	3.00
7	19T51T0008	9	3	5	1	7	2	0	0	**21**	3.00	2.00
8	19T51T0009	8	3	8	3	8	3	0	0	**24**	3.00	3.00
9	19T51T0010	6	2	9	3	8	3	0	0	**23**	2.50	3.00
10	19T51T0011	0	0	0	0	0	0	0	0	**0**	0.00	0.00
11	19T51T0012	10	3	9	3	10	3	0	0	**29**	3.00	3.00
12	19T51T0013	9	3	9	3	8	3	0	0	**26**	3.00	3.00
13	19T51T0014	10	3	9	3	10	3	0	0	**29**	3.00	3.00
14	19T51T0015	4	0	9	3	4	1	0	0	**17**	1.00	1.00
15	19T51T0016	9	3	2	0	6	2	0	0	**17**	1.50	2.00
16	19T51T0017	0	0	0	0	0	0	0	0	**0**	0.00	0.00
17	19T51T0018	9	3	9	3	8	3	0	0	**26**	3.00	3.00

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

18	19T51T0019	3	0	4	1	5	1	0	0	**12**	0.50	1.00
19	19T51T0020	10	3	9	3	10	3	0	0	**29**	3.00	3.00
20	19T51T0021	10	3	8	3	7	2	0	0	**25**	3.00	2.00
21	19T51T0022	8	3	10	3	9	3	0	0	**27**	3.00	3.00
22	19T51T0023	9	3	9	3	9	3	0	0	**27**	3.00	3.00
23	19T51T0024	8	3	8	3	5	1	0	0	**21**	3.00	1.00
24	19T51T0027	9	3	10	3	10	3	0	0	**29**	3.00	3.00
25	18T51T0001	9	3	4	1	5	1	0	0	**18**	2.00	1.00
26	17T51T0012	9	3	7	2	9	3	0	0	**25**	2.50	3.00

Attainment Level Summary	**CO1**	**CO2**
Maximum Attainment Level	3	3
Cut-off Attainment Level(60%)	1.8	1.8
No.of Student >=Cut-off	19	19
% of students >=cut-off	73	73
Level Attained	3	3

Level of Attained

% of students	<60	60-79	>=80
Level	1	2	3

B. Teja Sree
Faculty

Principal

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

AVANTHI INSTITUTE OF PHARMACEUTICAL SCIENCES

Cherukupally(Village), Near Thagarapuvalasa Bridge, Vizianagaram (Dist)-531162

Regulation : PCI(R08) , Subject: Pharmaceutical Formulations Year : III (MID-II)

Calculation standards of attainment

	1:Low (40%)	*2:Medium (60%)*	*3:High (75%)*									
Descriptive (30M)	12	18	22.5									

S.NO	Roll No	CO 3 (10 M)		CO 3 (10 M)		CO 4 (10 M)		CO 4 (10 M)		Final mid I marks	Avg(D/Q/ A) Attainment Level(CO3)	Avg(D/Q/ A) Attainment Level(CO4)
		Q1	Att level	Q2	Att level	Q3	Att Level	Q4	Att Level			
1	19T51T0001	9	3	9	3	0	0	9	3	27	3.00	3.00
2	19T51T0002	0	0	0	0	0	0	0	0	0	0.00	0.00
3	19T51T0004	8	3	9	3	0	0	9	3	26	3.00	3.00
4	19T51T0005	0	0	9	3	9	3	9	3	27	3.00	3.00
5	19T51T0006	9	3	9	3	0	0	6	2	24	3.00	2.00
6	19T51T0007	8	3	9	3	0	0	8	3	25	3.00	3.00
7	19T51T0008	0	0	0	0	0	0	0	0	0	0.00	0.00
8	19T51T0009	8	3	9	3	0	0	8	3	25	3.00	3.00
9	19T51T0010	9	3	9	3	0	0	9	3	27	3.00	3.00
10	19T51T0011	9	3	9	3	0	0	8	3	26	3.00	3.00
11	19T51T0012	9	3	9	3	0	0	9	3	[illegible]	[illegible]	3.00
12	19T51T0013	9	3	9	3	0	0	9	[illegible]	[illegible]	[illegible]	[illegible]
13	19T51T0014	9	3	10	3	0	0	9	[illegible]	28	3.00	[illegible]
14	19T51T0015	9	3	9	3	0	0	6	[illegible]	[illegible]	[illegible]	2.00
15	19T51T0016	9	3	10	3	0	0	8	3	[illegible]	[illegible]	3.00
16	19T51T0017	7	2	7	2	0	0	3	0	17	2.00	0.00
17	19T51T0018	10	3	5	1	0	0	7	2	22	2.00	2.00

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

18	19T51T0019	5	1	6	2	0	0	8	3	19	1.00	3.00
19	19T51T0020	9	3	9	3	0	0	10	3	28	3.00	3.00
20	19T51T0021	10	3	9	3	0	0	8	3	27	3.00	3.00
21	19T51T0022	9	3	9	3	0	0	9	3	27	3.00	3.00
22	19T51T0023	10	3	9	3	0	0	9	3	28	3.00	3.00
23	19T51T0024	9	3	9	3	0	0	8	3	26	3.00	3.00
24	19T51T0027	9	3	0	0	9	3	9	3	27	0.00	3.00
25	18T51T0001	9	3	4	1	0	0	9	3	22	3.00	3.00
26	17T51T0012	0	0	0	0	0	0	0	0	0	0.00	0.00

Attainment Level Summary	**CO3**	**CO4**
Maximum Attainment Level	3	3
Cut-off Attainment Level(60%)	1.8	1.8
No.of Student >=Cut-off	21	22
% of students >=cut-off	81	85
Level Attained	3	3

Level of Attained			
% of students	<60	60-79	>=80
Level	1	2	3

B. Pejashree
Faculty

Principal

AVANTHI INSTITUTE OF PHARMACEUTICAL SCIENCES
AVANTHI EDUCATIONAL SOCIETY
HYDERABAD
VIZIANAGARAM

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

AVANTHI INSTITUTE OF PHARMACEUTICAL SCIENCES

Cherukupally(Village), Near Thagarapuvalasa Bridge, Vizianagaram (Dist)-531162

Regulation:PCI(R08) , Subject: Pharmaceutical Formulations Year : III (MID-III)

Calculation standards of attainment

	1:Low (40%)	*2:Medium (60%)*	*3:High (75%)*
Descriptive (30M)	12	18	22.5

S.NO	Roll No	CO 5 (10 M)		CO 5 (10 M)		CO 6 (10 M)		CO 6 (10 M)		Final mid I marks	Avg(D/Q/ A) Attainment Level(CO5)	Avg(D/Q/ A) Attainment Level(CO6)
		Q1	Att level	Q2	Att level	Q3	Att Level	Q4	Att Level			
1	19T51T0001	10	3	0	0	9	3	9	3	28	3.00	3.00
2	19T51T0002	9	3	0	0	10	3	0	0	19	3.00	3.00
3	19T51T0004	0	0	0	0	0	0	0	0	0	0.00	0.00
4	19T51T0005	9	3	0	0	10	3	9	3	28	0.00	3.00
5	19T51T0006	0	0	0	0	0	0	0	0	0	0.00	0.00
6	19T51T0007	10	3	0	0	8	3	2	0	20	0.00	3.00
7	19T51T0008	0	0	0	0	6	2	8	3	14	0.00	3.00
8	19T51T0009	9	3	0	0	9	3	9	3	27	0.00	3.00
9	19T51T0010	0	0	0	0	0	0	0	0	0	0.00	0.00
10	19T51T0011	9	3	0	0	8	3	10	3	27	3.00	3.00
11	19T51T0012	9	3	0	0	10	3	9	3	28	0.00	3.00
12	19T51T0013	0	0	0	0	0	0	0	0	0	0.00	0.00
13	19T51T0014	10	3	0	0	9	3	10	3	29	3.00	3.00
14	19T51T0015	6	2	0	0	8	3	8	3	22	3.00	3.00
15	19T51T0016	8	3	0	0	9	3	5	1	21	3.00	3.00
16	19T51T0017	0	0	0	0	9	3	10	3	19	0.00	3.00
17	19T51T0018	6	2	0	0	0	0	7	2	13	0.00	1.00

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

18	19T51T0019	7	2	0	0	0	0	0	0	7	3.00	0.00
19	19T51T0020	9	3	0	0	9	3	10	3	28	3.00	3.00
20	19T51T0021	3	0	0	0	9	3	8	3	20	0.00	3.00
21	19T51T0022	0	0	0	0	0	0	0	0	0	0.00	0.00
22	19T51T0023	0	0	0	0	0	0	0	0	0	0.00	0.00
23	19T51T0024	0	0	0	0	0	0	0	0	0	0.00	0.00
24	19T51T0027	0	0	0	0	0	0	0	0	0	0.00	0.00
25	18T51T0001	0	0	0	0	0	0	0	0	0	0.00	0.00
26	17T51T0012	7	2	0	0	0	0	8	3	15	3.00	3.00

Attainment Level Summary	**CO5**	**CO6**
Maximum Attainment Level	3	3
Cut-off Attainment Level(60%)	1.8	1.8
No.of Student >=Cut-off	22	23
% of students >=cut-off	81	85
Level Attained	3	3

Level of Attained			
% of students	<60	60-79	>=80
Level	1	2	3

B. Teja Sree
Faculty

Principal

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

AVANTHI INSTITUTE OF PHARMACEUTICAL SCIENCES

Cherukupally(Village), Near Thagarapuvalasa Bridge, Vizianagaram (Dist)-531162

Regulation : PCI , Subject : Pharmaceutical Formulations Year : III

SL.NO	REGD.NO	Marks	Att. Level
1	19T51T0001	52	2
2	19T51T0002	44	2
3	19T51T0004	63	3
4	19T51T0005	47	2
5	19T51T0006	53	3
6	19T51T0007	60	3
7	19T51T0008	59	3
8	19T51T0009	62	3
9	19T51T0010	62	3
10	19T51T0011	61	3
11	19T51T0012	61	3
12	19T51T0013	60	3
13	19T51T0014	62	3
14	19T51T0015	62	3
15	19T51T0016	61	3
16	19T51T0017	63	3
17	19T51T0018	58	3
18	19T51T0019	57	3
19	19T51T0020	56	3
20	19T51T0021	47	2
21	19T51T0022	44	2
22	19T51T0023	60	3
23	19T51T0024	45	2
24	19T51T0027	56	3
25	18T51T0001	21	0
26	17T51T0012	20	0

Attainment Level Summary	CO1 to CO6
Maximum Attainment Level	3
Cut-off Attainment Level(1.8-Passed)	24
No.of Student >=Cut-off	24

AVANTHI INSTITUTE OF PHARMACEUTICAL SCIENCES * AVANTHI EDUCATIONAL SOCIETY * HYDERABAD * VIZIANAGARAM *

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

% of students >=cut-off	96	
Level Attained	3	
Level of Attained		
% of students	<50	50-79
Level	1	2

B. Teja Sree
Faculty

Principal

AVANTHI INSTITUTE OF PHARMACEUTICAL SCIENCES
AVANTHI EDUCATIONAL SOCIETY
HYDERABAD
VIZIANAGARAM

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

ESTD : 2005

AVANTHI INSTITUTE OF PHARMACEUTICAL SCIENCES

Cherukupally(Village), Near Thagarapuvalasa Bridge, Vizianagaram (Dist)-531162

Regulation:PCI(R08) , Subject: Pharmaceutical Formulations Year : III

Faculty: Dr. B Tejasree, Assistant Professor

Particulars	Overall Attainment					
	CO1	CO2	CO3	CO4	CO5	CO6
Internal Attaintment Level (INT)	3	3	3	3	3	3
External Attaintment Level (EXT)	3	3	3	3	3	3
TOTAL = INT * 0.25 + EXT * 0.75	3	3	3.00	3	3	3

Target Level is 2.3 (75%)

Target is attained.

B. TejaSree

Faculty

Principal

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

AVANTHI INSTITUTE OF PHARMACEUTICAL SCIENCES

ESTD : 2005

Cherukupally (Village), Near Thagarapuvalasa Bridge, Vizianagaram (Dist)-531162

Regulation:PCI(R08) , Subject: Pharmaceutical Formulations Year : III

Faculty: Dr. B Tejasree, Assistant Professor

	The Mapping of CO and PO on 3 point scale{high-3,Medium-2,Low-1} is:													
	CO Attainment Level	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PSO 1	PSO 2
CO3106.1	3	3	-	2	2	-	-	-	-	1	1	1	1	1
CO3106.2	3	3	-	2	2	-	-	-	-	1	1	1	2	1
CO3106.3	3	3	-	2	2	-	-	-	-	1	1	1	2	1
CO3106.4	3	3	-	2	2	-	-	-	-	1	1	1	2	1
CO3106.5	3	3	-	2	2	-	-	-	-	1	1	1	2	1
CO3106.6	3	3	-	2	2	-	-	-	-	1	1	1	1	1
PO/PSO Weightage		18	0	12	12	0	0	0	0	6	6	6	10	6
PO/PSO Co-relation weightage all Cos(1-5)		54	0	36	36	0	0	0	0	18	18	18	30	18
PO/PSO Attainment Level		3.00	-	3.00	3.00	-	-	-	-	3.00	3.00	3.00	3.00	3.00

B. TejaSree

Faculty

AVANTHI INSTITUTE OF PHARMACEUTICAL SCIENCES * AVANTHI EDUCATIONAL SOCIETY * HYDERABAD * VIZIANAGARAM *

Principal

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA
UNIVERSITY EXAMINATION CENTER, KAKINADA

I B. PHARMACY - I SEMESTER (PCI REGULATION) I MID EXAMINATIONS, APRIL - 2021

T I M E T A B L E

TIME: 10.00 AM to 12.00 NOON

DATE	06.04.2021 (Tuesday)	07.04.2021 (Wednesday)	08.04.2021 (Thursday)	09.04.2021 (Friday)
SUBJECTS	Human Anatomy and Physiology-I (**BP101T**)	Pharmaceutical Analysis-I (**BP102T**)	Pharmaceutics-I (**BP103T**)	Pharmaceutical Inorganic Chemistry (**BP104T**)

NOTE: (i) ANY OMISSIONS OR CLASHES IN THIS TIME TABLE MAY PLEASE BE INFORMED TO THE CONTROLLER OF EXAMINATIONS IM MEDIATELY.

(ii) EVEN IF GOVERNMENT DECLARES HOLIDAY ON ANY OF THE ABOVE DATES, THE EXAMINATIONS SHALL BE CONDUCTED AS USUAL.

(iii) THE PRINCIPALS ARE REQUESTED TO INFORM THE UNIVERSITY ANY OTHER SUBSTITUTE SUBJECTS THAT ARE NOT INCLUED IN THE ABOVE LIST IMMEDIATELY.

Date: 01-04-2021

Controller of Examinations

AVANTHI INSTITUTE OF PHARMACEUTICAL SCIENCES * AVANTHI EDUCATIONAL SOCIETY * HYDERABAD * VIZIANAGARAM

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA

UNIVERSITY EXAMINATION CENTER. KAKINADA

I B. PHARMACY II SEMESTER (PCI REGULATION) I MID EXAMINATIONS, AUGUST/SEPTEMBER - 2021

TIMETABLE

TIME : 10.00 AM TO 12.00 NOON

DATE	31-08-2021 (Tuesday)	01-09-2021 (Wednesday)	02-09-2021 (Thursday)	03-09-2021 (Friday)
SUBJECTS	Human Anatomy and Physiology-II (BP201T)	Pharmaceutical Organic Chemistry-I (BP202T)	Biochemistry (BP203T)	Pathophysiology (BP204T)

NOTE: (i) ANY OMISSIONS OR CLASHES IN THIS TIME TABLE MAY PLEASE BE INFORMED TO THE CONTROLLER OF EXAMINATIONS IM MEDIATELY.

(ii) EVEN IF GOVERNMENT DECLARES HOLIDAY ON ANY OF THE ABOVE DATES, THE EXAMINATIONS SHALL BE CONDUCTED AS USUAL.

(iii) THE PRINCIPALS ARE REQUESTED TO INFORM THE UNIVERSITY ANY OTHER SUBSTITUTE SUBJECTS THAT ARE NOT INCLUED IN THE ABOVE LIST IMMEDIATELY.

Controller of Examinations

DATE: 16 -08-2021

AVANTHI INSTITUTE OF PHARMACEUTICAL SCIENCES AVANTHI EDUCATIONAL SOCIETY HYDERABAD VIZIANAGARAM

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA

UNIVERSITY EXAMINATION CENTER, KAKINADA

I B. PHARMACY II SEMESTER (PCI REGULATION) II MID EXAMINATIONS, SEPTEMBER - 2021

TIMETABLE

TIME : 10.00 AM TO 12.00 NOON

DATE	20-09-2021 (Monday)	21-09-2021 (Tuesday)	22-09-2021 (Wednesday)	23-09-2021 (Thursday)
SUBJECTS	Human Anatomy and Physiology-II (BP201T)	Pharmaceutical Organic Chemistry-I (BP202T)	Biochemistry (BP203T)	Pathophysiology (BP204T)

NOTE: (i) ANY OMISSIONS OR CLASHES IN THIS TIME TABLE MAY PLEASE BE INFORMED TO THE CONTROLLER OF EXAMINATIONS IM MEDIATELY.

(ii) EVEN IF GOVERNMENT DECLARES HOLIDAY ON ANY OF THE ABOVE DATES, THE EXAMINATIONS SHALL BE CONDUCTED AS USUAL.

(iii) THE PRINCIPALS ARE REQUESTED TO INFORM THE UNIVERSITY ANY OTHER SUBSTITUTE SUBJECTS THAT ARE NOT INCLUED IN THE ABOVE LIST IMMEDIATELY.

Controller of Examinations

DATE: 01-09-2021

AVANTHI INSTITUTE OF PHARMACEUTICAL SCIENCES * AVANTHI EDUCATIONAL SOCIETY * HYDERABAD * VIZIANAGARAM *

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA
UNIVERSITY EXAMINATION CENTER, KAKINADA

II B. PHARMACY - I SEMESTER (PCI REGULATION) I MID EXAMINATIONS, JANUARY - 2021

TIME TABLE

DATE	27-01-2021 (Wednesday)	28-01-2021 (Thursday)	29-01-2021 (Friday)	30-01-2021 (Saturday)
SUBJECTS	Pharmaceutical Organic Chemistry-II (BP301T)	Physical Pharmaceutics-I (BP302T)	Pharmaceutical Microbiology (BP303T)	Pharmaceutical Engineering (BP304T)

NOTE: (i) ANY OMISSIONS OR CLASHES IN THIS TIME TABLE MAY PLEASE BE INFORMED TO THE CONTROLLER OF EXAMINATIONS IM MEDIATELY.

(ii) EVEN IF GOVERNMENT DECLARES HOLIDAY ON ANY OF THE ABOVE DATES, THE EXAMINATIONS SHALL BE CONDUCTED AS USUAL.

(iii) THE PRINCIPALS ARE REQUESTED TO INFORM THE UNIVERSITY ANY OTHER SUBSTITUTE SUBJECTS THAT ARE NOT INCLUED IN THE ABOVE LIST IMMEDIATELY.

DATE: 05-01-2021

Controller of Examinations

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA
UNIVERSITY EXAMINATION CENTER, KAKINADA

II B. PHARMACY - I SEMESTER (PCI REGULATION) II MID EXAMINATIONS, MARCH - 2021

TIME TABLE

DATE	01-03-2021 (Wednesday)	02-03-2021 (Tuesday)	03-03-2021 (Wednesday)	04-03-2021 (Thursday)
SUBJECTS	Pharmaceutical Organic Chemistry-II (BP301T)	Physical Pharmaceutics-I (BP302T)	Pharmaceutical Microbiology (BP303T)	Pharmaceutical Engineering (BP304T)

NOTE: (i) ANY OMISSIONS OR CLASHES IN THIS TIME TABLE MAY PLEASE BE INFORMED TO THE CONTROLLER OF EXAMINATIONS IM MEDIATELY.

(ii) EVEN IF GOVERNMENT DECLARES HOLIDAY ON ANY OF THE ABOVE DATES, THE EXAMINATIONS SHALL BE CONDUCTED AS USUAL.

(iii) THE PRINCIPALS ARE REQUESTED TO INFORM THE UNIVERSITY ANY OTHER SUBSTITUTE SUBJECTS THAT ARE NOT INCLUED IN THE ABOVE LIST IMMEDIATELY.

DATE: 15-02-2021

Controller of Examinations

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA

UNIVERSITY EXAMINATION CENTER, KAKINADA

II B.PHARMACY - II SEMESTER (R17 PCI REGULATION) I & II MID EXAMINATIONS, AUGUST - 2021

T I M E T A B L E

T I M E : 10.00 AM TO 12.00 NOON
T I M E : 02.00 PM TO 04.00 PM

DATE	23-08-2021 (Monday)	24-08-2021 (Tuesday)	25-08-2021 (Wednesday)	26-08-2021 (Thursday)	27-08-2021 (Friday)
SUBJECTS	PHARMACEUTICAL ORGANIC CHEMISTRY-III **(BP401T)**	MEDICINAL CHEMISTRY-I **(BP402T)**	PHYSICAL PHARMACEUTICS-II **(BP403T)**	PHARMACOLOGY-I **(BP404T)**	PHARMACOGNOSY AND PHYTOCHEMISTRY -I **(BP405T)**

NOTE: (i) ANY OMISSIONS OR CLASHES IN THIS TIME TABLE MAY PLEASE BE INFORMED TO THE CONTROLLER OF EXAMINATIONS IM MEDIATELY.

(ii) EVEN IF GOVERNMENT DECLARES HOLIDAY ON ANY OF THE ABOVE DATES, THE EXAMINATIONS SHALL BE CONDUCTED AS USUAL.

(iii) THE PRINCIPALS ARE REQUESTED TO INFORM THE UNIVERSITY ANY OTHER SUBSTITUTE SUBJECTS THAT ARE NOT INCLUED IN THE ABOVE LIST IMMEDIATELY.

DATE: 27-07-2021

Controller of Examinations

AVANTHI INSTITUTE OF PHARMACEUTICAL SCIENCES * AVANTHI EDUCATIONAL SOCIETY * HYDERABAD * VIZIANAGARAM

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA
UNIVERSITY EXAMINATION CENTER, KAKINADA

III B. PHARMACY - I SEMESTER (PCI REGULATION) I MID EXAMINATIONS, JANUARY/FEBRUARY - 2021

TIME TABLE

DATE	27-01-2021 (Wednesday)	28-01-2021 (Thursday)	29-01-2021 (Friday)	30-01-2021 (Saturday)	01-02-2021 (Monday)
SUBJECTS	MEDICINAL CHEMISTRY-II (BP501T)	INDUSTRIAL PHARMACY – I (BP502T)	PHARMACOLOGY-II (BP503T)	PHARMACOGNOSY AND PHYTOCHEMISTRY-II (BP504T)	PHARMACEUTICAL JURISPRUDENCE (BP505T)

NOTE: (i) ANY OMISSIONS OR CLASHES IN THIS TIME TABLE MAY PLEASE BE INFORMED TO THE CONTROLLER OF EXAMINATIONS IM MEDIATELY.

(ii) EVEN IF GOVERNMENT DECLARES HOLIDAY ON ANY OF THE ABOVE DATES, THE EXAMINATIONS SHALL BE CONDUCTED AS USUAL.

(iii) THE PRINCIPALS ARE REQUESTED TO INFORM THE UNIVERSITY ANY OTHER SUBSTITUTE SUBJECTS THAT ARE NOT INCLUED IN THE ABOVE LIST IMMEDIATELY.

DATE: 05-01-2021

Controller of Examinations

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA
UNIVERSITY EXAMINATION CENTER, KAKINADA

III B. PHARMACY - I SEMESTER (PCI REGULATION) II MID EXAMINATIONS, MARCH - 2021

TIME TABLE

DATE	01-03-2021 (Monday)	02-03-2021 (Tuesday)	03-03-2021 (Wednesday)	04-03-2021 (Thursday)	05-03-2021 (Friday)
SUBJECTS	MEDICINAL CHEMISTRY-II (BP501T)	INDUSTRIAL PHARMACY – I (BP502T)	PHARMACOLOGY-II (BP503T)	PHARMACOGNOSY AND PHYTOCHEMISTRY-II (BP504T)	PHARMACEUTICAL JURISPRUDENCE (BP505T)

NOTE: (i) ANY OMISSIONS OR CLASHES IN THIS TIME TABLE MAY PLEASE BE INFORMED TO THE CONTROLLER OF EXAMINATIONS IM MEDIATELY.

(ii) EVEN IF GOVERNMENT DECLARES HOLIDAY ON ANY OF THE ABOVE DATES, THE EXAMINATIONS SHALL BE CONDUCTED AS USUAL.

(iii) THE PRINCIPALS ARE REQUESTED TO INFORM THE UNIVERSITY.ANY OTHER SUBSTITUTE SUBJECTS THAT ARE NOT INCLUED IN THE ABOVE LIST IMMEDIATELY.

DATE: 15-02-2021

Controller of Examinations

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY : KAKINADA
UNIVERSI TY EXAMINATION CENTER, KAKINADA

III B. PHARMACY - II SEMESTER (PCI REGULATION) I, II MID EXAMINATIONS & QUIZ (OFF LINE), AUGUST - 2021

TIME TABLE

I MID TIME : 10.00 AM TO 12.00 NOON
II MID TIME : 02.00 PM TO 04.00 PM

DATE	02-08-2021 (Monday)	03-08-2021 (Tuesday)	04-08-2021 (Wednesday)	05-08-2021 (Thursday)	06-08-2021 (Friday)	07-08-2021 (Saturday)
SUBJECTS	Medicinal Chemistry III (BP601T)	Pharmacology III (BP602T)	Herbal Drug Technology (BP603T)	Biopharmaceutics and Pharmacokinetics (BP604T)	Pharmaceutical Biotechnology (BP605T)	Quality Assurance (BP606T)

NOTE: (i) ANY OMISSIONS OR CLASHES IN THIS TIME TABLE MAY PLEASE BE INFORMED TO THE CONTROLLER OF EXAMINATIONS IM MEDIATELY.

(ii) EVEN IF GOVERNMENT DECLARES HOLIDAY ON ANY OF THE ABOVE DATES, THE EXAMINATIONS SHALL BE CONDUCTED AS USUAL.

(iii) THE PRINCIPALS ARE REQUESTED TO INFORM THE UNIVERSITY ANY OTHER SUBSTITUTE SUBJECTS THAT ARE NOT INCLUED IN THE ABOVE LIST IMMEDIATELY.

DATE: 20-07-2021

Controller of Examinations

AVANTHI INSTITUTE OF PHARMACEUTICAL SCIENCES * AVANTHI EDUCATIONAL SOCIETY * HYDERABAD * VIZIANAGARAM

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA
UNIVERSITY EXAMINATION CENTER, KAKINADA

IV B.PHARMACY I SEMESTER (PCI) I MID EXAMINATIONS, JANUARY - 2021

T I M E T A B L E

COURSE	DATE & DAY			
	19-01-2021 (Tuesday)	**20-01-2021 (Wednesday)**	**21-01-2021 (Thursday)**	**22-01-2021 (Friday)**
SUBJECTS	Instrumental Methods of Analysis (BP701T)	Industrial Pharmacy II (BP702T)	Pharmacy Practice (BP703T)	Novel Drug Delivery System (BP704T)

NOTE: (i) ANY OMISSIONS OR CLASHES IN THIS TIME TABLE MAY PLEASE BE INFORMED TO THE CONTROLLER OF EXAMINATIONS IMMEDIATELY.

(ii) EVEN IF GOVERNMENT DECLARES HOLIDAY ON ANY OF THE ABOVE DATES, THE EXAMINATIONS SHALL BE CONDUCTED AS USUAL.

(iii) THE PRINCIPALS ARE REQUESTED TO INFORM THE UNIVERSITY ANY OTHER SUBSTITUTE SUBJECTS THAT ARE NOT INCLUED IN THE ABOVE LIST IMMEDIATELY.

DATE: 04-01-2021

Controller of Examinations

AVANTHI INSTITUTE OF PHARMACEUTICAL SCIENCES AVANTHI EDUCATIONAL SOCIETY HYDERABAD VIZIANAGARAM

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

UNIVERSITY EXAMINATION CENTER, KAKINADA

IV B.PHARMACY I SEMESTER (PCI) II MID EXAMINATIONS, MARCH - 2021

T I M E T A B L E

COURSE	DATE & DAY			
	01-03-2021 (Monday)	**02-03-2021 (Tuesday)**	**03-03-2021 (Wednesday)**	**04-03-2021 (Thursday)**
SUBJECTS	Instrumental Methods of Analysis (BP701T)	Industrial Pharmacy II (BP702T)	Pharmacy Practice (BP703T)	Novel Drug Delivery System (BP704T)

NOTE: (i) ANY OMISSIONS OR CLASHES IN THIS TIME TABLE MAY PLEASE BE INFORMED TO THE CONTROLLER OF EXAMINATIONS IMMEDIATELY.

(ii) EVEN IF GOVERNMENT DECLARES HOLIDAY ON ANY OF THE ABOVE DATES, THE EXAMINATIONS SHALL BE CONDUCTED AS USUAL.

(iii) THE PRINCIPALS ARE REQUESTED TO INFORM THE UNIVERSITY ANY OTHER SUBSTITUTE SUBJECTS THAT ARE NOT INCLUED IN THE ABOVE LIST IMMEDIATELY.

DATE: 15-02-2021

Controller of Examinations

AVANTHI INSTITUTE OF PHARMACEUTICAL SCIENCES * AVANTHI EDUCATIONAL SOCIETY * HYDERABAD * VIZIANAGARAM *

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA
UNIVERSITY EXAMINATION CENTER, KAKINADA

IV B.PHARMACY II SEMESTER (PCI REGULATIONS) I & II MID EXAMINATIONS, JULY - 2021

T I M E T A B L E

I Mid : 10.00 AM TO 12.00 NOON
II Mid : 02.00 PM TO 04.00 PM

DATE & DAY	PCI REGULATION
12.07.2021 (Monday)	Biostatistics and Research Methodology **(BP801T)**
13.07.2021 (Tuesday)	Social and Preventive Pharmacy **(BP802T)**
14.07.2021 (Wednesday)	Elective - I
15.07.2021 (Thursday)	Elective - II

NOTE (i) ANY OMISSIONS OR CLASHES IN THIS TIME TABLE MAY PLEASE BE INFORMED TO THE CONTROLLER OF EXAMINATIONS IMEDIATELY.
(ii) EVEN IF GOVERNMENT DECLARES HOLIDAY ON ANY OF THE ABOVE DATES, THE EXAMINATIONS SHALL BE CONDUCTED AS USUAL.
(iii) FOR ANY OTHER CLARIFICATION IN RESPECT OF THE ABOVE EXAMINATIONS PLEASE CONTACT CONTROLLER OF EXAMINATIONS /OR 9652300902.

Controller of Examinations

DATE: 30-06-2021

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA
UNIVERSITY EXAMINATION CENTER, KAKINADA
M. PHARMACY I SEMESTER (PCI REGULATION) I MID EXAMINATIONS, APRIL - 2021

TIME TABLE

TIME: 10:00 AM TO 12:00 NOON

BRANCH & SPECIALIZATION	06-04-2021 (Tuesday)	07-04-2021 (Wednesday)	08-04-2021 (Thursday)	09-04-2021 (Friday)
PHARMACEUTICAL CHEMISTRY (02)	Modern Pharmaceutical Analytical Techniques (**MPC101T**)	Advanced Organic Chemistry –I (**MPC102T**)	Advanced Medicinal Chemistry (**MPC103T**)	Chemistry of Natural Products (**MPC104T**)
PHARMACEUTICS (03)	Modern Pharmaceutical Analytical Techniques (**MPH101T**)	Drug Delivery Systems (**MPH102T**)	Modern Pharmaceutics (**MPH103T**)	Regulatory Affairs (**MPH104T**)
PHARMACOLOGY (06)	Modern Pharmaceutical Analytical Techniques (**MPL101T**)	Advanced Pharmacology-I (**MPL102T**)	Pharmacological and Toxicological Screening Methods-I (**MPL103T**)	Cellular and Molecular Pharmacology (**MPL104T**)
PHARMACOGNOSY (07)	Modern Pharmaceutical Analytical Techniques (**MPG101T**)	Advanced Pharmacognosy-I (**MPG102T**)	Phytochemistry (**MPG103T**)	Industrial Pharmacognostical Technology (**MPG104T**)
PHARMACY PRACTICE (08)	Clinical Pharmacy Practice (**MPP101T**)	Pharmacotherapeutics-I (**MPP102T**)	Hospital & Community Pharmacy (**MPP103T**)	Clinical Research (**MPP104T**)
INDUSTRIAL PHARMACY (09)	Modern Pharmaceutical Analytical Techniques (**MIP101T**)	Pharmaceutical Formulation Development (**MIP102T**)	Novel drug delivery systems (**MIP103T**)	Intellectual Property Rights (**MIP104T**)

AVANTHI INSTITUTE OF PHARMACEUTICAL SCIENCES * AVANTHI EDUCATIONAL SOCIETY * HYDERABAD * VIZIANAGARAM

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

BRANCH & SPECIALIZATION	06-04-2021 (Tuesday)	07-04-2021 (Wednesday)	08-04-2021 (Thursday)	09-04-2021 (Friday)
PHARMACEUTICAL REGULATORY AFFAIRS (13)	Good Regulatory Practices (**MRA101T**)	Documentation and Regulatory Writing (**MRA102T**)	Clinical Research Regulations (**MRA103T**)	Regulations and Legislation for Drugs & Cosmetics, Medical Devices, Biologicals & Herbals, and Food & Nutraceuticals In India and Intellectual Property Rights (**MRA104T**)
PHARMACY QUALITY ASSURANCE (15)	Modern Pharmaceutical Analytical Techniques (**MQA101T**)	Quality Management System (**MQA102T**)	Quality Control and Quality Assurance (**MQA103T**)	Product Development and Technology Transfer (**MQA104T**)
PHARMACEUTICAL ANALYSIS (16)	Modern Pharmaceutical Analytical Techniques (**MPA101T**)	Advanced Pharmaceutical Analysis (**MPA102T**)	Pharmaceutical Validation (**MPA103T**)	Food Analysis (**MPA104T**)

NOTE: (i) If Government declares holiday on any of the above dates, the examinations will be conducted as usual.
(ii) Any omissions or clashes in this Time Table may please be informed to the Controller of Examinations immediately.
(iii) The Principals are requested to inform the University, if any other substitute subjects that are not included in the above time table immediately

Date: 01-04-2021

Controller of Examinations

AVANTHI INSTITUTE OF PHARMACEUTICAL SCIENCES ★ AVANTHI EDUCATIONAL SOCIETY ★ HYDERABAD ★ VIZIANAGARAM

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA
UNIVERSITY EXAMINATION CENTER, KAKINADA
M. PHARMACY I SEMESTER (PCI REGULATION) II MID EXAMINATIONS, JULY - 2021

TIME TABLE

TIME: 10:00 AM TO 12:00 NOON

BRANCH & SPECIALIZATION	19-07-2021 (Monday)	20-07-2021 (Tuesday)	22-07-2021 (Thursday)	23-07-2021 (Friday)
PHARMACEUTICAL CHEMISTRY (02)	Modern Pharmaceutical Analytical Techniques (**MPC101T**)	Advanced Organic Chemistry –I (**MPC102T**)	Advanced Medicinal Chemistry (**MPC103T**)	Chemistry of Natural Products (**MPC104T**)
PHARMACEUTICS (03)	Modern Pharmaceutical Analytical Techniques (**MPH101T**)	Drug Delivery Systems (**MPH102T**)	Modern Pharmaceutics (**MPH103T**)	Regulatory Affairs (**MPH104T**)
PHARMACOLOGY (06)	Modern Pharmaceutical Analytical Techniques (**MPL101T**)	Advanced Pharmacology-I (**MPL102T**)	Pharmacological and Toxicological Screening Methods-I (**MPL103T**)	Cellular and Molecular Pharmacology (**MPL104T**)
PHARMACOGNOSY (07)	Modern Pharmaceutical Analytical Techniques (**MPG101T**)	Advanced Pharmacognosy-I (**MPG102T**)	Phytochemistry (**MPG103T**)	Industrial Pharmacognostical Technology (**MPG104T**)
PHARMACY PRACTICE (08)	Clinical Pharmacy Practice (**MPP101T**)	Pharmacotherapeutics-I (**MPP102T**)	Hospital & Community Pharmacy. (**MPP103T**)	Clinical Research (**MPP104T**)
INDUSTRIAL PHARMACY (09)	Modern Pharmaceutical Analytical Techniques (**MIP101T**)	Pharmaceutical Formulation Development (**MIP102T**)	Novel drug delivery systems (**MIP103T**)	Intellectual Property Rights (**MIP104T**)

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal

BRANCH & SPECIALIZATION	19-07-2021 (Monday)	20-07-2021 (Tuesday)	22-07-2021 (Thursday)	23-07-2021 (Friday)
PHARMACEUTICAL REGULATORY AFFAIRS (13)	Good Regulatory Practices (**MRA101T**)	Documentation and Regulatory Writing (**MRA102T**)	Clinical Research Regulations (**MRA103T**)	Regulations and Legislation for Drugs & Cosmetics, Medical Devices, Biologicals & Herbals, and Food & Nutraceuticals In India and Intellectual Property Rights (**MRA104T**)
PHARMACY QUALITY ASSURANCE (15)	Modern Pharmaceutical Analytical Techniques (**MQA101T**)	Quality Management System (**MQA102T**)	Quality Control and Quality Assurance (**MQA103T**)	Product Development and Technology Transfer (**MQA104T**)
PHARMACEUTICAL ANALYSIS (16)	Modern Pharmaceutical Analytical Techniques (**MPA101T**)	Advanced Pharmaceutical Analysis (**MPA102T**)	Pharmaceutical Validation (**MPA103T**)	Food Analysis (**MPA104T**)

NOTE: (i) If Government declares holiday on any of the above dates, the examinations will be conducted as usual
(ii) Any omissions or clashes in this Time Table may please be informed to the Controller of Examinations immediately.
(iii) The Principals are requested to inform the University, if any other substitute subjects that are not included in the above time table immediately

Date: 13-07-2021

Controller of Examinations

AVANTHI INSTITUTE OF PHARMACEUTICAL SCIENCES * AVANTHI EDUCATIONAL SOCIETY * HYDERABAD * VIZIANAGARAM *

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA
UNIVERSITY EXAMINATION CENTER, KAKINADA

M. Pharmacy II SEMESTER (PCI REGULATION) I MID EXAMINATIONS, AUGUST - 2021

TIME TABLE

TIME : 10.00 AM TO 12.00 NOON

BRANCH & SPECIALIZATION	23-08-2021 (Monday)	24-08-2021 (Tuesday)	25-08-2021 (Wednesday)	26-08-2021 (Thursday)
Pharmaceutics (03)	Molecular Pharmaceutics **(MPH201T)**	Advanced Bio pharmaceutics & Pharmacokinetics **(MPH202T)**	Computer Aided Drug Development **(MPH203T)**	Formulation Development of Pharmaceutical and Cosmetic Products **(MPH204T)**
Industrial Pharmacy (09)	Advanced Bio pharmaceutics and Pharmacokinetics **(MIP201T)**	Scale up and Technology Transfer **(MIP202T)**	Pharmaceutical Production Technology **(MIP203T)**	Entrepreneurship Management **(MIP204T)**
Pharmaceutical Chemistry (02)	Advanced Spectral Analysis **(MPC201T)**	Advanced Organic Chemistry II **(MPC202T)**	Computer Aided Drug Design **(MPC203T)**	Pharmaceutical Process Chemistry **(MPC204T)**
Pharmaceutical Analysis (16)	Advanced Instrumental Analysis **(MPA201T)**	Modern Bio-Analytical Techniques **(MPA202T)**	Quality Control and Quality Assurance **(MPA203T)**	Herbal and Cosmetic Analysis **(MPA204T)**
Pharmaceutical Quality Assurance (15)	Hazards and Safety Management **(MQA201T)**	Pharmaceutical Validation **(MQA202T)**	Audits and Regulatory Compliance **(MQA203T)**	Pharmaceutical Manufacturing Technology **(MQA204T)**
Pharmaceutical Regulatory Affairs (13)	Regulatory Aspects of Drugs and Cosmetics (MRA201T)	Regulatory Aspects of Herbal & Biologicals **(MRA202T)**	Regulatory Aspects of Medical Devices **(MRA203T)**	Regulatory Aspects of Food Neutraceuticals **(MRA204T)**
Pharmacy Practice (08)	Principles of Quality Use of Medicines **(MPP201T)**	Pharmacotherapeutics – II **(MPP202T)**	Clinical Pharmacokinetics and Therapeutic Drug Monitoring **(MPP203T)**	Pharmacoepidemiology & Pharmacoeconomics **(MPP204T)**
Pharmacology (06)	Advanced Pharmacology – II **(MPL201T)**	Pharmacology and Toxicology Screening methods- II **(MPL202T)**	Principles of Drug Discovery **(MPL203T)**	Clinical Research and Pharmacovigilance **(MPL204T)**
Pharmacognosy (07)	Medicinal Plant Biotechnology **(MPG201T)**	Advanced Pharmacognosy – II **(MPG202T)**	Indian system of Medicine **(MPG203T)**	Herbal Cosmetics **(MPG204T)**

NOTE: (i) If Government declares holiday on any of the above dates, the examinations will be conducted as usual
(ii) Any omissions or clashes in this Time Table may please be informed to the Controller of Examinations immediately.
(iii) The Principals are requested to inform the University, if any other substitute subjects that are not included in the above time table immediately.

Date: 11-08-2021

Controller of Examinations

AVANTHI INSTITUTE OF PHARMACEUTICAL SCIENCES, AVANTHI EDUCATIONAL SOCIETY, HYDERABAD, VIZIANAGARAM

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 52111

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA

UNIVERSITY EXAMINATION CENTER, KAKINADA

PHARM "D" II YEAR REGULAR/SUPPLEMENTARY EXAMINATIONS, AUGUST - 2021

(2019 TO 2012 ADMITTED BATCHES)

TIMETABLE

TIME : 02.00 PM TO 05.00 PM

03-08-2021 (Tuesday)	05-08-2021 (Thursday)	07-08-2021 (Saturday)	10-08-2021 (Tuesday)	12-08-2021 (Thursday)	14-08-2021 (Saturday)
PATHOPHYSIOLOGY (T2101)	PHARMACEUTICAL MICROBIOLOGY (T2102)	PHARMACOGNOSY AND PHYTOPHARMACEUTICALS (T2103)	COMMUNITY PHARMACY (T2105)	PHARMACOTHERAPEUTICS – I (T2106)	PHARMACOLOGY – I (T2104)

NOTE: (i) ANY OMISSIONS OR CLASHES IN THIS TIME TABLE MAY PLEASE BE INFORMED TO THE CONTROLLER OF EXAMINATIONS IMEDIATELY.

(ii) EVEN OF GOVERNMENT DECLARES HOLIDAY ON ANY OF THE ABOVE DATES ,THE EXAMINATIONS SHALL BE CONDUCTED AS USUAL.

(iii) FOR ANY OTHER CLARIFICATIONS IN RESPECT OF THE ABOVE EXAMINATIONS PLEASE CONTACT CONTROLLER OF EXAMINATIONS

Date: 20.07.2021

Controller of Examinations

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY : KAKINADA
UNIVERSITY EXAMINATION CENTER, KAKINADA

PHARM "D" III YEAR REGULAR/SUPPLEMENTARY EXAMINATIONS, AUGUST – 2021
(2018 TO 2012 ADMITTED BATCHES)

TIME TABLE

T I M E : 02.00 PM TO 05.00 PM

02-08-2021 (Monday)	04-08-2021 (Wednesday)	06-08-2021 (Friday)	09-08-2021 (Monday)	11-08-2021 (Wednesday)	13-08-2021 (Friday)
PHARMACOTHERAPEUTICS – II (T3103)	PHARMACEUTICAL JURISPRUDENCE (T3104)	PHARMACEUTICAL FORMULATIONS (T3106)	PHARMACOLOGY –II (T3101)	MEDICINAL CHEMISTRY (T3105)	PHARMACEUTICAL ANALYSIS (T3102)

NOTE: (i) ANY OMISSIONS OR CLASHES IN THIS TIME-TABLE MAY PLEASE BE INFORMED TO THE CONTROLLER OF EXAMINATIONS IMEDIATELY.
(ii) EVEN OF GOVERNMENT DECLARES HOLIDAY ON ANY OF THE ABOVE DATES ,THE EXAMINATIONS SHALL BE CONDUCTED AS USUAL.
(iii) FOR ANY OTHER CLARIFICATIONS IN RESPECT OF THE ABOVE EXAMINATIONS PLEASE CONTACT CONTROLLER OF EXAMINATIONS

Controller of Examinations

Date: 20.07.2021

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSIT : KAKINADA

UNIVERSITY EXAMINATION CENTER, KAKINADA

PHARM "D" IV YEAR REGULAR/SUPPLEMENTARY EXAMINATIONS, AUGUST - 2021

(2017 TO 2012 ADMITTED BATCHES)

TIME TABLE

TIME : 10.00 AM TO 1.00 PM

03-08-2021 (Tuesday)	05-08-2021 (Thursday)	07-08-2021 (Saturday)	10-08-2021 (Tuesday)	12-08-2021 (Thursday)	14-08-2021 (Saturday)	16-08-2021 (Monday)
CLINICAL TOXICOLOGY **(T4106)**	PHARMACOTHERAPEUTICS –III **(T4101)**	BIOPHARMACEUTICS & PHARMACOKINETICS **(T4105)**	HOSPITAL PHARMACY **(T4102)**	BIOSTATISTICS & RESEARCH METHODOLOGY **(T4104)**	CLINICAL PHARMACY **(T4103)**	PHARMACOTHERAPEUTICS – I & II **(T4111)**

NOTE: (i) ANY OMISSIONS OR CLASHES IN THIS TIME TABLE MAY PLEASE BE INFORMED TO THE CONTROLLER OF EXAMINATIONS IMEDIATELY.

(ii) EVEN OF GOVERNMENT DECLARES HOLIDAY ON ANY OF THE ABOVE DATES ,THE EXAMINATIONS SHALL BE CONDUCTED AS USUAL.

(iii) FOR ANY OTHER CLARIFICATIONS IN RESPECT OF THE ABOVE EXAMINATIONS PLEASE CONTACT CONTROLLER OF EXAMINATIONS

Controller of Examinations

Date: 20.07.2021

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY : KAKINADA
UNIVERSITY EXAMINATION CENTER, KAKINADA

PHARM "D" V YEAR REGULAR/SUPPLEMENTARY EXAMINATIONS, AUGUST - 2021

(2016 TO 2012 ADMITTED BATCH)

TIME TABLE

T I M E : 10.00 AM TO 1.00 PM

02-08-2021 (Monday)	04-08-2021 (Wednesday)	06-08-2021 (Friday)
CLINICAL PHARMACOKINETICS & PHARMACOTHERAPEUTIC DRUG MONITORING (**T5103**)	PHARMACOEPIDEMIOLOGY & PHARMACOECONOMICS (**T5102**)	CLINICAL RESEARCH (**T5101**)

NOTE: (i) ANY OMISSIONS OR CLASHES IN THIS TIME TABLE MAY PLEASE BE INFORMED TO THE CONTROLLER OF EXAMINATIONS IMEDIATELY.

(ii) EVEN OF GOVERNMENT DECLARES HOLIDAY ON ANY OF THE ABOVE DATES ,THE EXAMINATIONS SHALL BE CONDUCTED AS USUAL.

(iii) FOR ANY OTHER CLARIFICATIONS IN RESPECT OF THE ABOVE EXAMINATIONS PLEASE CONTACT CONTROLLER OF EXAMINATIONS

Controller of Examinations

Date: 20.07.2021

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

ESTD : 2005

AVANTHI INSTITUTE OF PHARMACEUTICALSCIENCES

(Approved by A.I.C.T.E, PCI, Recognized by the Govt. of A.P. & Affiliated to JNTU-Kakinada)
Cherukupally (Village), Chittivalasa (SO), Bhogapuram (Mandal), Vizianagaram (Dist.) -531162.
www.avanthipharma.ac.in, principal@avanthipharma.ac.in

Date: 29-03-2021

CIRCULAR

I B PHARM, I SEMESTER, I MID APRIL 2021

First Midterm Examination for I B Pharmacy I semester will commence from 05 April 2021 as per the schedule. Faculty of respective subjects is instructed to submit soft copy of the question paper at least one day before examination. Students shall consult teachers in their respective subject for the syllabus of the examination. Lab internal exam will be conducted immediately after theory mid examinations.

TIMETABLE

S. No.	DATE	SUBJECT
1.	05-04-2021	Human Anatomy and Physiology- I
2.	06-04-2021	Pharmaceutical Analysis I
3.	07-04-2021	Pharmaceutics- I
4.	08-04-2021	Pharmaceutical Inorganic Chemistry
DESCRIPTIVE EXAM		
EXAM TIMINGS : 10 A.M – 12 P.M		

AVANTHI INSTITUTE OF PHARMACEUTICAL SCIENCES · AVANTHI EDUCATIONAL SOCIETY · HYDERABAD · VIZIANAGARAM

Principal

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., 531162

ESTD : 2005

AVANTHI INSTITUTE OF PHARMACEUTICALSCIENCES

(Approved by A.I.C.T.E, PCI, Recognized by the Govt. of A.P. & Affiliated to JNTU-Kakinada)
Cherukupally (Village), Chittivalasa (SO), Bhogapuram (Mandal), Vizianagaram (Dist.) -531162.
www.avanthipharma.ac.in, principal@avanthipharma.ac.in

Date: 19-05-2021

CIRCULAR

I B PHARM, I SEMESTER, II MID MAY 2021

Second Midterm Examination for I B Pharmacy I semester will commence from 26 May 2021 as per the schedule. Faculty of respective subjects is instructed to submit soft copy of the question paper at least one day before examination. Students shall consult teachers in their respective subject for the syllabus of the examination. Lab internal exam will be conducted immediately after theory mid examinations.

TIMETABLE

S.No.	DATE	SUBJECT
1.	26-05-2021	Human Anatomy and Physiology- I
2.	27-05-2021	Pharmaceutical Analysis I
3.	28-05-2021	Pharmaceutics- I
4.	29-05-2021	Pharmaceutical Inorganic Chemistry
DESCRIPTIVE EXAM		
EXAM TIMINGS : 10 A.M – 12 P.M		

Principal

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

ESTD : 2005

AVANTHI INSTITUTE OF PHARMACEUTICALSCIENCES

(Approved by A.I.C.T.E, PCI, Recognized by the Govt. of A.P. & Affiliated to JNTU-Kakinada)
Cherukupally (Village), Chittivalasa (SO), Bhogapuram (Mandal), Vizianagaram (Dist.) -531162.
www.avanthipharma.ac.in, principal@avanthipharma.ac.in

Date: 26-07-2021

CIRCULAR

I B PHARM, II SEMESTER, I MID AUGUST 2021

First Midterm Examination for I B Pharmacy II semester will commence from 02 August 2021 as per the schedule. Faculty of respective subjects are instructed to submit soft copy of the question paper at least one day before examination. Students shall consult teachers in their respective subject for the syllabus of the examination. Lab internal exam will be conducted immediately after theory mid examinations.

TIMETABLE

S.No	DATE	SUBJECT
1.	02-08-2021	Human Anatomy and Physiology II
2.	03-08-2021	Pharmaceutical Organic Chemistry I
3.	04-08-2021	Biochemistry
4.	05-08-2021	Pathophysiology
DESCRIPTIVE EXAM		
EXAM TIMINGS:10 A.M -12 P.M		

Principal

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

ESTD : 2005

AVANTHI INSTITUTE OF PHARMACEUTICALSCIENCES

(Approved by A.I.C.T.E, PCI, Recognized by the Govt. of A.P. & Affiliated to JNTU-Kakinada)
Cherukupally (Village), Chittivalasa (SO), Bhogapuram (Mandal), Vizianagaram (Dist.) -531162.
www.avanthipharma.ac.in, principal@avanthipharma.ac.in

Date: 13-09-2021

CIRCULAR

I B PHARM, II SEMESTER, II MID SEPTEMBER 2021

Second Midterm Examination for I B Pharmacy II semester will commence from 20 September 2021 as per the schedule. Faculty of respective subjects are instructed to submit soft copy of the question paper at least one day before examination. Students shall consult teachers in their respective subject for the syllabus of the examination. Lab internal exam will be conducted immediately after theory mid examinations.

TIMETABLE

S.No.	DATE	SUBJECT
1.	20-09-2021	Human Anatomy and Physiology II
2.	21-09-2021	Pharmaceutical Organic Chemistry I
3.	22-09-2021	Biochemistry
4.	23-09-2021	Pathophysiology
DESCRIPTIVE EXAM		
EXAM TIMINGS: 10 A.M – 12 P.M		

Principal

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

ESTD : 2005

AVANTHI INSTITUTE OF PHARMACEUTICALSCIENCES

(Approved by A.I.C.T.E, PCI, Recognized by the Govt. of A.P. & Affiliated to JNTU-Kakinada)
Cherukupally (Village), Chittivalasa (SO), Bhogapuram (Mandal), Vizianagaram (Dist.) -531162.
www.avanthipharma.ac.in, principal@avanthipharma.ac.in

Date: 21-09-2020

CIRCULAR

II B PHARM, I SEMESTER, I MID SEPTEMBER 2020

First Midterm Examination for II B Pharmacy I semester will commence from 28 September 2020 as per the schedule. Faculty of respective subjects are instructed to submit soft copy of the question paper at least one day before examination. Students shall consult teachers in their respective subject for the syllabus of the examination. Lab internal exam will be conducted immediately after theory mid examinations.

TIMETABLE

S.No.	DATE	SUBJECT
1.	28-09-2020	Pharmaceutical Organic Chemistry II
2.	29-09-2020	Physical Pharmaceutics I
3.	30-09-2020	Pharmaceutical Microbiology
4.	01-09-2020	Pharmaceutical Engineering
DESCRIPTIVE EXAM		
EXAM TIMINGS : 10 A.M – 12 P.M		

Principal

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

ESTD : 2005

AVANTHI INSTITUTE OF PHARMACEUTICALSCIENCES

(Approved by A.I.C.T.E, PCI, Recognized by the Govt. of A.P. & Affiliated to JNTU-Kakinada)
Cherukupally (Village), Chittivalasa (SO), Bhogapuram (Mandal), Vizianagaram (Dist.) -531162.
www.avanthipharma.ac.in, principal@avanthipharma.ac.in

Date: 09-11-2020

CIRCULAR

II B PHARM, I SEMESTER, II MID NOVEMBER 2020

Second Midterm Examination for II B Pharmacy I semester will commence from 16 November 2020 as per the schedule. Faculty of respective subjects are instructed to submit soft copy of the question paper at least one day before examination. Students shall consult teachers in their respective subject for the syllabus of the examination. Lab internal exam will be conducted immediately after theory mid examinations.

TIMETABLE

S.No.	DATE	SUBJECT
1.	16-11-2020	Pharmaceutical Organic Chemistry II
2.	17-11-2020	Physical Pharmaceutics I
3.	18-11-2020	Pharmaceutical Microbiology
4.	19-11-2020	Pharmaceutical Engineering
DESCRIPTIVE EXAM		
EXAM TIMINGS : 10 A.M – 12 P.M		

Principal

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

ESTD : 2005

AVANTHI INSTITUTE OF PHARMACEUTICALSCIENCES

(Approved by A.I.C.T.E, PCI, Recognized by the Govt. of A.P. & Affiliated to JNTU-Kakinada)
Cherukupally (Village), Chittivalasa (SO), Bhogapuram (Mandal), Vizianagaram (Dist.) -531162.
www.avanthipharma.ac.in, principal@avanthipharma.ac.in

Date: 13-01-2020

CIRCULAR

II BPHARM, II SEMESTER, I MID JANUARY 2020

First Midterm Examination for II B Pharmacy II semester will commence from 25 January 2020 as per the schedule. Faculty of respective subjects are instructed to submit soft copy of the question paper at least one day before examination. Students shall consult teachers in their respective subject for the syllabus of the examination. Lab internal exam will be conducted immediately after theory mid examinations.

TIMETABLE

S. No	DATE	SUBJECT
1.	25-01-2020	Ph. Organic Chemistry- III
2.	26-01-2020	Medicinal Chemistry- I
3.	27-01-2020	Physical Pharmaceutics- II
4.	28-01-2020	Pharmacology- I
5.	29-01-2020	Pharmacognosy and Phytochemistry - I
DESCRIPTIVE EXAM		
EXAM TIMINGS : 10 A.M – 12 P.M		

Principal

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

ESTD : 2005

AVANTHI INSTITUTE OF PHARMACEUTICALSCIENCES

(Approved by A.I.C.T.E, PCI, Recognized by the Govt. of A.P. & Affiliated to JNTU-Kakinada)
Cherukupally (Village), Chittivalasa (SO), Bhogapuram (Mandal), Vizianagaram (Dist.) -531162.
www.avanthipharma.ac.in, principal@avanthipharma.ac.in

Date: 02-03-2020

CIRCULAR

II B PHARM, II SEMESTER, II MID, MARCH 2020

Second Midterm Examination for II B Pharmacy II semester will commence from 09 March 2020 as per the schedule. Faculty of respective subjects are instructed to submit soft copy of the question paper at least one day before examination. Students shall consult teachers in their respective subject for the syllabus of the examination. Lab internal exam will be conducted immediately after theory mid examinations.

TIMETABLE

S. No	DATE	SUBJECT
1.	09-03-2020	PH. Organic Chemistry III
2.	10-03-2020	Medicinal Chemistry I
3.	11-03-2020	Physical Pharmaceutics II
4.	12-03-2020	Pharmacology I
5.	13-03-2020	Pharmacognosy and Phytochemistry I
DESCRIPTIVE EXAM		
EXAM TIMINGS : 10 A.M – 12 P.M		

Principal

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

ESTD : 2005

AVANTHI INSTITUTE OF PHARMACEUTICALSCIENCES

(Approved by A.I.C.T.E, PCI, Recognized by the Govt. of A.P. & Affiliated to JNTU-Kakinada)
Cherukupally (Village), Chittivalasa (SO), Bhogapuram (Mandal), Vizianagaram (Dist.) -531162.
www.avanthipharma.ac.in, principal@avanthipharma.ac.in

Date: 21-09-2020

CIRCULAR

III B PHARM, I SEMESTER, I MID, SEPTEMBER 2020

First Midterm Examination for III B Pharmacy I semester will commence from 28 September 2020 as per the schedule. Faculty of respective subjects are instructed to submit soft copy of the question paper at least one day before examination. Students shall consult teachers in their respective subject for the syllabus of the examination. Lab internal exam will be conducted immediately after theory mid examinations.

TIMETABLE

S.No	DATE	SUBJECT
1.	28-09-2020	Medicinal Chemistry II
2.	29-09-2020	Industrial Pharmacy I
3.	30-09-2020	Pharmacology II
4.	01-09-2020	Pharmacognosy and Phytochemistry II
5.	02-09-2020	Pharmaceutical Jurisprudence
DESCRIPTIVE EXAM		
EXAM TIMINGS : 10 A.M – 12 P.M		

Principal

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

ESTD : 2005

AVANTHI INSTITUTE OF PHARMACEUTICALSCIENCES

(Approved by A.I.C.T.E, PCI, Recognized by the Govt. of A.P. & Affiliated to JNTU-Kakinada)
Cherukupally (Village), Chittivalasa (SO), Bhogapuram (Mandal), Vizianagaram (Dist.) -531162.
www.avanthipharma.ac.in, principal@avanthipharma.ac.in

Date: 09-11-2020

CIRCULAR

III B PHARM, I SEMESTER, II MID, NOVEMBER 2020

Second Midterm Examination for III B Pharmacy I semester will commence from 16 November 2020 as per the schedule. Faculty of respective subjects are instructed to submit soft copy of the question paper at least one day before examination. Students shall consult teachers in their respective subject for the syllabus of the examination. Lab internal exam will be conducted immediately after theory mid examinations.

TIMETABLE

S.No	DATE	SUBJECT
1.	16-11-2020	Medicinal Chemistry II
2.	17-11-2020	Industrial Pharmacy I
3.	18-11-2020	Pharmacology II
4.	19-11-2020	Pharmacognosy and Phytochemistry II
5.	20-11-2020	Pharmaceutical Jurisprudence
DESCRIPTIVE EXAM		
EXAM TIMINGS:10 A.M – 12 P.M		

Principal

AVANTHI INSTITUTE OF PHARMACEUTICAL SCIENCES · AVANTHI EDUCATIONAL SOCIETY · HYDERABAD · VIZIANAGARAM

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

ESTD : 2005

AVANTHI INSTITUTE OF PHARMACEUTICALSCIENCES

(Approved by A.I.C.T.E, PCI, Recognized by the Govt. of A.P. & Affiliated to JNTU-Kakinada)
Cherukupally (Village), Chittivalasa (SO), Bhogapuram (Mandal), Vizianagaram (Dist.) -531162.
www.avanthipharma.ac.in, principal@avanthipharma.ac.in

Date: 13-01-2021

CIRCULAR

III B PHARM, II SEMESTER, I MID, JANUARY 2021

First Midterm Examination for III B Pharmacy II semester will commence from 25 January 2021 as per the schedule. Faculty of respective subjects are instructed to submit soft copy of the question paper at least one day before examination. Students shall consult teachers in their respective subject for the syllabus of the examination. Lab internal exam will be conducted immediately after theory mid examinations.

TIMETABLE

S. No.	DATE	SUBJECT
1.	25-01-2021	Medicinal Chemistry III
2.	26-01-2021	Pharmacology III
3.	27-01-2021	Herbal Drug Technology
4.	28-01-2021	Biopharmaceutics and Pharmacokinetics
5.	29-01-2021	Pharmaceutical Biotechnology
6.	30-01-2021	Quality Assurance
DESCRIPTIVE EXAM		
EXAM TIMINGS : 10 A.M – 12 P.M		

AVANTHI INSTITUTE OF PHARMACEUTICAL SCIENCES * AVANTHI EDUCATIONAL SOCIETY * HYDERABAD * VIZIANAGARAM

PRINCIPAL Principal
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

ESTD : 2005

AVANTHI INSTITUTE OF PHARMACEUTICALSCIENCES

(Approved by A.I.C.T.E, PCI, Recognized by the Govt. of A.P. & Affiliated to JNTU-Kakinada)
Cherukupally (Village), Chittivalasa (SO), Bhogapuram (Mandal), Vizianagaram (Dist.) -531162.
www.avanthipharma.ac.in, principal@avanthipharma.ac.in

Date: 19-09-2022

CIRCULAR

III B PHARM, II SEMESTER, II MID, MARCH 2021

Second Midterm Examination for III B Pharmacy II semester will commence from 15 March 2021 as per the schedule. Faculty of respective subjects are instructed to submit soft copy of the question paper at least one day before examination. Students shall consult teachers in their respective subject for the syllabus of the examination. Lab internal exam will be conducted immediately after theory mid examinations.

TIMETABLE

S. No.	DATE	SUBJECT
1.	15-03-2021	Medicinal Chemistry III
2.	16-03-2021	Pharmacology III
3.	17-03-2020	Herbal Drug Technology
4.	18-03-2020	Biopharmaceutics and Pharmacokinetics
5.	19-03-2020	Pharmaceutical Biotechnology
6.	20-03-2020	Quality Assurance
DESCRIPTIVE EXAM		
EXAM TIMINGS : 10 A.M – 12 P.M		

Principal

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

ESTD : 2005

AVANTHI INSTITUTE OF PHARMACEUTICALSCIENCES

(Approved by A.I.C.T.E, PCI; Recognized by the Govt. of A.P. & Affiliated to JNTU-Kakinada)
Cherukupally (Village), Chittivalasa (SO), Bhogapuram (Mandal), Vizianagaram (Dist.) -531162.
www.avanthipharma.ac.in, principal@avanthipharma.ac.in

Date: 20-01-2021

CIRCULAR

IV B PHARM, I SEMESTER, I MID JANUARY 2021

First Midterm Examination for IV B Pharmacy I semester will commence from 27 January 2021 as per the schedule. Faculty of respective subjects are instructed to submit soft copy of the question paper at least one day before examination. Students shall consult teachers in their respective subject for the syllabus of the examination. Lab internal exam will be conducted immediately after theory mid examinations.

TIMETABLE

S.No.	DATE	SUBJECT
1.	27-01-2021	Instrumental Methods of Analysis
2.	28-01-2021	Industrial Pharmacy II
3.	29-01-2021	Pharmacy Practice
4.	30-01-2021	Novel Drug Delivery Systems
DESCRIPTIVE EXAM		
EXAM TIMINGS: 10 A.M – 12 P.M		

Principal

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

ESTD : 2005

AVANTHI INSTITUTE OF PHARMACEUTICALSCIENCES

(Approved by A.I.C.T.E, PCI, Recognized by the Govt. of A.P. & Affiliated to JNTU-Kakinada)
Cherukupally (Village), Chittivalasa (SO), Bhogapuram (Mandal), Vizianagaram (Dist.) -531162.
www.avanthipharma.ac.in, principal@avanthipharma.ac.in

Date: 15-02-2022

CIRCULAR

IV B PHARM, I SEMESTER, II MID, JANUARY 2021

Second Midterm Examination for IV B Pharmacy I semester will commence from 22 February 2021 as per the schedule. Faculty of respective subjects are instructed to submit soft copy of the question paper at least one day before examination. Students shall consult teachers in their respective subject for the syllabus of the examination. Lab internal exam will be conducted immediately after theory mid examinations.

TIMETABLE

S.No.	DATE	SUBJECT
1.	22-02-2021	Instrumental Methods of Analysis
2.	23-02-2021	Industrial Pharmacy II
3.	24-02-2021	Pharmacy Practice
4.	25-02-2021	Novel Drug Delivery Systems
DESCRIPTIVE EXAM		
EXAM TIMINGS :10 A.M – 12 P.M		

Principal

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

ESTD : 2005

AVANTHI INSTITUTE OF PHARMACEUTICALSCIENCES

(Approved by A.I.C.T.E, PCI, Recognized by the Govt. of A.P. & Affiliated to JNTU-Kakinada)
Cherukupally (Village), Chittivalasa (SO), Bhogapuram (Mandal), Vizianagaram (Dist.) -531162.
www.avanthipharma.ac.in, principal@avanthipharma.ac.in

Date: 03-05-2021

CIRCULAR

IV B PHARM, II SEMESTER, I MID, MAY 2021

First Midterm Examination for IV B Pharmacy II semester will commence from 10 May 2021 as per the schedule. Faculty of respective subjects are instructed to submit soft copy of the question paper at least one day before examination. Students shall consult teachers in their respective subject for the syllabus of the examination. Lab internal exam will be conducted immediately after theory mid examinations.

TIMETABLE

S.No.	DATE	SUBJECT
1.	10-05-2021	Biostatistics and Research Methodology
2.	11-05-2021	Social and Preventive Pharmacy
3.	12-05-2021	Elective - I
4.	13-05-2021	Elective - II
DESCRIPTIVE EXAM		
EXAM TIMINGS : 10 A.M – 12 P.M		

Principal

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

ESTD : 2005

AVANTHI INSTITUTE OF PHARMACEUTICALSCIENCES

(Approved by A.I.C.T.E, PCI, Recognized by the Govt. of A.P. & Affiliated to JNTU-Kakinada)
Cherukupally (Village), Chittivalasa (SO), Bhogapuram (Mandal), Vizianagaram (Dist.) -531162.
www.avanthipharma.ac.in, principal@avanthipharma.ac.in

Date: 29-06-2021

CIRCULAR

IV B PHARM, II SEMESTER, II MID, JULY 2021

Second Midterm Examination for IV B Pharmacy II semester will commence from 01 July 2021 as per the schedule. Faculty of respective subjects are instructed to submit soft copy of the question paper at least one day before examination. Students shall consult teachers in their respective subject for the syllabus of the examination. Lab internal exam will be conducted immediately after theory mid examinations.

TIMETABLE

S.No.	DATE	SUBJECT
1.	01-07-2021	Biostatistics and Research Methodology
2.	02-07-2021	Social and Preventive Pharmacy
3.	03-07-2021	Elective - I
4.	05-07-2021	Elective - II
DESCRIPTIVE EXAM		
EXAM TIMINGS : 10 A.M – 12 P.M		

principal

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

ESTD : 2005

AVANTHI INSTITUTE OF PHARMACEUTICALSCIENCES

(Approved by A.I.C.T.E, PCI, Recognized by the Govt. of A.P. & Affiliated to JNTU-Kakinada)
Cherukupally (Village), Chittivalasa (SO), Bhogapuram (Mandal), Vizianagaram (Dist.) -531162.
www.avanthipharma.ac.in, principal@avanthipharma.ac.in

Date: 18-04-2022

CIRCULAR

I PHARM D I MID APRIL 2022

First Midterm Examination for I PharmD will commence from 25 April 2022 as per the schedule. Faculty of respective subjects are instructed to submit soft copy of the question paper at least one day before examination. Students shall consult teachers in their respective subject for the syllabus of the examination. Lab internal exam will be conducted immediately after theory mid examinations.

TIMETABLE

S. No	DATE	SUBJECT
1.	25-04-2022	HUMAN ANATOMY AND PHYSIOLOGY
2.	26-04-2022	PHARMACEUTICS
3.	27-04-2022	MEDICINAL BIOCHEMISTRY
4.	28-04-2022	PH.ORGANIC CHEMISTRY
5.	29-04-2022	PH.INORGANIC CHEMISTRY
6.	30-04-2022	REMEDIAL MATHEMATICS /BIOLOGY
DESCRIPTIVE EXAM		
EXAM TIMINGS : 10 A.M – 12 P.M		

principal
PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

AVANTHI INSTITUTE OF PHARMACEUTICALSCIENCES

(Approved by A.I.C.T.E, PCI, Recognized by the Govt. of A.P. & Affiliated to JNTU-Kakinada)
Cherukupally (Village), Chittivalasa (SO), Bhogapuram (Mandal), Vizianagaram (Dist.) -531162.
www.avanthipharma.ac.in, principal@avanthipharma.ac.in

Date: 04-07-2022

CIRCULAR

I PHARM D II MID JULY 2022

Second Midterm Examination for I PharmD will commence from 11 July 2022 as per the schedule. Faculty of respective subjects are instructed to submit soft copy of the question paper at least one day before examination. Students shall consult teachers in their respective subject for the syllabus of the examination. Lab internal exam will be conducted immediately after theory mid examinations.

TIMETABLE

S. No	DATE	SUBJECT
1.	11-07-2022	HUMAN ANATOMY AND PHYSIOLOGY
2.	12-07-2022	PHARMACEUTICS
3.	13-07-2022	MEDICINAL BIOCHEMISTRY
4.	14-07-2022	PH.ORGANIC CHEMISTRY
5.	15-07-2022	PH.INORGANIC CHEMISTRY
6.	16-07-2022	REMEDIAL MATHEMATICS /BIOLOGY
DESCRIPTIVE EXAM		
EXAM TIMINGS : 10 A.M – 12.P.M		

Principal

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

ESTD : 2005

AVANTHI INSTITUTE OF PHARMACEUTICALSCIENCES

(Approved by A.I.C.T.E, PCI, Recognized by the Govt. of A.P. & Affiliated to JNTU-Kakinada)
Cherukupally (Village), Chittivalasa (SO), Bhogapuram (Mandal), Vizianagaram (Dist.) -531162.
www.avanthipharma.ac.in, principal@avanthipharma.ac.in

Date: 19-09-2022

CIRCULAR

I PHARM D III MID SEPTEMBER 2022

Third Midterm Examination for I PharmD will commence from 26 September 2022 as per the schedule. Faculty of respective subjects are instructed to submit soft copy of the question paper at least one day before examination. Students shall consult teachers in their respective subject for the syllabus of the examination. Lab internal exam will be conducted immediately after theory mid examinations.

TIMETABLE

S. No	DATE	SUBJECT
1.	26-09-2022	HUMAN ANATOMY AND PHYSIOLOGY
2.	27-09-2022	PHARMACEUTICS
3.	28-09-2022	MEDICINAL BIOCHEMISTRY
4.	29-09-2022	PH.ORGANIC CHEMISTRY
5.	30-09-2022	PH.INORGANIC CHEMISTRY
6.	01-10-2022	REMEDIAL MATHEMATICS /BIOLOGY
DESCRIPTIVE EXAM		
EXAM TIMINGS : 10 A.M – 12 P.M		

principal
PRINCIPAL
Avanthi Institute of Pharmaceutical Science
Cherukupally (V), Bhogapuram Manda
Vizianagaram Dt., 531162

ESTD : 2005

AVANTHI INSTITUTE OF PHARMACEUTICALSCIENCES

(Approved by A.I.C.T.E, PCI, Recognized by the Govt. of A.P. & Affiliated to JNTU-Kakinada)
Cherukupally (Village), Chittivalasa (SO), Bhogapuram (Mandal), Vizianagaram (Dist.) -531162.
www.avanthipharma.ac.in, principal@avanthipharma.ac.in

Date: 13-12-2022

CIRCULAR

II PHARM D I MID DECEMBER 2022

First Midterm Examination for II PharmD will commence from 20 December 2022 as per the schedule. Faculty of respective subjects are instructed to submit soft copy of the question paper at least one day before examination. Students shall consult teachers in their respective subject for the syllabus of the examination. Lab internal exam will be conducted immediately after theory mid examinations.

TIMETABLE

S. No	DATE	SUBJECT
1.	20-12-2021	PATHOPHYSIOLOGY
2.	21-12-2021	PHARMACEUTICAL MICROBIOLOGY
3.	22-12-2021	PHARMACOGNOSY AND PHYTOPHARMACEUTICALS
4.	23-12-2021	PHARMACOLOGY-I
5.	24-12-2021	COMMUNITY PHARMACY
6.	27-12-2021	PHARMACOTHERAPEUTICS-I
DESCRIPTIVE EXAM		
EXAM TIMINGS : 10 A.M – 12 P.M		

principal
PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

ESTD : 2005

AVANTHI INSTITUTE OF PHARMACEUTICALSCIENCES

(Approved by A.I.C.T.E, PCI, Recognized by the Govt. of A.P. & Affiliated to JNTU-Kakinada)
Cherukupally (Village), Chittivalasa (SO), Bhogapuram (Mandal), Vizianagaram (Dist.) -531162.
www.avanthipharma.ac.in, principal@avanthipharma.ac.in

Date: 07-03-2022

CIRCULAR

II PHARM D II MID MARCH 2022

Second Midterm Examination for II PharmD will commence from 14 March 2022 as per the schedule. Faculty of respective subjects are instructed to submit soft copy of the question paper at least one day before examination. Students shall consult teachers in their respective subject for the syllabus of the examination. Lab internal exam will be conducted immediately after theory mid examinations.

TIMETABLE

S. No	DATE	SUBJECT
1.	14-03-2022	PATHOPYSIOLOGY
2.	15-03-2022	PHARMACEUTICAL MICROBIOLOGY
3.	16-03-2022	PHARMACOGNOSY AND PHYTOPHARMACEUTICALS
4.	17-03-2022	PHARMACOLOGY-I
5.	18-03-2022	COMMUNITY PHARMACY
6.	19-03-2022	PHARMACOTHERAPEUTICS-I
DESCRIPTIVE EXAM		
EXAM TIMINGS : 10 A.M - 12 P.M		

AVANTHI INSTITUTE OF PHARMACEUTICAL SCIENCES * AVANTHI EDUCATIONAL SOCIETY * HYDERABAD * VIZIANAGARAM *

principal

PRINCIPAL
Avanthi Institute of Pharmaceutical Science
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

ESTD : 2005

AVANTHI INSTITUTE OF PHARMACEUTICALSCIENCES

(Approved by A.I.C.T.E, PCI, Recognized by the Govt. of A.P. & Affiliated to JNTU-Kakinada)
Cherukupally (Village), Chittivalasa (SO), Bhogapuram (Mandal), Vizianagaram (Dist.) -531162.
www.avanthipharma.ac.in, principal@avanthipharma.ac.in

Date: 30-05-2022

CIRCULAR

II PHARM D III MID JUNE 2022

Third Midterm Examination for II PharmD will commence from 06 June 2022 as per the schedule. Faculty of respective subjects are instructed to submit soft copy of the question paper at least one day before examination. Students shall consult teachers in their respective subject for the syllabus of the examination. Lab internal exam will be conducted immediately after theory mid examinations.

TIMETABLE

S. No	DATE	SUBJECT
1.	06-06-2022	PATHOPHYSIOLOGY
2.	07-06-2022	PHARMACEUTICAL MICROBIOLOGY
3.	08-06-2022	PHARMACOGNOSY AND PHYTOPHARMACEUTICALS
4.	09-06-2022	PHARMACOLOGY-I
5.	10-06-2022	COMMUNITY PHARMACY
6.	11-06-2022	PHARMACOTHERAPEUTICS-I
DESCRIPTIVE EXAM		
EXAM TIMINGS : 10 A.M – 12 P.M		

principal
PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt. - 531162

ESTD : 2005

AVANTHI INSTITUTE OF PHARMACEUTICALSCIENCES

(Approved by A.I.C.T.E, PCI, Recognized by the Govt. of A.P. & Affiliated to JNTU-Kakinada)
Cherukupally (Village), Chittivalasa (SO), Bhogapuram (Mandal), Vizianagaram (Dist.) -531162.
www.avanthipharma.ac.in, principal@avanthipharma.ac.in

Date:13-12-2022

CIRCULAR

III PHARM D I MID DECEMBER 2022

First Midterm Examination for III PharmD will commence from 20 December 2022 as per the schedule. Faculty of respective subjects are instructed to submit soft copy of the question paper at least one day before examination. Students shall consult teachers in their respective subject for the syllabus of the examination. Lab internal exam will be conducted immediately after theory mid examinations.

TIMETABLE

S. No	DATE	SUBJECT
1.	20-12-2021	PHARMACOLOGY-II
2.	21-12-2021	PHARMACEUTICAL ANALYSIS
3.	22-12-2021	PHARMACOTHERAPEUTICS-II
4.	23-12-2021	PHARMACEUTICAL JURISPRUDENCE
5.	24-12-2021	MEDICINAL CHEMISRY
6.	27-12-2021	PHARMACEUTICAL FORMULATIONS
DESCRIPTIVE EXAM		
EXAM TIMINGS : 10 A.M – 12 P.M		

AVANTHI INSTITUTE OF PHARMACEUTICAL SCIENCES * AVANTHI EDUCATIONAL SOCIETY * HYDERABAD * VIZIANAGARAM *

principal
PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

ESTD : 2005

AVANTHI INSTITUTE OF PHARMACEUTICALSCIENCES

(Approved by A.I.C.T.E, PCI, Recognized by the Govt. of A.P. & Affiliated to JNTU-Kakinada)
Cherukupally (Village), Chittivalasa (SO), Bhogapuram (Mandal), Vizianagaram (Dist.) -531162.
www.avanthipharma.ac.in, principal@avanthipharma.ac.in

Date:07-03-2022

CIRCULAR

III PHARM D II MID MARCH 2022

Second Midterm Examination for III PharmD will commence from 14 March 2022 as per the schedule. Faculty of respective subjects are instructed to submit soft copy of the question paper at least one day before examination. Students shall consult teachers in their respective subject for the syllabus of the examination. Lab internal exam will be conducted immediately after theory mid examinations.

TIMETABLE

S. No	DATE	SUBJECT
1.	14-03-2022	PHARMACOLOGY-II
2.	15-03-2022	PHARMACEUTICAL ANALYSIS
3.	16-03-2022	PHARMACOTHERAPEUTICS-II
4.	17-03-2022	PHARMACEUTICAL JURISPRUDENCE
5.	18-03-2022	MEDICINAL CHEMISRY
6.	19-03-2022	PHARMACEUTICAL FORMULATIONS
DESCRIPTIVE EXAM		
EXAM TIMINGS : 10 A.M – 12 P.M		

AVANTHI INSTITUTE OF PHARMACEUTICAL SCIENCES * AVANTHI EDUCATIONAL SOCIETY * HYDERABAD * VIZIANAGARAM

principal

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

ESTD : 2005

AVANTHI INSTITUTE OF PHARMACEUTICALSCIENCES

(Approved by A.I.C.T.E, PCI, Recognized by the Govt. of A.P. & Affiliated to JNTU-Kakinada)
Cherukupally (Village), Chittivalasa (SO), Bhogapuram (Mandal), Vizianagaram (Dist.) -531162.
www.avanthipharma.ac.in, principal@avanthipharma.ac.in

Date:30-05-2022

CIRCULAR

III PHARM D III MID JUNE 2022

Third Midterm Examination for III PharmD will commence from 06 June 2022 as per the schedule. Faculty of respective subjects are instructed to submit soft copy of the question paper at least one day before examination. Students shall consult teachers in their respective subject for the syllabus of the examination. Lab internal exam will be conducted immediately after theory mid examinations.

TIMETABLE

S. No	DATE	SUBJECT
1.	06-06-2022	PHARMACOLOGY-II
2.	07-06-2022	PHARMACEUTICAL ANALYSIS
3.	08-06-2022	PHARMACOTHERAPEUTICS-II
4.	09-06-2022	PHARMACEUTICAL JURISPRUDENCE
5.	10-06-2022	MEDICINAL CHEMISRY
6.	11-06-2022	PHARMACEUTICAL FORMULATIONS
DESCRIPTIVE EXAM		
EXAM TIMINGS : 10 A.M – 12 P.M		

AVANTHI INSTITUTE OF PHARMACEUTICAL SCIENCES · AVANTHI EDUCATIONAL SOCIETY · HYDERABAD · VIZIANAGARAM

principal
PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

ESTD : 2005

AVANTHI INSTITUTE OF PHARMACEUTICALSCIENCES

(Approved by A.I.C.T.E, PCI, Recognized by the Govt. of A.P. & Affiliated to JNTU-Kakinada)
Cherukupally (Village), Chittivalasa (SO), Bhogapuram (Mandal), Vizianagaram (Dist.) -531162.
www.avanthipharma.ac.in, principal@avanthipharma.ac.in

Date:13-12-2022

CIRCULAR

IV PHARM D I MID DECEMBER 2022

First Midterm Examination for IV PharmD will commence from 20 December 2022 as per the schedule. Faculty of respective subjects are instructed to submit soft copy of the question paper at least one day before examination. Students shall consult teachers in their respective subject for the syllabus of the examination. Lab internal exam will be conducted immediately after theory mid examinations.

TIMETABLE

SNO	DATE	NAME OF THE SUBJECT
1.	20-12-2021	PHARMACOTHERAPEUTICS -III
2.	21-12-2021	HOSPITAL PHARMACY
3.	22-12-2021	CLINICAL PHARMACY
4.	23-12-2021	BIOSTATISTICS AND RESEARCH METHODOLOGY
5.	24-12-2021	BIOPHARMACEUTICS AND PHARMCOKINETICS
6.	27-12-2021	CLINICAL TOXICOLOGY
DESCRIPTIVE EXAM		
EXAM TIMINGS : 10 A.M – 12 P.M		

principal

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

ESTD : 2005

AVANTHI INSTITUTE OF PHARMACEUTICALSCIENCES

(Approved by A.I.C.T.E, PCI, Recognized by the Govt. of A.P. & Affiliated to JNTU-Kakinada)
Cherukupally (Village), Chittivalasa (SO), Bhogapuram (Mandal), Vizianagaram (Dist.) -531162.
www.avanthipharma.ac.in, principal@avanthipharma.ac.in

Date:07-03-2022

CIRCULAR

IV PHARM D II MID MARCH 2022

Second Midterm Examination for IV PharmD will commence from 07 March 2022 as per the schedule. Faculty of respective subjects are instructed to submit soft copy of the question paper at least one day before examination. Students shall consult teachers in their respective subject for the syllabus of the examination. Lab internal exam will be conducted immediately after the theory mid examinations.

TIMETABLE

S. No	DATE	SUBJECT
1.	14-03-2022	PHARMACOTHERAPEUTICS -III
2.	15-03-2022	HOSPITAL PHARMACY
3.	16-03-2022	CLINICAL PHARMACY
4.	17-03-2022	BIOSTATISTICS AND RESEARCH METHODOLOGY
5.	18-03-2022	BIOPHARMACEUTICS AND PHARMCOKINETICS
6.	19-03-2022	CLINICAL TOXICOLOGY
DESCRIPTIVE EXAM		
EXAM TIMINGS : 10 A.M – 12 P.M		

principal
PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

ESTD : 2005

AVANTHI INSTITUTE OF PHARMACEUTICALSCIENCES

(Approved by A.I.C.T.E, PCI, Recognized by the Govt. of A.P. & Affiliated to JNTU-Kakinada)
Cherukupally (Village), Chittivalasa (SO), Bhogapuram (Mandal), Vizianagaram (Dist.) -531162.
www.avanthipharma.ac.in, principal@avanthipharma.ac.in

Date:30-05-2022

CIRCULAR

IV PHARM D III MID JUNE 2022

Third Midterm Examination for IV PharmD will commence from 06 June 2022 as per the schedule. Faculty of respective subjects are instructed to submit soft copy of the question paper at least one day before examination. Students shall consult teachers in their respective subject for the syllabus of the examination. Lab internal exam will be conducted immediately after theory mid examinations.

TIMETABLE

S. No	DATE	SUBJECT
1.	06-06-2022	PHARMACOTHERAPEUTICS -III
2.	07-06-2022	HOSPITAL PHARMACY
3.	08-06-2022	CLINICAL PHARMACY
4.	09-06-2022	BIOSTATISTICS AND RESEARCH METHODOLOGY
5.	10-06-2022	BIOPHARMACEUTICS AND PHARMCOKINETICS
6.	11-06-2022	CLINICAL TOXICOLOGY
DESCRIPTIVE EXAM		
EXAM TIMINGS : 10 A.M – 12 P.M		

AVANTHI INSTITUTE OF PHARMACEUTICAL SCIENCES * AVANTHI EDUCATIONAL SOCIETY * HYDERABAD * VIZIANAGARAM *

Principal
PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt. - 531162

ESTD. 2005

AVANTHI INSTITUTE OF PHARMACEUTICALSCIENCES

(Approved by A.I.C.T.E, PCI, Recognized by the Govt. of A.P & Affiliated to JNTU-Kakinada)
Cherukupally (Village), Chittivalasa (SO), Bhogapuram (Mandal), Vizianagaram (Dist.) -531162.
www.avanthipharma.ac.in, principal@avanthipharma.ac.in

Date: 13-12-2022

CIRCULAR

V PHARM D I MID DECEMBER 2022

First Midterm Examination for V PharmD will commence from 20 December 2022 as per the schedule. Faculty of respective subjects are instructed to submit soft copy of the question paper at least one day before examination. Students shall consult teachers in their respective subject for the syllabus of the examination. Lab internal exam will be conducted immediately after theory mid examinations.

TIMETABLE

S. No	DATE	SUBJECT
1.	20-12-2021	CLINICAL RESEARCH
2.	21-12-2021	PHARMACOEPIDIMIOLOGY AND PHARMACOECONOMICS
3.	22-12-2021	CLINICAL PHARMACOKINETICS AND PHARMCOTHERAPEUTIC DRUG MONITORING
DESCRIPTIVE EXAM		
EXAM TIMINGS : 10 A.M – 12 P.M		

AVANTHI INSTITUTE OF PHARMACEUTICAL SCIENCES * AVANTHI EDUCATIONAL SOCIETY * HYDERABAD * VIZIANAGARAM *

Principal
PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

ESTD : 2005

AVANTHI INSTITUTE OF PHARMACEUTICALSCIENCES

(Approved by A.I.C.T.E, PCI, Recognized by the Govt. of A.P. & Affiliated to JNTU-Kakinada)
Cherukupally (Village), Chittivalasa (SO), Bhogapuram (Mandal), Vizianagaram (Dist.) -531162.
www.avanthipharma.ac.in, principal@avanthipharma.ac.in

Date: 07-03-2022

CIRCULAR

V PHARM D II MID MARCH 2022

Second Midterm Examination for V PharmD will commence from 14 March 2022 as per the schedule. Faculty of respective subjects are instructed to submit soft copy of the question paper at least one day before examination. Students shall consult teachers in their respective subject for the syllabus of the examination. Lab internal exam will be conducted immediately after theory mid examinations.

TIMETABLE

S. No	DATE	SUBJECT
1.	14-03-2022	CLINICAL RESEARCH
2.	15-03-2022	PHARMACOEPIDIMIOLOGY AND PHARMACOECONOMICS
3.	16-03-2022	CLINICAL PHARMACOKINETICS AND PHARMCOTHERAPEUTIC DRUG MONITORING
DESCRIPTIVE EXAM		
EXAM TIMINGS : 10 A.M – 12 P.M		

Principal
PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

ESTD : 2005

AVANTHI INSTITUTE OF PHARMACEUTICALSCIENCES

(Approved by A.I.C.T.E, PCI, Recognized by the Govt. of A.P. & Affiliated to JNTU-Kakinada)
Cherukupally (Village), Chittivalasa (SO), Bhogapuram (Mandal), Vizianagaram (Dist.) -531162.
www.avanthipharma.ac.in, principal@avanthipharma.ac.in

Date: 30-05-2022

CIRCULAR

V PHARM D III MID JUNE 2022

Third Midterm Examination for V PharmD will commence from 06 June 2022 as per the schedule. Faculty of respective subjects are instructed to submit soft copy of the question paper at least one day before examination. Students shall consult teachers in their respective subject for the syllabus of the examination. Lab internal exam will be conducted immediately after theory mid examinations.

TIMETABLE

S. No	DATE	SUBJECT
1.	06-06-2022	CLINICAL RESEARCH
2.	07-06-2022	PHARMACOEPIDIMIOLOGY AND PHARMACOECONOMICS
3.	08-06-2022	CLINICAL PHARMACOKINETICS AND PHARMCOTHERAPEUTIC DRUG MONITORING
DESCRIPTIVE EXAM		
EXAM TIMINGS : 10 A.M – 12 P.M		

AVANTHI INSTITUTE OF PHARMACEUTICAL SCIENCES * AVANTHI EDUCATIONAL SOCIETY * HYDERABAD * VIZIANAGARAM *

Principal

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA
UNIVERSITY EXAMINATION CENTER, KAKINADA

IV B.PHARMACY I SEMESTER (PCI, R16 & R13) REGULAR/SUPPLEMENTARY EXAMINATIONS, MARCH - 2021

T I M E T A B L E

T I M E: 10.00 AM TO 01.00 PM

DATE & DAY	PCI REGULATIONS REGULAR	R16 REGULATIONS SUPPLEMENTARY	R13 REGULATIONS SUPPLEMENTARY
08-03-2021 (Monday)	Instrumental Methods of Analysis (BP701T)	Pharmaceutical Analysis –II (PHR16411)	Pharmaceutical Analysis – II (B134101)
12-03-2021 (Friday)	Industrial Pharmacy II (BP702T)	Biopharmaceutics & Pharmacokinetics (PHR16412)	Bio Assays & Toxicology (B134102)
15-03-2021 (Monday	Pharmacy Practice (BP703T)	Chemistry of Natural Products (PHR16413)	Chemistry of Natural Products (B134103)
17-03-2021 (Wednesday)	Novel Drug Delivery System (BP704T)	Hospital & Community Pharmacy (PHR16414)	Hospital & Community Pharmacy (B134104)
19-03-2021 (Friday)	---	Pharmaceutical Jurisprudence (PHR16415)	Pharmaceutical Jurisprudence (B134105)

NOTE: (i) ANY OMISSIONS OR CLASHES IN THIS TIME TABLE MAY PLEASE BE INFORMED TO THE CONTROLLER OF EXAMINATIONS IMMEDIATELY.

(ii) EVEN IF GOVERNMENT DECLARES HOLIDAY ON ANY OF THE ABOVE DATES, THE EXAMINATIONS SHALL BE CONDUCTED AS USUAL.

(iii) THE PRINCIPALS ARE REQUESTED TO INFORM THE UNIVERSITY ANY OTHER SUBSTITUTE SUBJECTS THAT ARE NOT INCLUED IN THE ABOVE LIST IMMEDIATELY.

DATE: 19-02-2021

Controller of Examinations

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

TIME TABLE OF IV B.PHARMACY I SEMESTER SUBSTITUTE SUBJECTS FOR READMITTED STUDENTS FROM R10 TO R13 REGULATIONS

DATE OF EXAMINATION: 19.03.2021 (Friday)	TIME OF EXAMINATION: 10.00 AM TO 1.00 PM

Name of the Course	Subject Already Studied	Substituted Subject
B. Pharmacy	------	Pharmaceutical Management (RAB134109)

NOTE:

i ANY OMISSIONS OR CLASHES IN THIS TIME TABLE MAY PLEASE BE INFORMED TC THE CONTROLLER OF EXAMINATIONS, IMMEDIATELY.
ii EVEN IF GOVERNMENT DECLARES HOLIDAY ON ANY OF THE ABOVE DATES, THE EXAMINATIONS SHALL BE CONDUCTED AS USUAL.
iii THE PRINCIPALS ARE REQUESTED TO INFORM THE UNIVERSITY ANY OTHER SUBSTITUTE SUBJECTS THAT ARE NOT INCLUED IN THE ABOVE LIST IMMEDIATELY.

DATE: 19-02-2021

Controller of Examinations

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

UNIVERSITY EXAMINATION CENTER, KAKINADA

IV B.PHARMACY II SEMESTER (PCI) REGULAR EXAMINATIONS, JULY - 2021

T I M E T A B L E

T I M E: 10.00 AM TO 01.00 PM

COURSE	DATE & DAY			
	19.07.2021 (Monday)	**22.07.2021 (Thursday)**	**24.07.2021 (Saturday)**	**26.07.2021 (Monday)**
SUBJECTS	Biostatistics and Research Methodology **(BP801T)**	Social and Preventive Pharmacy **(BP802T)**	Pharma Marketing Management **(BP803ET1)**, Pharmaceutical Regulatory Science **(BP804ET1)**, Pharmacovigilance **(BP805ET1)**, Quality Control and Standardization of Herbals **(BP806ET1)**, Computer Aided Drug Design **(BP807ET1)**, Cell and Molecular Biology **(BP808ET1)**, Cosmetic Science **(BP809ET1)**, Experimental Pharmacology **(BP810ET1)**	Pharmaceutical Regulatory Science **(BP804ET2)**, Pharmacovigilance **(BP805ET2)**, Quality Control and Standardization of Herbals **(BP806ET2)**, Computer Aided Drug Design **(BP807ET2)**, Cell and Molecular Biology **(BP808ET2)**, Cosmetic Science **(BP809ET2)**, Experimental Pharmacology **(BP810ET2)**, Advanced Instrumentation Techniques **(BP811ET2)**, Dietary Supplements and Nutraceuticals **(BP812ET2)**

NOTE: (i) ANY OMISSIONS OR CLASHES IN THIS TIME TABLE MAY PLEASE BE INFORMED TO THE CONTROLLER OF EXAMINATIONS IMMEDIATELY.

(ii) EVEN IF GOVERNMENT DECLARES HOLIDAY ON ANY OF THE ABOVE DATES, THE EXAMINATIONS SHALL BE CONDUCTED AS USUAL.

(iii) THE PRINCIPALS ARE REQUESTED TO INFORM THE UNIVERSITY ANY OTHER SUBSTITUTE SUBJECTS THAT ARE NOT INCLUED IN THE ABOVE LIST IMMEDIATELY.

DATE: 01-07-2021

Controller of Examinations

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

UNIVERSITY EXAMINATION CENTER, KAKINADA

M. PHARMACY I SEMESTER (PCI REGULATION) IST REGULAR/SUPPLEMENTARY EXAMINATIONS, JULY/AUGUST - 2021

(2018, 2019 & 2020 Admitted Batches only)

TIME TABLE

TIME: 02:00 PM TO 05:00 PM

BRANCH & SPECIALIZATION	27.07.2021 (Tuesday)	29.07.2021 (Thursday)	31.07.2021 (Saturday)	03.08.2021 (Tuesday)
PHARMACEUTICS (03)	Modern Pharmaceutical Analytical Techniques (**MPH101T**)	Drug Delivery Systems (**MPH102T**)	Modern Pharmaceutics (**MPH103T**)	Regulatory Affairs (**MPH104T**)
PHARMACOLOGY (06)	Modern Pharmaceutical Analytical Techniques (**MPL101T**)	Advanced Pharmacology-I (**MPL102T**)	Pharmacological and Toxicological Screening Methods-I (**MPL103T**)	Cellular and Molecular Pharmacology (**MPL104T**)
PHARMACEUTICAL ANALYSIS (16)	Modern Pharmaceutical Analytical Techniques (**MPA101T**)	Advanced Pharmaceutical Analysis (**MPA102T**)	Pharmaceutical Validation (**MPA103T**)	Food Analysis (**MPA104T**)

NOTE: (i) If Government declares holiday on any of the above dates, the examinations will be conducted as usual

(ii) Any omissions or clashes in this Time Table may please be informed to the Controller of Examinations immediately.

(iii) The Principals are requested to inform the University, if any other substitute subjects that are not included in the above time table immediately

Date: 13-07-2021

Controller of Examinations

AVANTHI INSTITUTE OF PHARMACEUTICAL SCIENCES * AVANTHI EDUCATIONAL SOCIETY * HYDERABAD * VIZIANAGARAM *

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V... ...uram Mandal
Vizianag... ...1162

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

UNIVERSITY EXAMINATIONS CENTER, KAKINADA

M. PHARMACY I SEMESTER (R16) SUPPLEMENTARY EXAMINATIONS, JULY/AUGUST - 2021

(2017 ADMITTED BATCH ONLY)

T I M E T A B L E

TIME: 02:00 PM TO 05:00 PM

DATE & DAY	27.07.2021 (Tuesday)	29.07.2021 (Thursday)	31.07.2021 (Saturday)	03.08.2021 (Tuesday)
PHARMACEUTICS (03)	Modern Analytical Techniques (**IP31A**)	Research Methodologies (**IP31B**)	Bio-Pharmaceutics & Pharmacokinetics (**PCE31A**)	Advanced Physical Pharmaceutics (**PCE31B**)
PHARMACEUTICAL ANALYSIS & QUALITY ASSURANCE / PHARMACEUTICAL ANALYSIS (04/16)	Modern Analytical Techniques (**IP31A**)	Research Methodologies (**IP31B**)	Advanced Pharmaceutical Analysis – I (**PAQA31A**)	Chromatographic & Other Special Techniques (**PAQA31B**)
PHARMACEUTICAL CHEMISTRY(02)	Modern Analytical Techniques (**IP31A**)	Research Methodologies (**IP31B**)	Advanced Pharmaceutical Organic Chemistry (**PCEC31A**)	Advanced Chemistry of Natural Products (**PCEC31B**)
PHARMACOLOGY / PHARMACOLOGY TOXICOLOGY (06/14)	Modern Analytical Techniques (**IP31A**)	Research Methodologies (IP31B)	Systemic Pharmacology (PMC31A)	Pharmacokinetics and Drug Metabolism (**PMC31B**)
PHARMACEUTICAL TECHNOLOGY(11)	Modern Analytical Techniques (**IP31A**)	Research Methodologies (**IP31B**)	Bio-Pharmaceutics & Pharmacokinetics (**PCE31A**)	Advanced Physical Pharmaceutics (**PCE31B**)
INDUSTRIAL PHARMACY (09)	Modern Analytical Techniques (**IP31A**)	Research Methodologies (**IP31B**)	Advanced Biopharmaceutics,Pharmacokinetics&Physical Pharmaceutics (**IP31C**)	Advanced Pharmaceutical Technology (**IP31D**)

AVANTHI INSTITUTE OF PHARMACEUTICAL SCIENCES AVANTHI EDUCATIONAL SOCIETY HYDERABAD VIZIANAGARAM

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupalli puram Mandal
Vizia - 531162

DATE & DAY	27.07.2021 (Tuesday)	29.07.2021 (Thursday)	31.07.2021 (Saturday)	03.08.2021 (Tuesday)
PHARMACEUTICAL ANALYSIS AND QUALITY CONTROL (12)	Modern Analytical Techniques (**IP31A**)	Research Methodologies (**IP31B**)	Advanced Pharmaceutical Analysis-I (**PAQA31A**)	Chromatographic and Other Special Techniques (**PAQA31B**)
PHARMACEUTICAL MANAGEMENT AND REGULATORY AFFAIRS (13)	Modern Analytical Techniques (**IP31A**)	Research Methodologies (**IP31B**)	Pharmaceutical Organization and Production Management (**PMRA31A**)	Indian Drugs Regulatory Aspects (**PMRA31B**)
PHARMACOGNOSY (07)	Modern Analytical Techniques (**IP31A**)	Research Methodologies (**IP31B**)	Advanced Pharmacognosy & Phytochemistry (**PMCG31A**)	Industrial Pharmacognosy (**PMCG31B**)
PHARMACY PRACTICE (08)	Modern Analytical Techniques (**IP31A**)	Research Methodologies (**IP31B**)	Clinical Pharmacy Practice (**PP31A**)	Pharmacotherapeutics-I (**PP31B**)
QUALITY ASSURANCE AND REGULATORY AFFAIRS (15)	Modern Analytical Techniques (**IP31A**)	Research Methodologies (**IP31B**)	Quality Control of Pharmaceutica (**QARA31A**)	Indian Drugs Regulatory Aspects (**PMRA31B**)

NOTE:

(i) ANY OMISSIONS OR CLASHES IN THIS TIME TABLE MAY PLEASE BE INFORMED TO THE CONTROLLER OF EXAMINATIONS IMEDIATELY.

(ii) EVEN IF GOVERNMENT DECLARES HOLIDAY ON ANY OF THE ABOVE DATES, THE EXAMINATIONS SHALL BE CONDUCTED AS USUAL.

(iii) FOR ANY OTHER CLARIFICATION IN RESPECT OF THE ABOVE EXAMINATIONS PLEASE CONTACT THE CONTROLLER OF EXAMINATIONS or 0884 2300907.

Date: 13-07-2021

Controller of Examinations

AVANTHI INSTITUTE OF PHARMACEUTICAL SCIENCES AVANTHI EDUCATIONAL SOCIETY HYDERABAD VIZIANAGARAM

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

UNIVERSITY EXAMINATIONS CENTER, KAKINADA

M. PHARMACY II SEMESTER (PCI) REGULAR/SUPPLEMENTARY EXAMINATIONS, OCTOBER - 2021

(2020, 2019, 2018 ADMITTED BATCHES OF IST, JNTUK)

TIMETABLE

TIME: 10:00 AM TO 01:00 PM

DATE & DAY	04-10-2021 (Monday)	06-10-2021 (Wednesday)	08-10-2021 (Friday)	11-10-2021 (Monday)
PHARMACEUTICAL CHEMISTRY (02)	Advanced Spectral Analysis **(MPC201T)**	Advanced Organic Chemistry II **(MPC202T)**	Computer Aided Drug Design **(MPC203T)**	Pharmaceutical Process Chemistry **(MPC204T)**
PHARMACEUTICS (03)	Molecular Pharmaceutics (Nano Technology and Targeted DDS)(NTDS) **(MPH201T)**	Advanced Biopharmaceutics & Pharmacokinetics **(MPH202T)**	Computer Aided Drug Development **(MPH203T)**	Formulation Development of Pharmaceutical and Cosmetic Products **(MPH204T)**
PHARMACOLOGY (06)	Advanced Pharmacology – II **(MPL201T)**	Pharmacological and Toxicological Screening Methods- II **(MPL202T)**	Principles of Drug Discovery **(MPL203T)**	Clinical Research And Pharmacovigilance **(MPL204T)**
PHARMACY PRACTICE (08)	Principles of Quality Use of Medicines **(MPP201T)**	Pharmacotherapeutics – II **(MPP202T)**	Clinical Pharmacokinetics and Therapeutic Drug Monitoring **(MPP203T)**	Pharmacoepidemiology & Pharmacoeconomics **(MPP204T)**
INDUSTRIAL PHARMACY (09)	Scale up and Technology Transfer **(MIP202T)**	Advanced Biopharmaceutics and Pharmacokinetics **(MIP201T)**	Pharmaceutical Production Technology **(MIP203T)**	Entrepreneurship Management **(MIP204T)**
PHARMACEUTICAL REGULATORY AFFAIRS (13)	Regulatory Aspects of Drugs and Cosmetics **(MRA201T)**	Regulatory Aspects of Herbal & Biologicals **(MRA202T)**	Regulatory Aspects of Medical Devices **(MRA203T)**	Regulatory Aspects of Food Neutraceuticals **(MRA204T)**
PHARMACEUTICAL QUALITY ASSURANCE (15)	Hazards and Safety Management **(MQA201T)**	Pharmaceutical Validation **(MQA202T)**	Audits and Regulatory Compliance **(MQA203T)**	Pharmaceutical Manufacturing Technology **(MQA204T)**

AVANTHI INSTITUTE OF PHARMACEUTICAL SCIENCES * AVANTHI EDUCATIONAL SOCIETY * HYDERABAD * VIZIANAGARAM

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

DATE & DAY	04-10-2021 (Monday)	06-10-2021 (Wednesday)	08-10-2021 (Friday)	11-10-2021 (Monday)
PHARMACEUTICAL ANALYSIS &QUALITY CONTROL (12) **PHARMACEUTICAL ANALYSIS (16)**	Advanced Instrumental Analysis **(MPA201T)**	Modern Bio-Analytical Techniques **(MPA202T)**	Quality Control and Quality Assurance **(MPA203T)**	Herbal and Cosmetic Analysis **(MPA204T)**
PHARMACEUTICAL BIOTECHNOLOGY	Proteins and protein Formulation **(MPB201T)**	Immunotechnology **(MPB202T)**	Bioinformatics and Computer Technology **(MPB203T)**	Biological Evaluation of Drug Therapy **(MPB204T)**
PHARMACOGNOSY (07)	Medicinal Plant biotechnology **(MPG201T)**	Advanced Pharmacognosy-II **(MPG202T)**	Indian system of medicine **(MPG203T)**	Herbal cosmetics **(MPG204T)**

NOTE: (I) IF GOVERNMENT DECLARES HOLIDAY ON ANY OF THE ABOVE DATES, THE EXAMINATIONS WILL BE CONDUCTED AS USUAL.

(II) ANY OMISSIONS OR CLASHES IN THIS TIME TABLE MAY PLEASE BE INFORMED TO THE CONTROLLER OF EXAMINATIONS IMMEDIATELY.

(III) THE PRINCIPALS ARE REQUESTED TO INFORM THE UNIVERSITY, IF ANY OTHER SUBSTITUTE SUBJECTS THAT ARE NOT INCLUDED IN THE ABOVE LIST IMMEDIATELY.

Date: 18-09-2021

Controller of Examinations

AVANTHI INSTITUTE OF PHARMACEUTICAL SCIENCES · AVANTHI EDUCATIONAL SOCIETY · HYDERABAD · VIZIANAGARAM

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

UNIVERSITY EXAMINATIONS CENTER, KAKINADA

M. PHARMACY II SEMESTER (R16) SUPPLEMENTARY EXAMINATIONS, OCTOBER – 2021

(2017 ADMITTED BATCH ONLY)

TIMETABLE

TIME: 10:00AM TO 01:00 PM

DATE & DAY	04-10-2021 (Monday)	06-10-2021 (Wednesday)	08-10-2021 (Friday)	11-10-2021 (Monday)
PHARMACEUTICS (03)	Advanced Pharmaceutical Technology (PCE32A)	Advanced in Drug Delivery Systems (IP32A)	Industrial Pharmacy (PCEU32A)	Drug Regulatory Affairs (IP32D)
PHARMACEUTICAL ANALYSIS & QUALITY ASSURANCE (04)	Advanced Pharmaceutical Analysis - II (PAQA32A)	Phytopharmaceutical and Biological Analysis (PAQA32B)	Quality Assurance of Pharmaceuticals - I (PAQA32C)	Drug Regulatory Affairs (IP32D)
PHARMACEUTICAL CHEMISTRY (02)	Advanced Medicinal Chemistry – I (PCEC32A)	Advanced Medicinal Chemistry – II (PCEC32B)	Bioassaya & Pharmacological Screening Methods (PMC32C)	Drug Regulatory Affairs (IP32D)
PHARMACOLOGY (06)	Advanced Pharmacology (PMC32A)	Pathophysiology and KPharmacotherapeutics (PMC32B)	Bioassaya & Pharmacological Screening Methods (PMC32C)	Drug Regulatory Affairs (IP32D)
PHARMACEUTICAL MANAGEMENT AND REGULATORY AFFAIRS (13)	Pharmaceutical Management Science – I (PMRA32B)	International Drug Regulatory Aspects (PMRA32A)	Pharmaceutical Management Science – II (PMRA32C)	Drug Regulatory Affairs (IP32D)
PHARMACOGNOSY (07)	Herbal Drug Technology & Formulation Development (PCG32A)	Indigenous Systems of Medicine (PCG32C)	Bioassays & Pharmacological Screening Methods (PMC32C)	Drug Regulatory Affairs (IP32D)
PHARMACOLOGY AND TOXICOLOGY (14)	Advanced Pharmacology (PMC32A)	Toxicology (PAT32A)	Bioassays & Pharmacological Screening Methods (PMC32C)	Drug Regulatory Affairs (IP32D)

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

DATE & DAY	04-10-2021 (Monday)	06-10-2021 (Wednesday)	08-10-2021 (Friday)	11-10-2021 (Monday)
QUALITY ASSURANCE AND REGULATORY AFFAIRS (15)	Advanced Pharmaceutical Analysis (PAQA32A1)	International Drug Regulatory Aspects (PMRA32A)	Quality Assurance of Pharmaceuticals (QARA32A)	Drug Regulatory Affairs (IP32D)
INDUSTRIAL PHARMACY (09)	Industrial Pharmacy – II (IP32C)	Advances In Drug Delivery Systems (IP32A)	Industrial Pharmacy – I (IP32B)	Drug Regulatory Affairs (IP32D)
PHARMACEUTICAL TECHNOLOGY (11)	Advanced Pharmaceutical Technology – I (PCE32A)	Advanced in Drug Delivery Systems (IP32A)	Advanced Pharmaceutical Technology – II (PCE32B)	Drug Regulatory Affairs (IP32D)
PHARMACY PRACTICE (08)	Hospital & Community Pharmacy (PP32A)	Pharmacutherapeutics Includig Clinical Pharmacokinetics (PP32B)	Clinical Research, Pharmacoepidemiology & Pharmacoeconomics (PP32C)	Drug Regulatory Affairs (IP32D)
PHARMACEUTICAL ANALYSIS &QUALITY CONTROL, PHARMACEUTICAL ANALYSIS (12 / 16)	Advanced Pharmaceutical Analysis - II (PAQA32A)	Quality Control of Pharmaceuticals (PAQC32A)	Quality Assurance of Pharmaceuticals – I (PAQA32C)	Drug Regulatory Affairs (IP32D)

NOTE: (I) IF GOVERNMENT DECLARES HOLIDAY ON ANY OF THE ABOVE DATES, THE EXAMINATIONS WILL BE CONDUCTED AS USUAL.

(II) ANY OMISSIONS OR CLASHES IN THIS TIME TABLE MAY PLEASE BE INFORMED TO THE CONTROLLER OF EXAMINATIONS IMMEDIATELY.

(III) THE PRINCIPALS ARE REQUESTED TO INFORM THE UNIVERSITY, IF ANY OTHER SUBSTITUTE SUBJECTS THAT ARE NOT INCLUDED IN THE ABOVE LIST IMMEDIATELY.

Date: 18-09-2021

Controller of Examinations

AVANTHI INSTITUTE OF PHARMACEUTICAL SCIENCES * AVANTHI EDUCATIONAL SOCIETY * HYDERABAD * VIZIANAGARAM *

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA
UNIVERSITY EXAMINATION CENTER, KAKINADA

IV B.PHARMACY I SEMESTER (PCI, R16 & R13) REGULAR/SUPPLEMENTARY EXAMINATIONS, JANUARY/FEBRUARY - 2022

T I M E T A B L E

T I M E: 10.00 AM TO 01.00 PM

DATE & DAY	PCI REGULATIONS REGULAR/SUPPLEMENTARY	R16 REGULATIONS SUPPLEMENTARY	R13 REGULATIONS SUPPLEMENTARY
31-01-2022 (Monday)	Instrumental Methods of Analysis (BP701T)	Pharmaceutical Analysis –II (PHR16411)	Pharmaceutical Analysis – II (B134101)
02-02-2022 (Wednesday)	Industrial Pharmacy II (BP702T)	Biopharmaceutics & Pharmacokinetics (PHR16412)	Bio Assays & Toxicology (B134102)
04-02-2022 (Friday)	Pharmacy Practice (BP703T)	Chemistry of Natural Products (PHR16413)	Chemistry of Natural Products (B134103)
07-02-2022 (Monday)	Novel Drug Delivery System (BP704T)	Hospital & Community Pharmacy (PHR16414)	Hospital & Community Pharmacy (B134104)
09-02-2022 (Wednesday)	---	Pharmaceutical Jurisprudence (PHR16415)	Pharmaceutical Jurisprudence (B134105)

NOTE: (i) ANY OMISSIONS OR CLASHES IN THIS TIME TABLE MAY PLEASE BE INFORMED TO THE CONTROLLER OF EXAMINATIONS IMMEDIATELY.

(ii) EVEN IF GOVERNMENT DECLARES HOLIDAY ON ANY OF THE ABOVE DATES, THE EXAMINATIONS SHALL BE CONDUCTED AS USUAL.

(iii) THE PRINCIPALS ARE REQUESTED TO INFORM THE UNIVERSITY ANY OTHER SUBSTITUTE SUBJECTS THAT ARE NOT INCLUED IN THE ABOVE LIST IMMEDIATELY.

DATE: 10-01-2022

Controller of Examinations

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

TIME TABLE OF IV B.PHARMACY I SEMESTER SUBSTITUTE SUBJECTS FOR READMITTED STUDENTS FROM R10 TO R13 REGULATIONS

DATE OF EXAMINATION: 04.02.2022 (Friday)	TIME OF EXAMINATION: 10.00 AM TO 01.00 PM

Name of the Course	Subject Already Studied	Substituted Subject
B. Pharmacy	------	Pharmaceutical Management (RAB134109)

NOTE:

i ANY OMISSIONS OR CLASHES IN THIS TIME TABLE MAY PLEASE BE INFORMED TO THE CONTROLLER OF EXAMINATIONS, IMMEDIATELY.
ii EVEN IF GOVERNMENT DECLARES HOLIDAY ON ANY OF THE ABOVE DATES, THE EXAMINATIONS SHALL BE CONDUCTED AS USUAL.
iii THE PRINCIPALS ARE REQUESTED TO INFORM THE UNIVERSITY ANY OTHER SUBSTITUTE SUBJECTS THAT ARE NOT INCLUED IN THE ABOVE LIST IMMEDIATELY.

DATE: 10-01-2022

Controller of Examinations

AVANTHI INSTITUTE OF PHARMACEUTICAL SCIENCES * AVANTHI EDUCATIONAL SOCIETY * HYDERABAD * VIZIANAGARAM

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

UNIVERSITY EXAMINATION CENTER, KAKINADA

I B.PHARMACY II SEMESTER (PCI, R16, R13) SUPPLEMENTARY EXAMINATIONS, MARCH - 2022

T I M E T A B L E

TIME : 10.00 AM TO 01.00 PM

DATE & DAY	PCI REGULATION SUPPLEMENTARY	R16 REGULATION SUPPLEMENTARY	R13 REGULATION SUPPLEMENTARY
14-03-2022 (Monday)	Human Anatomy and Physiology-II (BP201T)	Human Anatomy & Physiology-II (PHR16121)	Human Anatomy & Physiology – II (B13204)
16-03-2022 (Wednesday)	Pharmaceutical Organic Chemistry-I (BP202T)	Pharm. Inorganic Chemistry (PHR16122)	Pharm. Inorganic Chemistry (B13201)
19-03-2022 (Saturday)	Biochemistry (BP203T)	Pharm. Organic Chemistry-II (PHR16123)	Pharm. Organic Chemistry – II (B13205)
22-03-2022 (Tuesday)	Pathophysiology (BP204T)	Physical Pharmacy-I (PHR16124)	Physical Pharmacy – I (B13202)
24-03-2022 (Thursday)	----	Computer Applications & Biostatistics (PHR16125)	Computer Applications & Biostatistics (B13203)

NOTE:

i. ANY OMISSIONS OR CLASHES IN THIS TIME TABLE MAY PLEASE BE INFORMED TO THE CONTROLLER OF EXAMINATIONS IMMEDIATELY.

ii. EVEN IF GOVERNMENT DECLARES HOLIDAY ON ANY OF THE ABOVE DATES, THE EXAMINATIONS SHALL BE CONDUCTED AS USUAL.

iii. THE PRINCIPALS ARE REQUESTED TO INFORM THE UNIVERSITY ANY OTHER SUBSTITUTE SUBJECTS THAT ARE NOT INCLUED IN THE ABOVE TIME TABLE IMMEDIATELY.

DATE: 24-02-2022

Controller of Examinations

AVANTHI INSTITUTE OF PHARMACEUTICAL SCIENCES * AVANTHI EDUCATIONAL SOCIETY * HYDERABAD * VIZIANAGARAM

PRINCIPAL
Avanthi Institute of Pharmaceutical Science
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

UNIVERSITY EXAMINATION CENTER, KAKINADA

II B.PHARMACY I SEMESTER (PCI,R16 & R13) REGULAR/SUPPLEMENTARY EXAMINATIONS, FEB/MAR - 2022

T I M E T A B L E

T I M E: 10.00 AM TO 01.00 PM

DATE & DAY	PCI REGULATION REGULAR/SUPPLEMENTARY	R16 REGULATION SUPPLEMENTARY	R13 REGULATION SUPPLEMENTARY
21-02-2022 (Monday)	PHARMACEUTICAL ORGANIC CHEMISTRY – II (BP301T)	PHARMACEUTICAL UNIT OPERATIONS-I (PHR16211)	PHARMACEUTICAL UNIT OPERATIONS – I (B132101)
23-02-2022 (Wednesday)	PHYSICAL PHARMACEUTICS – I (BP302T)	PHARMACEUTICAL BIOCHEMISTRY (PHR16212)	PHARMACOGNOSY – I (B132102)
25-02-2022 (Friday)	PHARMACEUTICAL MICROBIOLOGY (BP303T)	PHYSICAL PHARMACY-II (PHR16213)	PHYSICAL PHARMACY – II (B132103)
28-02-2022 (Monday)	PHARMACEUTICAL ENGINEERING (BP304T)	PHARMACEUTICAL MICROBIOLOGY (PHR16214)	PHARMACEUTICAL MICROBIOLOGY (B132104)
03-03-2022 (Thursday)	---	HEALTH EDUCATION & PATHOPHYSIOLOGY (PHR16215)	ENVIRONMENTAL SCIENCE (B132105)

NOTE:

i. ANY OMISSIONS OR CLASHES IN THIS TIME TABLE MAY PLEASE BE INFORMED TO THE CONTROLLER OF EXAMINATIONS IMMEDIATELY.
ii. EVEN IF GOVERNMENT DECLARES HOLIDAY ON ANY OF THE ABOVE DATES, THE EXAMINATIONS SHALL BE CONDUCTED AS USUAL.
iii. THE PRINCIPALS ARE REQUESTED TO INFORM THE UNIVERSITY ANY OTHER SUBSTITUTE SUBJECTS THAT ARE NOT INCLUED IN THE ABOVE LIST IMMEDIATELY.

Date: 02-02-2022

Controller of Examinations

PRINCIPAL
Avanthi Institute of Pharmaceutical Science
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

UNIVERSITY EXAMINATION CENTER, KAKINADA

TIME TABLE FOR II B.PHARMACY I SEMESTER ADITIONAL SUBJECT FOR TRANSFER STUDENTS FROM R13 TO R16 REGULATIONS

DATE OF EXAMINATION: 21-02-2022 (Monday)	TIME OF EXAMINATION: 10.00 AM TO 01.00 PM

Name of the Course	Subject Already Studied	Substituted Subject
II B. Pharmacy I Semester	----	Computer Applications & Biostatistics

TIME TABLE FOR II B.PHARMACY I SEMESTER SUBSTITUTE SUBJECT FOR READMITTED STUDENTS FROM R13 REGULATIONS

DATE OF EXAMINATION: 03-03-2022 (Thursday)	TIME OF EXAMINATION: 10.00 AM TO 01.00 PM

Name of the Course	Subject Already Studied	Substituted Subject
II B. Pharmacy I Semester	Environmental Studies	Dispensing Pharmacy & Ethics

NOTE:

i. ANY OMISSIONS OR CLASHES IN THIS TIME TABLE MAY PLEASE BE INFORMED TO THE CONTROLLER OF EXAMINATIONS IMMEDIATELY.

ii. EVEN IF GOVERNMENT DECLARES HOLIDAY ON ANY OF THE ABOVE DATES, THE EXAMINATIONS SHALL BE CONDUCTED AS USUAL.

iii. THE PRINCIPALS ARE REQUESTED TO INFORM THE UNIVERSITY ANY OTHER SUBSTITUTE SUBJECTS THAT ARE NOT INCLUED IN THE ABOVE LIST IMMEDIATELY.

Date: 02-02-2022

Controller of Examinations

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA
UNIVERSITY EXAMINATION CENTER, KAKINADA

TIME TABLE FOR II B.PHARMACY I SEMESTER ADITIONAL SUBJECT FOR TRANSFER STUDENTS FROM R16 TO PCI REGULATIONS

DATE OF EXAMINATION: 03-03-2022 (Thursday)		TIME OF EXAMINATION: 10.00 AM TO 01.00 PM
Name of the Course	**Already Studied Subject**	**Additional Subject (PCI)**
II B. Pharmacy I Semester	**Pharm. Organic Chemistry-II**	**Pathophysilogy (ABP204T)**

TIME TABLE FOR II B.PHARMACY I SEMESTER SUBSTITUTE SUBJECT FOR READMITTED STUDENTS FROM R16 TO PCI REGULATIONS

DATE OF EXAMINATION: 23-02-2022 (Wednesday)		TIME OF EXAMINATION: 10.00 AM TO 01.00 PM
Name of the Course	**Already Studied Subject**	**Substitute Subject (PCI)**
II B. Pharmacy I Semester	**Pharm. Organic Chemistry-II**	**Pharmaceutical Analysis-I (PBP102T)**

NOTE:

i. ANY OMISSIONS OR CLASHES IN THIS TIME TABLE MAY PLEASE BE INFORMED TO THE CONTROLLER OF EXAMINATIONS IMMEDIATELY.

ii. EVEN IF GOVERNMENT DECLARES HOLIDAY ON ANY OF THE ABOVE DATES, THE EXAMINATIONS SHALL BE CONDUCTED AS USUAL.

iii. THE PRINCIPALS ARE REQUESTED TO INFORM THE UNIVERSITY ANY OTHER SUBSTITUTE SUBJECTS THAT ARE NOT INCLUED IN THE ABOVE LIST IMMEDIATELY.

Date: 02-02-2022

Controller of Examinations

AVANTHI INSTITUTE OF PHARMACEUTICAL SCIENCES * AVANTHI EDUCATIONAL SOCIETY * HYDERABAD * VIZIANAGARAM

PRINCIPAL
Avanthi Institute of Pharmaceutical Science
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA
UNIVERSITY EXAMINATION CENTER, KAKINADA

TIME TABLE FOR II B.PHARMACY I SEMESTER ADITIONAL SUBJECT FOR TRANSFER STUDENTS FROM R16 TO PCI REGULATIONS

DATE OF EXAMINATION: 21-02-2022 (Monday)	TIME OF EXAMINATION: 10.00 AM TO 01.00 PM

Name of the Course	Already Studied Subject	Substitute Subject (PCI)
II B. Pharmacy I Semester	Physical Pharmaceutics-I	Biochemistry (PBP203T)

NOTE:

i. ANY OMISSIONS OR CLASHES IN THIS TIME TABLE MAY PLEASE BE INFORMED TO THE CONTROLLER OF EXAMINATIONS IMMEDIATELY.
ii. EVEN IF GOVERNMENT DECLARES HOLIDAY ON ANY OF THE ABOVE DATES, THE EXAMINATIONS SHALL BE CONDUCTED AS USUAL.
iii. THE PRINCIPALS ARE REQUESTED TO INFORM THE UNIVERSITY ANY OTHER SUBSTITUTE SUBJECTS THAT ARE NOT INCLUED IN THE ABOVE LIST IMMEDIATELY.

Date: 02-02-2022

Controller of Examinations

AVANTHI INSTITUTE OF PHARMACEUTICAL SCIENCES * AVANTHI EDUCATIONAL SOCIETY * HYDERABAD * VIZIANAGARAM

PRINCIPAL
Avanthi Institute of Pharmaceutical Scienc
Cherukupally (V), Bhogapuram Manda
Vizianagaram Dt., - 531162

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSIT : KAKINADA

UNIVERSITY EXAMINATION CENTER, KAKINADA

PHARM "D" IV YEAR SUPPLEMENTARY EXAMINATIONS, MARCH - 2022

(2012 TO 2017 ADMITTED BATCHES)

TIME TABLE

TIME : 10.00 AM TO 1.00 PM

15-03-2022 (Tuesday)	17-03-2022 (Thursday)	21-03-2022 (Monday)	23-03-2022 (Wednesday)	25-03-2022 (Friday)	28-03-2022 (Monday)	30-03-2022 (Wednesday)
CLINICAL TOXICOLOGY (T4106)	PHARMACOTHERAPEUTICS –III (T4101)	BIOPHARMACEUTICS & PHARMACOKINETICS (T4105)	HOSPITAL PHARMACY (T4102)	BIOSTATISTICS & RESEARCH METHODOLOGY (T4104)	CLINICAL PHARMACY (T4103)	PHARMACOTHERAPEUTICS – I & II (T4111)

NOTE: (i) ANY OMISSIONS OR CLASHES IN THIS TIME TABLE MAY PLEASE BE INFORMED TO THE CONTROLLER OF EXAMINATIONS IMEDIATELY.

(ii) EVEN OF GOVERNMENT DECLARES HOLIDAY ON ANY OF THE ABOVE DATES ,THE EXAMINATIONS SHALL BE CONDUCTED AS USUAL.

(iii) FOR ANY OTHER CLARIFICATIONS IN RESPECT OF THE ABOVE EXAMINATIONS PLEASE CONTACT CONTROLLER OF EXAMINATIONS

DATE: 26-02-2022

Controller of Examinations

PRINCIPAL
Avanthi Institute of Pharmaceutical Science
Cherukupally (V), Bhogapuram Manda
Vizianagaram Dt., - 531162

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA
UNIVERSITY EXAMINATION CENTER, KAKINADA

II B.PHARMACY II SEMESTER (PCI, R16 & R13) SUPPLEMENTARY EXAMINATIONS, FEBRUARY - 2022

T I M E T A B L E

T I M E : 02.00 PM TO 05.00 PM

DATE & DAY	PCI REGULATION SUPPLEMENTARY	R16 REGULATION SUPPLEMENTARY	R13 REGULATION SUPPLEMENTARY
07-02-2022 (Monday)	PHARMACEUTICAL ORGANIC CHEMISTRY-III (**BP401T**)	PHARMACEUTICAL UNIT OPERATIONS – II (**PHR16221**)	PHARMACEUTICAL UNIT OPERATIONS – II (**B132201**)
09-02-2022 (Wednesday)	MEDICINAL CHEMISTRY-I (**BP402T**)	PHARMACEUTICAL ANALYSIS - I (**PHR161222**)	PHARMACEUTICAL ANALYSIS – I (**B132202**)
11-02-2022 (Friday)	PHYSICAL PHARMACEUTICS-II (**BP403T**)	PHARMACOGNOSY – I (**PHR161223**)	PHARMACOGNOSY – II (**B132203**)
15-02-2022 (Tuesday)	PHARMACOLOGY-I (**BP404T**)	MEDICINAL CHEMISTRY – I (**PHR161224**)	MEDICINAL CHEMISTRY – I (**B132204**)
17-02-2022 (Thursday)	PHARMACOGNOSY AND PHYTOCHEMISTRY-I (**BP405T**)	PHARMACOLOGY-I (**PHR162225**)	HEALTH EDUCATION & PATHOPHYSIOLOGY (**B132205**)

NOTE:

i. ANY OMISSIONS OR CLASHES IN THIS TIME TABLE MAY PLEASE BE INFORMED TO THE CONTROLLER OF EXAMINATIONS IMMEDIATELY.

ii. EVEN IF GOVERNMENT DECLARES HOLIDAY ON ANY OF THE ABOVE DATES, THE EXAMINATIONS SHALL BE CONDUCTED AS USUAL.

iii. THE PRINCIPALS ARE REQUESTED TO INFORM THE UNIVERSITY ANY OTHER SUBSTITUTE SUBJECTS THAT ARE NOT INCLUED IN THE ABOVE TIME TABLE IMMEDIATELY.

DATE: 24-01-2022

Controller of Examinations

PRINCIPAL
Avarthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

TIME TABLE OF II B.PHARMACY II SEMESTER ADITIONAL SUBJECTS FOR READMITTED STUDENTS FROM R16 REGULATIONS

DATE OF EXAMINATION: 11-02-2022 (Friday)		TIME OF EXAMINATION: 02.00 PM TO 05.00 PM
BRANCH	**SUBJECT ALREADY STUDIED**	**SUBSTITUTED SUBJECT**
B. PHARMACY	PHARMACOGNOSY-I	HUMAN ANATOMY & PHYSIOLOGY-II (**APHR16121**)

DATE OF EXAMINATION: 11-02-2022 (Friday)		TIME OF EXAMINATION: 02.00 PM TO 05.00 PM
BRANCH	**SUBJECT ALREADY STUDIED**	**SUBSTITUTED SUBJECT**
B. PHARMACY	PHARMACOGNOSY-I	PHYSICAL PHARMACY-I (**APHR16124**)

TIME TABLE OF II B.PHARMACY II SEMESTER SUBSTITUTE SUBJECTS FOR READMITTED STUDENTS FROM R16 REGULATIONS

DATE OF EXAMINATION: 11-02-2022 (Friday)		TIME OF EXAMINATION: 02.00 PM TO 05.00 PM
BRANCH	**SUBJECT ALREADY STUDIED**	**SUBSTITUTED SUBJECT**
B. PHARMACY	ENVIRONMENTAL SCIENCE	HUMAN ANATOMY & PHYSIOLOGY-II (**PHP16215**)

NOTE:

i. ANY OMISSIONS OR CLASHES IN THIS TIME TABLE MAY PLEASE BE INFORMED TO THE CONTROLLER OF EXAMINATIONS, IMMEDIATELY.
ii. EVEN IF GOVERNMENT DECLARES HOLIDAY ON ANY OF THE ABOVE DATES, THE EXAMINATIONS SHALL BE CONDUCTED AS USUAL.
iii. THE PRINCIPALS ARE REQUESTED TO INFORM THE UNIVERSITY ANY OTHER SUBSTITUTE SUBJECTS THAT ARE NOT INCLUED IN THE ABOVE LIST IMMEDIATELY.

DATE: 24-01-2022

Controller of Examinations

PRINCIPAL
Avanthi Institute of Pharmaceutical Science
Cherukupally (V), Bhogapuram Manda
Vizianagaram Dt., - 531162

TIME TABLE FOR II B.PHARMACY II SEMESTER SUBSTITUTE SUBJECT IN R13 REGULATIONS

DATE OF EXAMINATION: 11-02-2022 (Friday)		TIME OF EXAMINATION: 02.00 PM TO 05.00 PM
BRANCH	**SUBJECT ALREADY STUDIED**	**SUBSTITUTED SUBJECT**
B. PHARMACY	PHARMACOGNOSY-I	PHARMACEUTICAL BIOCHEMISTRY (**RAPHR212**)

DATE OF EXAMINATION: 17-02-2022 (Thursday)		TIME OF EXAMINATION: 02.00 PM TO 05.00 PM
BRANCH	**SUBJECT ALREADY STUDIED**	**SUBSTITUTED SUBJECT**
B. PHARMACY	HEALTH EDUCATION & PATHOPHYSIOLOGY	BIOSTATISTICS (RAB1322A)

DATE OF EXAMINATION: 17-02-2022 (Thursday)		TIME OF EXAMINATION: 02.00 PM TO 05.00 PM
BRANCH	**SUBJECT ALREADY STUDIED**	**SUBSTITUTED SUBJECT**
B. PHARMACY	HEALTH EDUCATION & PATHOPHYSIOLOGY	DISPENSING & HOSPITAL PHARMACY (RAB132209)

DATE OF EXAMINATION: 17-02-2022 (Thursday)		TIME OF EXAMINATION: 02.00 PM TO 05.00 PM
BRANCH	**SUBJECT ALREADY STUDIED**	**SUBSTITUTED SUBJECT**
B. PHARMACY	HEALTH EDUCATION & PATHOPHYSIOLOGY	PHARMACEUTICAL MICROBIOLOGY (RAB1322B)

NOTE:

i. ANY OMISSIONS OR CLASHES IN THIS TIME TABLE MAY PLEASE BE INFORMED TO THE CONTROLLER OF EXAMINATIONS, IMMEDIATELY.

ii. EVEN IF GOVERNMENT DECLARES HOLIDAY ON ANY OF THE ABOVE DATES, THE EXAMINATIONS SHALL BE CONDUCTED AS USUAL.

iii. THE PRINCIPALS ARE REQUESTED TO INFORM THE UNIVERSITY ANY OTHER SUBSTITUTE SUBJECTS THAT ARE NOT INCLUED IN THE ABOVE LIST IMMEDIATELY.

DATE: 24-01-2022

AVANTHI INSTITUTE OF PHARMACEUTICAL SCIENCES · AVANTHI EDUCATIONAL SOCIETY · HYDERABAD · VIZIANAGARAM

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

Controller of Examinations

TIME TABLE OF II B.PHARMACY II SEMESTER SUBSTITUTE SUBJECTS FOR READMITTED STUDENTS FROM R16 REGULATIONS

DATE OF EXAMINATION: 11-02-2022 (Friday)		TIME OF EXAMINATION: 02.00 PM TO 05.00 PM
BRANCH	**SUBJECT ALREADY STUDIED**	**SUBSTITUTED SUBJECT**
B. PHARMACY	PHYSICAL PHARMACEUTICS-II (**BP403T**)	PHARMACEUTICAL ENGINEERING (**PBP304T**)

NOTE: (i) ANY OMISSIONS OR CLASHES IN THIS TIME TABLE MAY PLEASE BE INFORMED TO THE CONTROLLER OF EXAMINATIONS IM MEDIATELY.

(ii) EVEN IF GOVERNMENT DECLARES HOLIDAY ON ANY OF THE ABOVE DATES, THE EXAMINATIONS SHALL BE CONDUCTED AS USUAL.

(iii) THE PRINCIPALS ARE REQUESTED TO INFORM THE UNIVERSITY ANY OTHER SUBSTITUTE SUBJECTS THAT ARE NOT INCLUED IN THE ABOVE LIST IMMEDIATELY.

DATE: 24-01-2022

Controller of Examinations

AVANTHI INSTITUTE OF PHARMACEUTICAL SCIENCES · AVANTHI EDUCATIONAL SOCIETY · HYDERABAD · VIZIANAGARAM

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Manda
Vizianagaram Dt., - 531162

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA

UNIVERSITY EXAMINATION CENTER, KAKINADA

PHARM "D" I YEAR SUPPLEMENTARY EXAMINATIONS, APRIL - 2022

(2020 TO 2012 ADMITTED BATCHES)

TIMETABLE

TIME: 10.00 AM TO 01.00 PM

04-04-2022 (Monday)	06-04-2022 (Wednesday)	08-04-2022 (Friday)	11-04-2022 (Monday)	13-04-2022 (Wednesday)	16-04-2022 (Saturday)
HUMAN ANATOMY AND PHYSIOLOGY (T1101)	PHARMACEUTICAL INORGANIC CHEMISTRY (T1105)	MEDICINAL BIOCHEMISTRY (T1103)	PHARMACEUTICS (T1102)	PHARMACEUTICAL ORGANIC CHEMISTRY (T1104)	REMEDIAL MATHEMATICS (T1106) / BIOLOGY (T1107)

NOTE: (i) ANY OMISSIONS OR CLASHES IN THIS TIME TABLE MAY PLEASE BE INFORMED TO THE CONTROLLER OF EXAMINATIONS IMEDIATELY.

(ii) EVEN OF GOVERNMENT DECLARES HOLIDAY ON ANY OF THE ABOVE DATES ,THE EXAMINATIONS SHALL BE CONDUCTED AS USUAL.

(iii) FOR ANY OTHER CLARIFICATIONS IN RESPECT OF THE ABOVE EXAMINATIONS PLEASE CONTACT CONTROLLER OF EXAMINATIONS

DATE: 16-03-2022

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

Controller of Examinations

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

UNIVERSITY EXAMINATION CENTER, KAKINADA

III B.PHARMACY II SEMESTER (PCI, R16 & R13) SUPPLEMENTARY EXAMINATIONS, FEBRUARY - 2022

TIME TABLE

TIME : 02.00 PM TO 05.00 PM

DATE & DAY	PCI REGULATIONS (R17)	R16 REGULATION SUPPLEMENTARY	R13 REGULATION SUPPLEMENTARY
08-02-2022 (Tuesday)	Medicinal Chemistry III (**BP601T**)	PHARMACEUTICAL TECHNOLOGY-II (**PHR16321**)	PHARMACEUTICAL TECHNOLOGY-II (**B133201**)
10-02-2022 (Thursday)	Pharmacology III (**BP602T**)	PHARM. BIOTECHNOLOGY (**PHR16322**)	PHARM. BIOTECHNOLOGY (**B133202**)
14-02-2022 (Monday)	Herbal Drug Technology (**BP603T**)	PHARMACOLOGY-II (**PHR16323**)	PHARMACOLOGY-II (**B133203**)
16-02-2022 (Wednesday)	Biopharmaceutics and Pharmacokinetics (**BP604T**)	MEDICINAL CHEMISTRY-III (**PHR16324**)	MEDICINAL CHEMISTRY-III (**B133204**)
18-02-2022 (Friday)	Pharmaceutical Biotechnology (**BP605T**)	REGULATORY AFFAIRS, IPR & PATTENTS (**PHR16325**)	REGULATORY AFFAIRS, IPR & PATTENTS (**B133205**)
21-02-2022 (Monday)	Quality Assurance (**BP606T**)	--	--

NOTE :

(i) ANY OMISSIONS OR CLASHES IN THIS TIME TABLE MAY PLEASE BE INFORMED TO THE CONTROLLER OF EXAMINATIONS IMMEDIATELY.

(ii) EVEN IF GOVERNMENT DECLARES HOLIDAY ON ANY OF THE ABOVE DATES, THE EXAMINATIONS SHALL BE CONDUCTED AS USUAL.

(iii) THE PRINCIPALS ARE REQUESTED TO INFORM THE UNIVERSITY, IF ANY OTHER SUBSTITUTE SUBJECTS THAT ARE NOT INCLUDED IN THE ABOVE LIST IMMEDIATELY.

DATE: 24-01-2022

PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162

AVANTHI INSTITUTE OF PHARMACEUTICAL SCIENCES · AVANTHI EDUCATIONAL SOCIETY · HYDERABAD · VIZIANAGARAM

Controller of Examinations