



**SELF ASSESSMENT REPORT (SAR) FORMAT
UNDERGRADUATE PHARMACY PROGRAM
FIRST TIME ACCREDITATION
(UPDATED SAR AS PER CAY 2021-2022)**

**ANURADHA COLLEGE OF PHARMACY, (B.PHARM)
ANURADHA NAGAR, SAKEGAON ROAD,
CHIKHLI, DIST. BULDANA
MAHARASHTRA (INDIA)**



(Applicable for all the programs, except those granted full accreditation for 5 years as per Jan 2013 Manual)

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(January, 2016)





PARAMHANSA RAMKRUSHNA MAUNIBABA SHIKSHAN SANSTHA'S

ANURADHA COLLEGE OF PHARMACY, (DTE CODE : 1133)

Approved by P.C.I. New Delhi, D.T.E. Mumbai, Govt. of Maharashtra and Affiliated to Sant Gadge Baba Amravati University, Amravati & MSBTE Mumbai.

Rahul Bondre
President**Adv.Sau. Vrushali Bondre**
Secretary**Dr. Kailash Biyani**
Principal

Anuradha Nagar, Chikhli, Dist. Buldana - 443201 (MS), Phone :- 9822432850, (07264) 244285 (Off.) Fax: 07264-244702

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Ref. No. / Acp. **ESK / NBA / B. Pharm / 2022-23 / 80228**Date : **2/10/2022**

To,

**Hon'ble Member Secretary,
National Board of Accreditation,
4th Floor, East Tower, NBCC Place,
Bhisham Pitamah Marg, Pragati Vihar,
New Delhi-110 003, India.**

Subject: - Regarding submission of updated e-Self Assessment Report (eSAR) for accreditation of B. Pharm. Program (as per CAY 2021-2022) of Anuradha College of Pharmacy, Chikhli, Dist:- Buldana (MS).

Reference: - 1. Application ID no. 2156-23/12/2016.
2. Your e-mail dated August 10th 2022, regarding submission of revised visit dates-
Respected Sir,

With reference to cited subject, we are submitting updated e-Self Assessment Report (e-SAR) and revised visit dates for accreditation of B. Pharm. Program (as per CAY 2021-2022) of Anuradha College of Pharmacy, Chikhli, Dist:-Buldana (MS).

We are thankful to your esteemed office for your kind guidance and co-operation during the entire process.

You are most sincerely requested to arrange the visit.

Thanking You!

Yours Faithfully

Dr. K. R. Biyani

Principal

**Anuradha College of Pharmacy
Chikhli Dist. Buldana**



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PART A: Institutional Information**1. Name and Address of the Institution:**

Anuradha College of Pharmacy,
Anuradha Nagar,
Sakegaon Road,
CHIKHLI,
Dist. Buldana (M.S.)
Pin: 443 201

2. Name and Address of the Affiliating University:

Sant Gadge Baba Amravati University,
Tapovan Road, AMRAVATI (M.S.) Pin: 444 602

3. Year of Establishment of the Institution: 1995**4. Type of the Institution:**

- University
- Deemed University
- Autonomous
- Affiliated
- Any Other (Please specify)

5. Ownership Status:

- Central Government
- State Government
- Grant-in-Aid
- Self financing
- Trust
- Society
- Section 25 Company
- Any Other (Please specify)

Provide Details: Not Applicable



6. Other Academic Institutions of the Trust/Society/etc., if any:

Name of the Institution(s)	Year of Establishment	Programs of Study	Location
PRMSS, Anuradha College of Pharmacy, Chikhli	1994 2018	D.Pharm B. Pharm.	Anuradha Nagar, Chikhli
Anuradha Engineering College	1993	<ul style="list-style-type: none"> B. E. (Mechanical Engineering) B. E. (Electronics and Telecommunication Engineering) B. E.(Computer Science Engineering) B.E.(Chemal Engineering) M. Tech. (Mechanical Engineering) M. Tech. (Chemical Engineering) 	Anuradha Nagar, Chikhli Anuradha Nagar, Chikhli Anuradha Nagar, Chikhli Anuradha Nagar, Chikhli Anuradha Nagar, Chikhli Anuradha Nagar, Chikhli Anuradha Nagar, Chikhli
Anuradha English Medium School	2002	<ul style="list-style-type: none"> Nursery to S.S.C. education, (C.B.S.E. board.) 	Anuradha Nagar, Chikhli
Karmayogi Tatayasaheb Bondre Institute of Pharmacy, Chikhli	2019	<ul style="list-style-type: none"> B.Pharm 	Near Panchamukhi Mahadeo Mandir, Khamgaon Road, Chikhli
Anuradha Nursing College	2007 2014	<ul style="list-style-type: none"> ANM BSc Nursing 	Anuradha Nagar, Chikhli



7. Details of all the programs being offered by the Institution under consideration:

S. N.	Program Name	Year of Start	Intake	Increase in intake, if any	Year of increase	AICT E/PCI Approval	Accreditation Status*
1	B. Pharm.	1995	40	100	2010	Yes	Granted accreditation for THREE years (2008-2011) and now applied waiting for visit
2	M.Pharm. (Pharmacology)	2008	12	-	NA	Yes	Work in progress
3	M.Pharm. (Pharmaceutics)	2010	15	-	NA	Yes	Work in progress
4	M.Pharm. (Quality Assurance)	2010	15	-	NA	Yes	Work in progress
5	M.Pharm. (Industrial Pharmacy)	2012	15	-	NA	Yes	Work in progress
6	Ph.D. (Pharmaceutical Sciences)	2012	08	-	NA	Yes	-
7	D. Pharm	2018	60	-	NA	Yes	Work in progress

Write applicable one:

- Applying first time
- Granted provisional accreditation for two/three years for the period (specify period)
- Granted accreditation for 5/6 years for the period (specify period)
- Not accredited (specify visit dates, year)
- Withdrawn (specify visit dates, year)
- Not eligible for accreditation
- Eligible but not applied

Note: Add rows as needed.

7. Programs to be considered for Accreditation vide this application:

Sr.No	Program Name
01	B. Pharmacy



8. Total number of Employees:**a. Regular * Faculty and staff:**

Items		CAY (2021- 22)		CAYm 1 (2020- 21)		CAYm 2 (2019- 20)	
		M in	M ax	Mi n	M ax	Mi n	M ax
Faculty in Pharmacy	M	26	27	19	19	24	25
	F	13	13	15	15	14	14
Faculty in Sciences & Humanities	M	-	-	-	-	-	-
	F	-	-	-	-	-	-
Non-teaching staff	M	22	27	25	25	24	25
	F	-	-	-	-	-	-

* Note: Minimum 75% should be Regular/Full Time faculty and the remaining shall be Contractual Faculty as per AICTE norms and standards.

The contractual faculty (doing away with the terminology of visiting/adjunct faculty, whatsoever) who have taught for 2 consecutive semesters in the corresponding academic year on full time basis shall be considered for the purpose of calculation in the Student Faculty Ratio.

CAY – Current Academic Year

CAYm1- Current Academic Year minus1= Current Assessment Year

CAYm2 - Current Academic Year minus2=Current Assessment Year minus 1

b. Contractual Staff (Not covered in Table A):

Items		CAY		CAYm1		CAYm2	
		M in	M ax	M in	M ax	M in	M ax
Faculty in Pharmacy	M	-	-	-	-	-	-
	F	-	-	-	-	-	-
Faculty in Sciences & Humanities	M	3	3	4	4	2	2
	F	-	-	-	-	-	-
Non-teaching staff	M	1	1	1	1	1	1
	F	4	4	4	4	4	4

9. Total number of Pharmacy students:**a. Total number of Pharmacy students: UG**

Student Numbers	CAY 2021-22	CAYm1 2020-21	CAYm2 2019-20
Total no. of boys	276	252	257
Total no. of girls	2 03	183	161
Total no. of students	479	435	418



a. Total number of Pharmacy students: PG

Student Numbers	CAY 2021-22	CAY _{m1} 2020-21	CAY _{m2} 2019-20
Total no. of boys	69	66	55
Total no. of girls	49	37	35
Total no. of students	118	103	90

b. Total number of Pharmacy students: PhD

Student Numbers	CAY 2021-22	CAY _{m1} 2020-21	CAY _{m2} 2019-20
Total no. of boys	5	3	3
Total no. of girls	3	3	4
Total no. of students	8	6	7

(Instruction: The data may be categorized in tabular form in case institute runs UG, PG and doctoral programs, Please prepare separate table for each level, if applicable)

a. Vision of the Institution:

“To provide finest and growing environment for teaching, learning and research to students and staff”

b. Mission of the Institution:

- To prepare dedicated skilled pharmacists in the field of pharmacy accomplishing intellectual, physical, ethical and spiritual development of an individual.
- To prepare dedicated skilled pharmacists in the field of pharmacy in co-ordination with industry.
- To prepare dedicated skilled pharmacists in the field of pharmacy in co-ordination with community

c. Contact Information of the Head of the Institution and NBA coordinator, if designated:

- Name: Dr. Kailash Radheshamji Biyani.
Designation: Principal
Mobile No: +919604444200
Email id: principal.acpchikli@gmail.com
- NBA coordinator, if designated:
Name: Mr. Unmesh Madhavrao Joshi
Designation: Associate Professor
Mobile No. : +919850377598
Email Id: umjoshi25@gmail.com



PART B : Criteria Summary

Criteria No.	Criteria	Mark/ Weightage
Program Level Criteria		
1.	Vision, Mission and Program Educational Objectives	50
2.	Program Curriculum and Teaching –Learning Processes	150
3.	Course Outcomes and Program Outcomes	100
4.	Students' Performance	180
5.	Faculty Information and Contributions	175
6.	Facilities	120
7.	Continuous Improvement	75
Institute Level Criteria		
8.	Student Support Systems	50
9.	Governance, Institutional Support and Financial Resources	100
Total		1000

NOTE: In the document wherever word 'Semester' has been used, same shall be read as 'Semester or Annual'. The Institutions may use appropriately whichever is applicable to them.



Self Assessment Report (SAR)

CRITERION 1	Vision, Mission and Program Educational Objectives	50
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1. Vision, Mission and Program Educational Objectives (50)

State the Vision and Mission (5)

(Vision statement typically indicates aspirations and Mission statement states the broad approach to achieve aspirations.)

VISION:

“To provide finest and growing environment for teaching, learning and research to students and staff”

MISSION:

- To prepare dedicated skilled pharmacists in the field of pharmacy accomplishing intellectual, physical, ethical and spiritual development of an individual.
- To prepare dedicated skilled pharmacists in the field of pharmacy in co-ordination with industry.
- To prepare dedicated skilled pharmacists in the field of pharmacy in co-ordination with community



1.2 State the Program Educational Objectives (PEOs) (5)

(State the Program Educational Objectives (3 to 5) of the program seeking accreditation)

PEO1	To develop an aptitude amongst the students to understand the basic aspects of pharmacy.
PEO2	To enable the students to have a confidence to handle the laboratory equipments, to understand the principles of such instruments and to be known about their applications.
PEO3	To enable the students to correlate the principles of pharmacy with their implementations in pharmaceutical industry.
PEO4	To generate sensibility amongst the graduating students towards their social responsibilities as a pharmacist.
PEO5	To accomplish holistic development of the students.

1.3 Indicate where and how the Vision, Mission and PEOs are published and disseminated among stakeholders (15)

(Describe where (websites, curricula, posters etc.) the Vision, Mission and PEOs are published and detail the process which ensures awareness among internal and external stakeholders with effective process implementation)

(Internal stakeholders may include Management, Governing Board Members, faculty, support staff, students etc. and external stakeholders may include employers, industry, alumni, funding agencies, etc.)

- The vision, mission and PEO's are duly published on-
 - The website of the Institute.
 - Displayed at different sites of the institute like, Administrative office, Each laboratory, corridors and amenity places.
 - The Principal's office
 - Admission Brochure



1.4 State the process for defining the Vision & Mission and PEOs of the program (10)

(Articulate the process for defining the Vision, Mission and PEOs of the program)

The department established the vision and mission through a thorough discussion which involved the stakeholders like The Representatives of The Management, Faculty Members etc. The views of experts from academia and Industry were also taken into account while designing the Vision and Mission. The process can be summarized as-

- The objectives of the Institute was taken as a basis, the vision was decided on the basis of the objectives of the Management behind starting the program at a rural place.
- The Mission was decided as a means to comply with the vision of the institute.
- The views of the Management, Faculty and sister concerns were considered during formulation of the Vision and Mission.

The Program Educational Objectives were formulated through a consultation with the concerned stakeholders. The stakeholders considered for the step were inclusive of The Administration, The Faculty, The students and external stakeholders like Industry Personnel, Academicians from other academic institutes and within the Institute.

- The vision and mission of the institute were taken as the basic guidelines for preparing the PEO's.
- The Views of Industry experts about their expectations from a Graduate were considered.
- The expectations of faculty from an outgoing graduate were also considered during designing the PEOs.
- The views of the outgoing students were also considered for designing the PEOs.
- All the views were openly discussed and reviewed.
- Final outcomes of the discussions were decisive in the process.



1.5 Establish consistency of PEOs with Mission of the Institute (15)

(Generate a “Mission of the Institute – PEOs matrix” with justification and rationale of the mapping)

PEO Statements	M 1	M 2	M 3
PEO1: To develop an aptitude amongst the students to understand the basic aspects of pharmacy.	3	3	3
PEO2: To enable the students to have a confidence to handle the laboratory equipments, to understand the principles of such instruments and to be known about their applications.	3	3	2
PEO3: To enable the students to correlate the principles of pharmacy with their implementations in pharmaceutical industry.	3	3	2
PEO4: To generate sensibility amongst the graduating students towards their social responsibilities as a pharmacist.	3	2	3
PEO5: To accomplish holistic development of the students.	3	3	3

Note: M1, M2, ...,Mn are distinct elements of Mission statement. Enter correlation levels 1, 2 or 3 as defined below:

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

It there is no correlation, put “-”

Note: In this document wherever the term ‘Process’ has been used its meaning is process formulation, notification and implementation.



- **Justification and Rationale of Mapping:**

- **PEO1** is substantially consistent with all the missions of the institute. It can be easily justified through the curriculum in theory classes, laboratory experiments in various subjects, University and Internal examinations during the program.
- **PEO2** is again very much consistent with mission 1 and 2. The application of their knowledge about the aspects about instruments is ultimately used for the societal cause hence mission 3 is also accomplished with this PEO. The laboratory experiments, the availability and utility of the various, modern and basic laboratory equipments justify the consistency.
- **PEO3** is substantially consistent with the missions of the Institute. The basic experiments performed in the laboratory are a sample of the industrial processes adopted. The consistency can be demonstrated through a mandatory training which is provided to every graduate before getting the Degree.
- **PEO4** is consistent with the mission of the institute to serve the society as a whole. The co curricular activities like Blood donation camps, health check up and treatment camps, National Service Scheme camps, Pharmacist's Day Celebration and many other co curricular activities justify the social aspects of pharmacy education.
- **PEO5** is consistent with the missions of the institute to meet the demands of an individual, industry as well as fulfilling the expectations of the society from a pharmacist. The co curricular and extracurricular activities demonstrate and justify the aspects of holistic development of the students. The aspects include ability to work in a group, leadership skills, communication skills as well as physical development through sports events organized.



CRITERION 2	Program Curriculum and Teaching –Learning Processes	150
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2. Program Curriculum and Teaching-Learning Processes (150)

2.1 Program Curriculum (40)

2.1.1 Delivery of Syllabus Contents and compliance of the curriculum for attainment of POs (10)

(State the contents of the syllabus; about the course/learning material/content/laboratory experiments/projects etc. also mention identified curriculum gaps, if any)

Note: In case all POs are being demonstrably met through University Curriculum then 2.1.2 will not be applicable and the weightage of 2.1.1 will be 30.

1. The curriculum of Undergraduate course in Pharmacy is provided by the SGBAU, Amravati. It is a four years degree Program conducted in eight semesters.
2. Currently Credit based semester system (CBCS) curriculum is implemented by SGBAU Amravati (Annexure III)
3. The curriculum CBCS is framed by Pharmacy council of India, New Delhi and approved by SGBAU Amravati is implemented from academic year 2017-18 and accepted by academic council of SGBAU Amravati.
4. Syllabus specifies number of lectures and practicals in each course.
5. The Teaching & Examination Scheme specifies the duration and marks of both Internal and External Theory and Practical examination.
6. As per the curriculum:
 - i) The internal exam constitutes continuous internal assessment comprising of periodic test and continuous evaluation.
 - ii) The external exam constitutes end semester examination comprising of theory and practicals
7. As per the CBCS curriculum, the percentage of marks for Semester and Internal Theory examination is 75% and 25% respectively and for practicals Semester and Internal is 70% and 30% respectively.
8. Course attainments are calculated after completion of the end semester examination.



9. Program outcome attainments are calculated after completion of all the course attainments of each semester.

The syllabus contents are delivered with the aid of effective audio-visual and multimedia elements and interactive teaching. In addition, to develop interest and enthusiasm among students, innovative teaching and learning techniques are followed. These include making of charts and models, giving assignments or projects to students based on their area of interest. Also weaker students are given additional support by arranging remedial classes for them and by personally getting the University question papers of the concerned subjects solved from them.

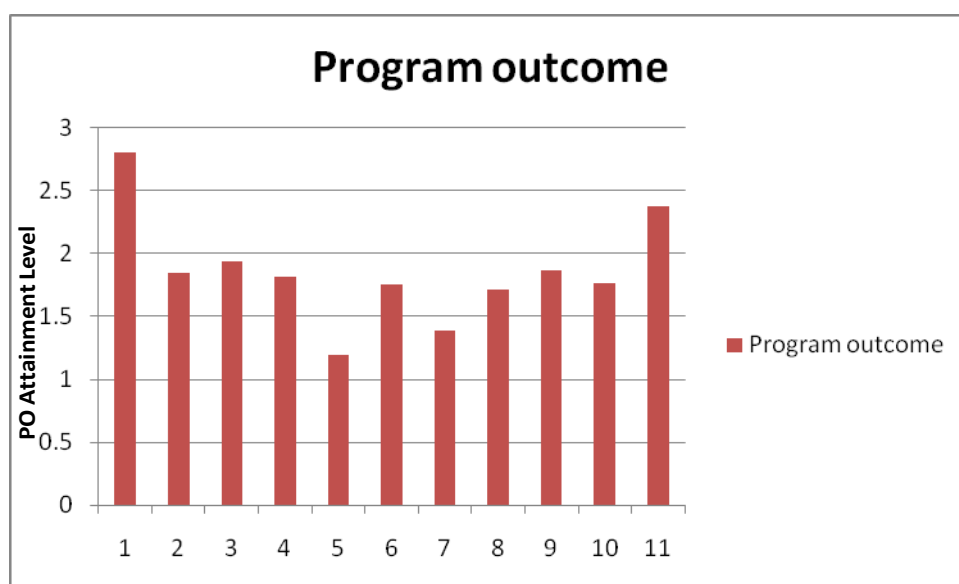


Fig 2.1.1: Compliance of curriculum for attainment of POs
All POs are reasonably attained ranging between 1.19 and 2.81

Delivery of Syllabus contents and compliances of the curriculum for the attainment of POs(20)

(Provide details of the additional course/learning material/content/laboratory experiments/projects etc., arising from the gaps identified in 2.1.1 in a tabular form in the format given below)

As all POs are being demonstrably met through University curriculum

2.1.2 State the delivery details of the contents beyond the Syllabus for the attainment of POs (20)

(Provide details of the additional course/learning material/content/laboratory experiments/projects etc., arising from the gaps identified in 2.1.1 in a tabular form in the format given below)

As all POs are being demonstrably met through University curriculum. Hence 2.1.2 is not applicable.

Note: Please mention *in detail* whether the Institution has given such inputs and suggestions to the Affiliating University regarding curricular gaps and possible addition of new content/add-on courses in the curriculum, to bridge the gap and to improve attain program outcome(s).

2.1.3. Adherence to Academic Calendar (10)

(Demonstrate notified academic calendar & its adherence)

In the beginning of every academic year, an academic calendar is prepared with an objective to plan the academic activities to be undertaken in the coming year based on the University circular. It is finalized by the college academic committee in consultation with the Principal and other committee members. The calendar specifies the number of days available for teaching excluding Holidays, Sundays and Examination days. The calendar specifies minimum number of lectures and practicals to be conducted per semester depending upon weightage in the curriculum. It gives dates for conduction of internal theory and practical examinations. The planned dates are subject to change as per the University circular related to examinations. The teaching plan is prepared adhering to the academic calendar in the beginning of the semester. Other activities including various cultural events, extra and co-curricular events, health campaigns and sports events are also planned in advance.

2.2 Teaching-Learning Processes (110)

2.2.1 Initiatives in teaching and learning process (25)

(Implemented teaching-learning process and Initiatives in improving instruction methods, using real world examples, collaborative learning, the quality of laboratory experiments with regard to conduct, record observations, analysis, Feedback collection process; collection, analysis and action taken etc. encouraging bright students, assisting weak students etc. The initiatives, implementation details and impact analysis need to be documented)



In Anuradha college of Pharmacy the teaching and learning process begins with an Orientation programme. The topics of the programme help the students to learn better, benefit from theory and practical classes, face examinations and study plans; also the students are informed about various sports and cultural activities. These immensely prepare the students towards the self learning and achieve high scores. Anuradha college of Pharmacy has taken several steps to characterize and channelize the energies and time for fruitful way in the teaching-learning process. The teaching process has a blend of concepts, applications and problem based teaching. The laboratory time is devoted for demonstration, practice and feedback. The syllabus is prescribed by the SGBAU, Amravati and hence there is very little scope in going beyond syllabus and the syllabus is well compliant with the programme outcomes and delivered efficiently hence no gaps are found. However, in view of holistic development of the students, the institute includes additional course in personality development on regular basis for all the students. A dedicated trainer is appointed on regular basis for this activity.

The initiatives in teaching and learning process are done at two levels i.e. for theory classes and practical sessions separately. The mechanism and implementation have been described hereafter.

I] Theory classes: As theory classes are of immense importance lots of measures are taken to keep the lectures engaging and interactive.

Some of the measures taken are:

1. Multimedia elements such as Power Point, Animations etc. have been used.
2. Other practices such as Teaching with Humour, Role Playing, Model Making, Chart Making, bringing live specimens, Markets Surveys etc. have been employed depending upon the curriculum and its scope.
3. In order to boost interest amongst the students various awards are given to the meritorious students every year.
4. As per the SGBAU Amravati curriculum various projects and seminars are given to the students of VIIth and VIIIth semester.

II] Practical sessions:

1. Practicals are conducted as per SGBAU Amravati curriculum regularly.
2. Continuous assessment of the practicals performed by is done regularly.



2.2.2 Quality of internal semester question papers, assignments and evaluation (10)

(Mention the initiatives, implementation details and impact analysis related to quality assurance of semester question papers, assignments that encourage and empower the students to develop skills and higher orders of learning and evaluation)

As per the CBCS curriculum, the percentage of marks for Semester and Internal Theory examination is 75% and 25% respectively and for practicals Semester and Internal is 70% and 30% respectively. University Semester examination papers are set by a panel of examiners appointed by the University. The question papers are sent online by Digital Examination Paper Downloading (DEPD) system to the Examination center on the day of examination. The University examinations are conducted at a center other than this college. The Answerbooks of university examinations are evaluated by centralized assessment program (CAP) of the university at the university CAP center. Internal periodic examination papers are set by the subject teacher(s) are submitted in sealed envelope to the examination section. The answerbooks of internal examinations are evaluated by respective subject teachers. The internal assessments marks are entered in given formats and Sessional register. The internal assessment marks are sent to the university online to the university portal in the given formats. Sometimes in addition to the internal periodic examination, a class test is conducted and students are given assignments in their respective subjects to upgrade their knowledge. These are evaluated by individual faculties with their own perspective.

2.2.2 Quality of Students projects (15)

(Quality of the project is measured in terms of consideration to factors including, but not limited to, cost, type {application, product, research, review etc.} environment, safety, ethics and standards. Processes related to project identification, allotment, continuous monitoring, evaluation including demonstration of working prototypes, and to enhance the relevance of projects. Mention Implementation details including details of POs addressed through the projects with justification)

The projects seminars are identified as an important component, which imparts and improves the written and oral communication skills. These skills improve the employability of the students. As per the SGBAU Amravati University curriculum Projects are allotted to the



VIIth & VIIIth semester students based on the syllabus. Project guides are allotted to each student. Evaluation of projects are carried out at the end of semester by conducting seminar examination. The evaluation of project is done by faculty members appointed by The University. A panel of internal and external examiners is involved in the evaluation as per The University appointments. The students present their work in the form of hard copy and deliver seminars with the help of power point presentations. As the criterion for evaluation of projects are Objective, Presentation, Defence and Quality based on its reflection on various programme outcomes like PO1, PO2, PO3, PO5 and PO8 from the results, it is observed that maximum students identified and understood the topic of project given to them. Mostly the projects are cost-effective and safe. Project reports are submitted to the library and project guide.

2.2.3 Initiatives related to Industry and/or Hospital interaction (20)

(Give details of the industry/ hospital involvement in the program such as industry-attached laboratories, partial delivery of appropriate courses by industry experts and/or collaborative initiatives with the hospitals etc. Mention the initiatives, implementation details and impact analysis)

With an aim to provide hands-on training to the pharmacy students on recent technologies using commercially viable machineries, equipments, sophisticated process, validated documents, job training, career opportunities, campus recruitments, innovative idea generation interactions between institutions and industry is the need of an hour. For students it is important because they get exposure to industry and subsequent placements in various disciplines. Industries need good students who are well aware of industry standards and capable of achieving so. Therefore, here is a need of interaction of industry and academia where academic institute can prepare students for jobs in multinational companies and industry will also be benefited by receiving well trained work force. An expert from Industry is considered to be a member of board of studies who takes active role in the curriculum design.

The college promotes and motivates the students to undergo professional training during their graduation. The college provides and recommends the students for industrial/ professional training at various industries, community pharmacies or hospitals as applicable. The student has to complete in-plant training in pharmaceutical industries, community pharmacies or hospitals and submit the report accordingly.



Anuradha college of Pharmacy research centre is equipped with sophisticated equipments and instruments required in the research projects. Students and faculty members of the college have an easy access to the research facilities available in the research centre.

Students can avail quality lectures from the highly experienced industry professionals. Many college alumni also contribute to this cause. They help the students through some lectures as well as help them in industrial training. The students can think upon the recent challenges the corporate are facing and can approach the industry. It keeps them updated on the current industrial trends and creates ample of job opportunities for them.

The college also organizes lectures in Hospital Pharmacy coupled with Hospital visits to make the students acquainted with the current trends in this arena. Also lectures on specialized topics are arranged.

The college runs Siddhivinayak medical mall a generic medical store which is helpful to the students to learn patient counseling.

The college has also established active interaction with and signed Memorandum of understanding with leading Pharmaceutical industries such as A-Klass Pharmaceuticals Khamgaon, Leben laboratories Akola. The governing board of the institute also comprises of advisory member from industry and health related fields. The industry- institute interaction supports research activities by providing gift samples of APIs. The alumni of this institute working in different pharmaceutical industries extend their support to students for In-plant training, gift samples of APIs and placements.



2.2.4 Initiatives related to skill Development programs/industry internship/summer training (10)

(Mention the initiatives, implementation details and impact analysis)

College Training and Placement Cell facilitates arrangements for in-plant training to be undergone by the B. Pharm students. At the beginning of Semester-V, the Cell gives orientation to the students regarding the purpose of In-plant training and procedure to approach the industries for the same. The Cell facilitates issue of official appeal letters to the students which need to be submitted to industries.

The Cell further coordinates with industries for the confirmation of accommodation of training. On completion of the training, the students are asked to submit a training completion certificate. Students are benefitted from the practical In-Plant training activity since they have related topics in their subsequent final year syllabus. The students are additionally given training on following equipments for skill development

1. ROTARY TABLET PRESS MACHINE:

The students are demonstrated the working of a rotary tablet press machine in the machine room and asked to perform compression of a conventional tablet formula with evaluation of its quality control parameters.

2. HPLC:

The students are given an understanding of analytical method development using these sophisticated instruments.

3. FTIR:

Different sampling techniques of FTIR analysis are demonstrated to the students.

4. MICROSCOPE:

The students are acquainted with the study of herbal drug microscopy using this instrument.

5. DIFFUSION CELL APPRATUS

The students are demonstrated the working of diffusion cell apparatus. To study the permeability of the drug.

6.DOUBLE BEAM SPECTROPHOTOMETER

The students are given an understanding of analytical method development using these sophisticated instruments.

7. BROOKFIELD VISCOMETER

The students are introduced with working of Brookfield viscometer



2.2.5 Continuous Evaluation Process (10)

(Mention the process followed and its effectiveness)

As per the SGBAU Amravati CBCS curriculum, 10% weightage is given to continuous evaluation, both in theory and practical. Out of the 10 marks reserved for continuous mode of theory internal assessment, 4 marks are reserved for attendance, 3 marks for academic activities and 3 marks for student teacher interaction. Of the 5 marks reserved for continuous mode of practical internal assessment 2 marks for attendance and 3 marks for practical record and Viva-voce. Marks for learner- teacher interaction are given based on the learner's drive to ask questions in the class, be ready to be a part of the discussions raised in the class, actively participating in the class projects and other activities that are a part of the lecture.

In case of practical, of the 15 marks reserved for internal assessment, 5 marks are for continuous mode of evaluation.

Along with the above mentioned academic activities which are mandatory as per the University of SGBAU Amravati, special efforts are taken for the holistic development of the students.

Especially for the final year students, pre-placement talks are organized. We also organize G-PAT guidance programmes and test series. They are also counselled for Post Graduate studies in India and abroad along with information of the courses available. The guidance regarding various competitive examinations such as NIPER are given to the students by arranging guest lectures.

Students are encouraged to participate in various Inter and Intra-Collegiate sports events, cultural activities, NSS camps and Blood donation camps and health check up camps and public awareness rallies etc. This helps in their overall development.



2.2.6 Quality of Experiments (20)

(Quality from the equipment set-up and performance perspective)

The college has a machine room as well as an instrument room having equipments and sophisticated instruments such as HPLC, FTIR, UV Spectrophotometer(s), Rotary Tablet press machine, Calorimeter, Diffusion cell apparatus etc. College laboratories are spacious and well equipped with necessary infrastructure, basic requirements as per the syllabus that facilitates for the smooth conduct of experiment. The college has necessary equipments, instruments and apparatus as prescribed by Pharmacy council of India (PCI). The teachers are meritorious, well qualified and experienced for handling practical work and effective learning.

1. SGBAU Amravati curriculum specifies the number of experiments in each course along with the type of practicals to be conducted.
2. Students are given demonstration and hands-on experience on equipments some of which are a part of their theory syllabus. Thus, students can correlate theoretical concepts with practical knowledge, enabling them to have a better understanding of the subject.
3. The practicals of the overall Program taken together from Sem I to Sem VIII provide healthy platform for skill development. (e.g. tabulation of readings, calculations, plotting graphs, interpretation of results and comment on the results, wherever applicable).
4. Safe handling of chemicals, instruments and equipments is taught, wherever applicable.
5. After conduction of every practical, results obtained are discussed.
6. Students are oriented to refer Standard Operating Procedures (SOPs) before using any instrument or equipment especially for those which are sophisticated.
7. Safety precautions while operating equipments are explained.
8. Trouble shooting and maintenance is taught and demonstrated.
9. Students are also explained the importance of documentation.



CRITERION 3	Course Outcomes (COs) and Program Outcomes (POs)	100
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3. Course Outcomes (COs) and Program Outcomes (POs) (100)

3.1 Establish the correlation between the courses and the Program outcomes (20)
(NBA defined Program Outcomes as mentioned in Annexure I)

3.1.1 Course Outcomes (SAR should include course outcomes of one course from each semester of study, however, should be prepared for all courses) (05)

Note: Number of Outcomes for a Course is expected to be around 6.

Course Name: Ciii **Year of Study:** YYYY – YY; **For ex. C202 Year of study 2021-22**

C101.1	Explain the basic anatomical terminologies.
C101.2	Describe the structure and functions of various organs of the human body.
C101.3	Describe the various homeostatic mechanisms.
C101.4	Explain the divisions of skeletal system.
C101.5	Explain the composition and function of body fluids.
C101.50	Appreciate coordinated working pattern of different organs of each system.

C101 is in the first semester, 101 is the subject code for Human Anatomy and Physiology-I and C101.1 to C101.50 are the outcomes of this course.

C202.1	Understanding the type of isomerism of the organic compound.
C202.2	Ability to write the structure, name of the organic compounds.
C202.3	Understanding of the preparation methods of the organic compounds.
C202.2	Understanding of the reaction, name the reaction and orientation of reactions
C202.5	Understanding of account for reactivity/stability of compounds
C202.6	Understanding of identify/confirm the identification of organic compound

C202 is in the second semester, 202 is the subject code for Pharmaceutical organic chemistry-I and C202.1 to C202.6 are the outcomes of this course.



C303.1	Understand the importance and implementation of sterilization & disinfectant in the pharmaceutical industry.
C303.2	Know the general bacteriology and Understand methods of identification.
C303.3	Understand methods of identification, isolation, cultivation, and preservation of bacteria & viruses.
C303.4	Understand the designing of the aseptic area and various methods of the microbiological assay.
C303.5	Know about microbial spoilage and how to preserve the pharmaceutical product from microbial spoilage.
C303.6	Understand the cell culture technology and its application in the pharmaceutical Industry.

C303 is in the third semester, 303 is the subject code for Pharmaceutical Microbiology and C303.1 to C303.6 are the outcomes of this course.

C404.1	Students would have understood the pharmacological actions of different categories of drugs.
C404.2	They would have studied in detailed about mechanism of drug action at organ system/sub cellular/ macromolecular levels.
C404.3	They would have understood the application of basic pharmacological knowledge in the prevention and treatment of various diseases
C404.4	They would have understood the signal transduction mechanism of various receptors
C404.5	Students would have understood Drug discovery and clinical evaluation of new drugs.
C404.6	Students would get an idea about Pharmacology of drugs acting on peripheral nervous system and CNS.

C404 is in the fourth semester, 404 is the subject code for Pharmacology-I Theory and C404.1 to C404.6 are the outcomes of this course

C505.1	To Understand basic knowledge on important legislations related to the profession of pharmacy in India.
C505.2	To Understand Various Indian pharmaceutical Acts and Laws
C505.3	To Understand the regulatory authorities and agencies governing the manufacture and sale of pharmaceuticals
C505.4	To Understand the code of ethics during the pharmaceutical practice
C505.5	To Understand Basic Knowledge about Intellectual property rights
C505.6	To Understand the Pharmaceutical legislations and their implications in the development and marketing of pharmaceuticals

C505 is in the fifth semester, 505 is the subject code for Pharmaceutical Jurisprudence TH and C505.1 to C505.6 are the outcomes of this course.



C605.1	To understand the importance of Immobilized enzymes in Pharmaceutical Industries.
C605.2	To study the Genetic engineering applications in relation to production of pharmaceuticals
C605.3	To study the Importance of Monoclonal antibodies in Industries.
C605.4	To appreciate the use of microorganisms in fermentation technology.
C605.5	To study the Collection, Processing and Storage of whole human blood, dried human plasma, plasma Substitutes.
C605.6	To study the Immuno blotting techniques- ELISA, Western blotting, Southern blotting.

C605 is in the Sixth semester, 605 is the subject code for Pharmaceutical Biotechnology-Theory and C605.1 to C605.6 are the outcomes of this course.

C701.1	Understand the interaction of matter with electromagnetic radiations and its applications in drug analysis and principle, instrumentation and application of UV- Vis, Atomic Absorption and Emission Spectroscopy.
C701.2	Understanding principles, instrumentation and applications of Infrared spectroscopy.
C701.3	Understand principle, instrumentation and application of Flame Photometry, Fluorimetry, Phosphorimetry and Nephelometry.
C701.4	To understand the basic technique of chromatography. Understand the chromatographic separation like adsorption, partition, Column, TLC, and electrophoresis in the analysis of drug.
C701.5	Understand the chromatographic separation like GC, HPLC, Ion Exchange, Gel chromatography in the analysis of drug.
C701.6	Understand the chromatographic separation like paper, thin layer, Column.

C701 is in the Sixth semester, 701 is the subject code for Instrumental Methods of Analysis (Theory) and C701.1 to C701.50 are the outcomes of this course

C802.1	Acquire high consciousness/realization of current issues related to health and pharmaceutical problems within the country and worldwide.
C802.2	Understand on preventive medicine on SARS, Ebola virus, influenza, acute respiratory infections and pneumonia, etc.
C802.3	Explain regarding various National health programs, its objectives, functioning and outcomes.
C802.4	To provide a critical way of thinking based on current healthcare development.
C802.5	Evaluate alternative ways of solving problems related to health and pharmaceutical issues.
C802.6	Explain regarding various community services in rural, urban and school health.

C802 is in the eight semester, 802 is the subject code for Social And Preventive Pharmacy-Theory and C802.1 to C802.6 are the outcomes of this course



Table 3.1.1

CO-PO matrices of courses selected in 3.1.1 (four matrices to be mentioned; one per semester from 1st to 8th semester; at least one per year) (05)

Human Anatomy and Physiology-I C101	CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
	C101.1	H	-	-	-	-	L	L	H	H	M	M
	C101.2	H	-	-	-	-	L	L	H	H	M	M
	C101.3	H	-	-	-	-	-	-	M	M	M	M
	C101.4	H	-	-	-	-	L	L	H	H	M	L
	C101.5	H	-	-	-	-	-	L	H	H	M	L
	C101.50	H	-	-	-	-	L	-	H	H	M	M
	Average	3	0	0	0	0	0.756	0.756	2.83	2.83	2	1.506

Note: Correlation levels 1, 2 or 3 as defined below:

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

Pharmaceutical Microbiology	CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
	C303.1	H	M	H	L	-	L	-	M	M	L	M
	C303.2	H	L	M	L	-	M	L	-	-	M	L
	C303.3	M	L	-	L	-	-	M	-	M	L	L
	C303.4	H	L	M	L	-	L	-	-	-	L	L
	C303.5	H	M	L	M	-	M	L	-	L	L	M
	C303.6	M	L	H	L	-	-	-	L	-	M	L
	Average	2.66	1.5	1.88	1.17	0.00	1.00	0.757	0.50	0.757	1.34	1.34

Pharmacology-II C505	CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
	C505.1	H	M	M	M	L	H	H	L	H	M	L
	C505.2	H	L	L	M	L	H	H	L	H	L	M
	C505.3	H	L	L	H	L	H	M	L	H	L	H
	C505.4	H	L	L	H	H	H	H	H	H	M	H
	C505.5	H	M	M	M	H	M	H	L	H	L	H
	C505.6	H	H	H	H	M	H	H	M	H	L	M
	Average	3.00	1.507	1.507	2.50	1.84	2.84	2.84	1.50	3.00	1.34	2.34

Medicinal Chemistry-III C702	CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
	C701.1	H	M	H	L	-	L	-	-	M	L	M
	C701.2	H	L	M	L	-	M	L	-	-	M	L
	C701.3	H	L	-	L	-	-	M	-	M	L	L
	C701.4	H	M	M	L	-	L	-	-	-	L	L
	C701.5	H	M	L	M	-	M	L	-	L	L	M
	C701.50	H	L	H	L	-	-	-	-	-	M	L
	Average	3.00	1.50	1.84	1.17	0.00	1.00	0.757	0.00	0.754	1.34	1.34



3.1.3 Course-PO matrix of courses for all four years of study (10)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
C101	3	0	0	0	0	0.756	0.756	2.83	2.83	2	1.506
C102	2.5	2.16	1.506	1.33	00	0.756	0.756	00	0.756	1.33	1.33
C103	2.83	2.66	2.66	2.5	1.5	3.00	1.83	2.16	2.83	2.00	2.83
C104	3.00	0.00	0.00	0.00	0.00	0.756	0.756	2.83	2.83	2.00	1.506
C105	2.83	0.00	0.50	0.33	0.00	1.33	0.50	1.50	1.506	1.00	1.506
C106	3.00	0.30	0.30	0.75	0.00	1.50	1.20	2.70	2.30	1.90	1.80
C107	3.00	0.00	0.33	0.00	0.00	1.33	0.50	1.506	1.506	1.00	1.16
C108	3.00	1.506	1.50	1.33	0.00	1	0.756	0	0.756	1.50	1.50
C109	3.00	3.00	3.00	3.00	2.00	3.00	1.00	2.33	3.00	2.00	3.00
C110	2.83	0.00	0.33	0.00	0.00	1.33	0.50	1.506	1.506	1.00	1.16
C111	3.00	1.83	2.16	1.33	0.00	0.756	0.50	0.00	0.50	1.506	1.50
C112	3.00	0.30	0.30	0.75	0.00	1.80	1.00	2.70	2.30	1.50	1.80
C201	3.00	1.00	0.5	2.00	0.166	2.16	0.00	1.16	3.00	3.00	3.00
C202	3.00	1.00	2.50	0.00	0.00	2.00	0.16	0.756	2.33	1.50	3.00
C203	3.00	2.00	1.506	1.33	0.00	0.756	0.5	0.00	0.5	1.506	1.5
C204	3.00	0.00	1.83	0.00	0.00	1.506	0.753	2.66	2.66	1.16	2.00
C205	3.00	2.5	0.753	1.83	0.753	1.33	0.5	1.33	3.00	3.00	3.00
C206	3.00	1.50	1.83	1.16	0.00	1.00	0.756	0.00	0.753	1.33	1.33
C207	3.00	2.5	0.753	1.83	0.753	1.33	0.5	1.33	3.00	3.00	3.00
C208	3.00	1.00	3.00	0.00	0.00	1.00	0.00	1.506	1.506	0.00	3.00
C209	3.00	1.5	1.7	1.3	0.00	1	0.756	0.00	0.75	0.756	0.756
C210	3.00	2.5	0.753	1.83	0.753	1.33	0.5	1.33	3.00	3.00	3.00
C301	3.00	1.506	3.00	1.33	0	0.75	0.5	0	0.5	1.506	1.50
C302	3.00	2.50	3.00	2.83	0.753	1.83	1.00	1.50	1.33	2.33	2.83
C303	2.66	1.5	1.88	1.17	0.00	1.00	0.757	0.50	0.757	1.34	1.34
C304	3.00	2.83	3.00	2.83	2.16	2.83	2.33	0.50	2.33	2.00	2.83
C305	3.00	3.00	3.00	0.50	0.50	1.83	1.83	0.756	2.00	1.50	3.00
C306	3.00	2.83	3.00	3.00	1.16	2.00	1.00	2.00	1.83	1.50	2.50
C307	3.00	0.00	1.50	0.00	0.00	1.506	0.753	2.66	1.506	1.16	2.00
C308	2.50	1.00	1.83	2.33	0.33	0.33	0.50	0.00	0.33	1.33	1.50
C401	3.00	1.33	1.50	2.33	0.50	1.00	0.753	1.16	1.50	2.33	2.83
C402	2.66	1.00	0.753	2.16	0.33	2.16	0.50	1.16	3.00	3.00	3.00
C403	3.00	2.33	3.00	2.83	0.753	2.33	1.00	2.66	2.66	3.00	3.00
C404	3.00	0.0	0.0	1.00	0.0	1.00	3.00	3.00	3.00	3.00	3.00
C405	3.00	2.16	1.83	2.66	1.33	1.5	2.00	1.83	1.5	1.83	3.00
C406	3.00	2.66	3.00	3.00	1.00	2.50	1.506	3.00	2.00	1.50	3.00
C407	3.00	2.66	3.00	3.00	1.00	2.50	1.506	3.00	2.00	1.50	3.00
C408	3.00	1.16	2.50	3.00	0.00	1.00	3.00	3.00	3.00	3.00	3.00
C409	2.33	0.756	2.33	2.33	0.00	2.33	0.16	0.00	2.33	2.33	3.00
C501	3.00	0.756	2.16	2.33	0.5	1.00	1.16	2.83	2.50	2.00	2.66
C502	3.00	1.50	2.50	2.66	1.506	3.00	1.83	2.83	2.50	2.00	2.83

C503	3.00	1.00	2.10	2.25	0.00	2.90	1.00	1.20	2.70	1.50	2.20
C504	3.00	3.00	3.00	2.66	1.5	1.5	2.16	1.33	1.506	1.506	3.00
C505	3.00	1.507	1.507	2.50	1.84	2.84	2.84	1.50	3.00	1.34	2.34
C506	2.83	2.50	2.50	2.83	2.00	2.50	2.33	3.00	2.50	2.00	2.50
C507	3.00	1.10	1.83	1.90	0.50	2.90	0.50	1.16	1.90	1.90	2.20
C508	2.83	2.66	2.66	2.33	1.00	1.00	1.00	1.00	1.00	1.00	3.00
C601	1.5	2.16	1.83	1.33	00	0.756	0.756	00	0.756	1.33	1.33
C602	3.00	2.10	1.83	2.70	2.00	0.90	2.70	1.30	2.70	1.50	2.20
C603	2.16	1.33	1.33	1.00	1.33	1.33	1.33	1.00	1.00	1.00	1.83
C604	3.00	0.753	1.83	0.33	0.16	1.506	0.753	2.50	2.66	1.16	1.50
C605	3.00	2.33	2.50	2.66	1.50	2.16	2.50	2.00	2.66	2.83	3.00
C606	3.00	2.50	2.33	2.33	1.50	2.16	2.33	1.83	2.33	2.00	2.50
C607	3.00	1.506	1.33	1.506	0	1.33	0.756	00	0.756	1.33	1.50
C608	3.00	1.10	1.83	1.90	0.50	1.00	.50	1.16	1.90	1.90	2.20
C609	2.66	2.66	2.66	2.5	1.33	1.00	1.506	1.5	1.16	1.16	2.5
C701	3.00	1.83	2.16	2.00	0.00	0.756	0.50	0.00	0.50	1.506	2.50
C702	3.00	3.00	3.00	2.66	2.66	3.00	3.00	3.00	2.00	3.00	3.00
C703	3.00	1.00	0.756	0.753	2.50	3.00	3.00	3.00	3.00	3.00	3.00
C704	3.00	2.83	2.33	2.83	0.33	2.16	2.50	2.16	3.00	2.00	2.33
C705	3.00	1.50	1.50	1.3	0	1	0.75	0	0.9	1.2	1.506
C706	3.00	1.00	0.756	0.753	2.50	3.00	3.00	3.00	3.00	3.00	3.00
C801	3.00	2.83	2.83	3.00	0.756	2.00	1.506	1.5	2.00	1.16	3.00
C802	2.83	2.00	2.66	2.66	.506	2.00	1.83	3.00	2.83	1.83	2.66
C803	2.83	2.66	2.66	1.506	2.66	2.16	2.33	2.33	2.16	1.83	3.00
C804	3.00	3.00	3.00	2.50	3.00	3.00	3.00	3.00	2.83	2.00	3.00
C805	3.00	0.50	1.16	1.33	2.50	3.00	3.00	3.00	3.00	3.00	3.00
C806	3.00	2.83	3.00	3.00	2.50	3.00	3.00	2.00	3.00	2.33	3.00
C807	3.00	1.10	1.83	1.90	0.50	2.90	0.50	1.16	1.90	1.90	2.20
C808	3.00	2.83	3.00	3.00	2.50	3.00	3.00	2.00	3.00	2.33	3.00
C809	3.00	3.00	3.00	2.50	3.00	3.00	3.00	3.00	2.83	2.00	3.00

Table 3.1.3*

Note: Correlation levels 1, 2 or 3, as defined below:

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

It there is no correlation, put '-'

* It may be noted that contents of Table 3.1.2 must be consistent with information available in Table 3.1.3 for all the courses.



3.2 Attainment of Course Outcomes (40)

3.2.1 Describe the assessment processes used to gather the data upon which the evaluation of Course Outcome is based (10)

(Examples of data collection processes may include, but are not limited to, specific exam/tutorial questions, assignments, laboratory tests, project evaluation, student portfolios (A portfolio is a collection of artifacts that demonstrate skills, personal characteristics, and accomplishments created by the student during study period), internally developed assessment exams, project presentations, oral exams, focus groups etc. It is expected that each theory subject taught should impart specific knowledge and make a foundation for a set of Basic Concepts related to it. Similarly the laboratory experiments should have some predetermined and predefined skills which can be developed during the study)

Weightage distribution and Justification

The assessment process for the evaluation of course outcomes is divided into two parts.

1) Internal Assessment

2) University Exam Assessment

The total weightage of each subject is 100 marks as pre university curriculum for theory subjects and 50 marks for practical subjects; out of which 25 marks are contributed by sessional examination and 75 marks are from end semester examination, for theory subjects and 15 marks for internal assessment and 35 marks for university assessments in practicals. According to marks distribution system by university 75% weightage is given to the scores obtain by the students in the end semester examination and 25% weightage is given to the marks scored by the students in the internal (semester) examination.

- **Internal Assessment:** The course outcomes are assessed by the performance of students in the internal exams. The internal exams are divided into two periodic tests. The questions are planned in such a way that they cover all the course outcomes (Three course outcomes per test). This comprises of 20% of direct assessment as per NBA specifications.
- **End Semester Examination:** It is an important tool for assessment of course outcomes. This examination consists of objective/MCQ, Short answer questions and long answer type questions and is conducted by the University.



As the University does not provide average or median marks, we have set University pass percentage (50%) as the target level for theory courses and 50% marks as the target level for practical courses.

1. If 50% of students have obtained marks above target then the level is considered as low level
2. If 60% of students have obtained marks above target then the level is considered as medium level 2.
3. If 70% of students have obtained marks above target then the level is considered as high level 3.

3.2.2 Record the attainment of Course Outcomes of all courses with respect to set attainment levels (30)

Program shall have set Course Outcome attainment levels for all courses.

(The attainment levels shall be set considering average performance levels in the university examination or any higher value set as target for the assessment years. Attainment level is to be measured in terms of student performance in internal assessments with respect the course outcomes of a course in addition to the performance in the University examination)

Measuring Course Outcomes attained through University Examinations

Target may be stated in terms of percentage of students getting more than the university average marks or more as selected by the Program in the final examination. For cases where the university does not provide useful indicators like average or median marks etc., the program may choose an attainment level on its own with justification.

Example related to attainment levels Vs. targets: (The examples indicated are for reference only. Program may appropriately define levels)

Attainment Level 1: 60% students scoring more than University average percentage marks or set attainment level in the final examination is considered to be attainment of "1"

Attainment Level 2: 70% students scoring more than University average percentage marks or set attainment level in the final examination is considered to be attainment of "2"

Attainment Level 3: 80% students scoring more than University average percentage marks or set attainment level in the final examination is considered to be attainment of "3"

Attainment is measured in terms of actual percentage of students getting set percentage of marks.



If targets are achieved then all the course outcomes are attained for that year. Program is expected to set higher targets for the following years as a part of continuous improvement.

If targets are not achieved the program should put in place an action plan to attain the target in subsequent years.

Measuring CO attainment through Internal Assessments: (The examples indicated are for reference only. Program may appropriately define levels)

Target may be stated in terms of percentage of students getting more than class average marks or set by the program in each of the associated COs in the assessment instruments (midterm tests, assignments, mini projects, reports and presentations etc. as mapped with the COs)

Example

Mid-term test 1 addresses C202.1 and C202.2. Out of the maximum 20 marks for this test 12 marks are associated with C202.1 and 8 marks are associated with C202.2.

Examples related to attainment levels Vs. targets:

Attainment Level 1: 60% students scoring more than 60% marks out of the relevant maximum marks is considered to be attainment of “1”

Attainment Level 2: 70% students scoring more than 60% marks out of the relevant maximum marks is considered to be attainment of “2”

Attainment Level 3: 80% students scoring more than 60% marks out of the relevant maximum marks is considered to be attainment of “3”

Attainment is measured in terms of actual percentage of students getting set percentage of marks.

If targets are achieved then the C202.1 and C202.2 are attained for that year. Program is expected to set higher targets for the following years as a part of continuous improvement.

If targets are not achieved the program should put in place an action plan to attain the target in subsequent years.

Similar targets and achievement are to be stated for the other mid term tests/internal assessment instruments

Course Outcome Attainment:



Table 3.2
CO attainment for Batch 2018-22

Course	Code	Exam	Target (%)	CO1	CO2	CO3	CO4	CO5	CO6	Average	Attainment Level
Human Anatomy and Physiology-I TH	C101	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
		University	50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Pharmaceutical analysis- I TH	C102	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
		University	50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Pharmaceutics-I TH	C103	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	1.50
		University	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	
Pharma. Inorganic chemistry TH	C104	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	2.25
		University	50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	
Communication skills TH	C105	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	3.00
		University	50	2.25	2.25	2.25	2.25	2.25	2.25	2.25	
Remedial maths-TH	C106	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	3.00
		University	50	2.25	2.25	2.25	2.25	2.25	2.25	2.25	
Remedial Bio-TH	C106	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	3.00
		University	50	2.25	2.25	2.25	2.25	2.25	2.25	2.25	
Human Anatomy and Physiology-I PR	C107	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	3.00
		University	50	2.25	2.25	2.25	2.25	2.25	2.25	2.25	
Pharmaceutical analysis- I PR	C108	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	3.00
		University	50	2.25	2.25	2.25	2.25	2.25	2.25	2.25	
Pharmaceutics-I PR	C109	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	3.00
		University	50	2.25	2.25	2.25	2.25	2.25	2.25	2.25	
Pharma Inorganic chemistry PR	C110	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	3.00
		University	50	2.25	2.25	2.25	2.25	2.25	2.25	2.25	
Communication skills PR	C111	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	3.00
		University	50	2.25	2.25	2.25	2.25	2.25	2.25	2.25	
Rem. bio PR	C112	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	3.00
		University	50	2.25	2.25	2.25	2.25	2.25	2.25	2.25	

HAP -II TH	C201	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	1.50
		University	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	
Pharma. organic chemistry-I TH	C202	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	1.50
		University	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	
Biochemistry TH	C203	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
		University	50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pathophysio TH	C204	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
		University	50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Computer TH	C205	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	3.00
		University	50	2.25	2.25	2.25	2.25	2.25	2.25	2.25	
EVS TH	C206	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	3.00
		University	50	2.25	2.25	2.25	2.25	2.25	2.25	2.25	
HAP-II PR	C207	Internal	50	0.50	0.50	0.50	0.00	0.00	0.00	0.25	3.00
		University	50	2.25	2.25	2.25	2.25	2.25	2.25	2.25	
Pharma. organic chemistry-I PR	C208	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	3.00
		University	50	2.25	2.25	2.25	2.25	2.25	2.25	2.25	
Biochemistry PR	C209	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	3.00
		University	50	2.25	2.25	2.25	2.25	2.25	2.25	2.25	
Computer PR	C210	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	3.00
		University	50	2.25	2.25	2.25	2.25	2.25	2.25	2.25	
Pharma.organic chemistry-II TH	C301	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	2.25
		University	50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	
Physical pharma. -I TH	C302	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
		University	50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pharma. micro TH	C303	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	2.25
		University	50	1.5	1.5	1.5	1.5	1.5	1.5	1.5	
Pharmaceutical engineering TH	C304	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
		University	50	00	00	00	00	00	00	00	00
Pharmaceutical Organic chemistry-II PR	C305	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	3.00
		University	50	2.25	2.25	2.25	2.25	2.25	2.25	2.25	
Phy. pharma-I PR	C306	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	3.00
		University	50	2.25	2.25	2.25	2.25	2.25	2.25	2.25	
Pharm. micro PR	C307	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	3.00
		University	50	2.25	2.25	2.25	2.25	2.25	2.25	2.25	
Pharmaceutical engineering PR	C308	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	3.00
		University	50	2.25	2.25	2.25	2.25	2.25	2.25	2.25	

Pharma.Organic chem...-III TH	C401	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	3.00
		University	50	2.25	2.25	2.25	2.25	2.25	2.25	2.25	
Medicinal chemistry-I TH	C402	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	3.00
		University	50	2.25	2.25	2.25	2.25	2.25	2.25	2.25	
Phy. ceutics-II TH	C403	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	3.00
		University	50	2.25	2.25	2.25	2.25	2.25	2.25	2.25	
Pharmacol-I TH	C404	Internal	50	0.25	0.25	0.25	0.50	0.50	0.50	0.38	2.63
		University	50	2.25	2.25	2.25	2.25	2.25	2.25	2.25	
P'cognosy and phyto-II TH	C405	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	3.00
		University	50	2.25	2.25	2.25	2.25	2.25	2.25	2.25	
Medicinal chemistry-I PR	C406	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	3.00
		University	50	2.25	2.25	2.25	2.25	2.25	2.25	2.25	
Phy pharma-II PR	C407	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	3.00
		University	50	2.25	2.25	2.25	2.25	2.25	2.25	2.25	
Pharmacology-I PR	C408	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	3.00
		University	50	2.25	2.25	2.25	2.25	2.25	2.25	2.25	
P'cognosy and phyto-II TH PR	C409	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	3.00
		University	50	2.25	2.25	2.25	2.25	2.25	2.25	2.25	
Medicinal chemistry-II TH	C501	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	3.00
		University	50	2.25	2.25	2.25	2.25	2.25	2.25	2.25	
Industrial pharmacy-I TH	C502	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	3.00
		University	50	2.25	2.25	2.25	2.25	2.25	2.25	2.25	
Pharmacology-II TH	C503	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	3.00
		University	50	2.25	2.25	2.25	2.25	2.25	2.25	2.25	
P'cognosy and phyto-II TH	C504	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	3.00
		University	50	2.25	2.25	2.25	2.25	2.25	2.25	2.25	
Pharmaceutical jurisprudence TH	C505	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	3.00
		University	50	2.25	2.25	2.25	2.25	2.25	2.25	2.25	
Industrial pharmacy-I PR	C506	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	3.00
		University	50	2.25	2.25	2.25	2.25	2.25	2.25	2.25	
Pharmacology-II PR	C507	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	3.00
		University	50	2.25	2.25	2.25	2.25	2.25	2.25	2.25	
P'cognosy and phyto-II TH	C508	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	3.00
		University	50	2.25	2.25	2.25	2.25	2.25	2.25	2.25	



Medicinal chemistry-III TH	C601	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	3.00
		University	50	2.25	2.25	2.25	2.25	2.25	2.25	2.25	
Pharmacology-III TH	C602	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	3.00
		University	50	2.25	2.25	2.25	2.25	2.25	2.25	2.25	
Herbal drug technology TH	C603	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	3.00
		University	50	2.25	2.25	2.25	2.25	2.25	2.25	2.25	
Biopharm and pharmacokinetics TH	C604	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	3.00
		University	50	2.25	2.25	2.25	2.25	2.25	2.25	2.25	
Pharma biotech TH	C605	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	3.00
		University	50	2.25	2.25	2.25	2.25	2.25	2.25	2.25	
Quality assurance TH	C606	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	3.00
		University	50	2.25	2.25	2.25	2.25	2.25	2.25	2.25	
Medicinal chemistry-III PR	C607	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	3.00
		University	50	2.25	2.25	2.25	2.25	2.25	2.25	2.25	
Pharmacology-III PR	C608	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	3.00
		University	50	2.25	2.25	2.25	2.25	2.25	2.25	2.25	
Herbal drug technology PR	C609	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	3.00
		University	50	2.25	2.25	2.25	2.25	2.25	2.25	2.25	
Instrumental methods of analysis TH	C701	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	3.00
		University	50	2.25	2.25	2.25	2.25	2.25	2.25	2.25	
Industrial pharmacy-II TH	C702	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	3.00
		University	50	2.25	2.25	2.25	2.25	2.25	2.25	2.25	
Pharmacy practice TH	C703	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	3.00
		University	50	2.25	2.25	2.25	2.25	2.25	2.25	2.25	
Novel drug delivery system TH	C704	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	3.00
		University	50	2.25	2.25	2.25	2.25	2.25	2.25	2.25	
Instrumental methods of analysis PR	C705	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	3.00
		University	50	2.25	2.25	2.25	2.25	2.25	2.25	2.25	
Practice school PR	C706	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	3.00
		University	50	2.25	2.25	2.25	2.25	2.25	2.25	2.25	

Biost TH	C801	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	1.50
		University	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	
SOC. & Prev. Pharm. TH	C802	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	3.00
		University	50	2.25	2.25	2.25	2.25	2.25	2.25	2.25	
Pharma marketing management TH	C803	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	3.00
		University	50	2.25	2.25	2.25	2.25	2.25	2.25	2.25	
Pharma regulatory science TH	C804	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	3.00
		University	50	2.25	2.25	2.25	2.25	2.25	2.25	2.25	
P'covigilance TH	C805	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	3.00
		University	50	2.25	2.25	2.25	2.25	2.25	2.25	2.25	
QC and std of herbs TH	C806	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	3.00
		University	50	2.25	2.25	2.25	2.25	2.25	2.25	2.25	
Experimental pharmacology TH	C807	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	3.00
		University	50	2.25	2.25	2.25	2.25	2.25	2.25	2.25	
Advanced instrumentation techniques TH	C808	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	3.00
		University	50	2.25	2.25	2.25	2.25	2.25	2.25	2.25	
Project work PR	C809	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	3.00
		University	50	2.25	2.25	2.25	2.25	2.25	2.25	2.25	

CO attainment for Batch 2017-21

Course	Code	Exam	Target (%)	CO1	CO2	CO3	CO4	CO5	CO6	Average	Attainment Level
Human Anatomy and Physiology-I TH	C101	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
		University	50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Pharmaceutical analysis- I TH	C102	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	2.25
		University	50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	
Pharmaceutics-I TH	C103	Internal	50	0.250	0.250	0.250	0.00	0.00	0.00	0.13	0.13
		University	50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Pharma. Inorganic chemistry TH	C104	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	2.25
		University	50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	
Communication skills TH	C105	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	3.00
		University	50	2.25	2.25	2.25	2.25	2.25	2.25	2.25	
Remedial bio/maths-TH	C106	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
		University	50	00	00	00	00	00	00	00	
Human Anatomy and Physiology-I PR	C107	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	3.00
		University	50	2.25	2.25	2.25	2.25	2.25	2.25	2.25	
Pharmaceutical analysis- I PR	C108	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	3.00
		University	50	2.25	2.25	2.25	2.25	2.25	2.25	2.25	
Pharmaceutics-I PR	C109	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	3.00
		University	50	2.25	2.25	2.25	2.25	2.25	2.25	2.25	
Pharma Inorganic chemistry PR	C110	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	3.00
		University	50	2.25	2.25	2.25	2.25	2.25	2.25	2.25	
Communication skills PR	C111	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	3.00
		University	50	2.25	2.25	2.25	2.25	2.25	2.25	2.25	



HAP -II TH	C201	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	1.50
		University	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	
Pharma. organic chemistry-I TH	C202	Internal	50	0.50	0.50	0.50	0.75	0.75	0.75	0.63	1.38
		University	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	
Biochemistry TH	C203	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
		University	50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Pathophysio TH	C204	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
		University	50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Computer TH	C205	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	3.00
		University	50	2.25	2.25	2.25	2.25	2.25	2.25	2.25	
EVS TH	C206	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	3.00
		University	50	2.25	2.25	2.25	2.25	2.25	2.25	2.25	
HAP-II PR	C207	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	1.50
		University	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	
Pharma. organic chemistry-I PR	C208	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	3.00
		University	50	2.25	2.25	2.25	2.25	2.25	2.25	2.25	
Biochemistry PR	C209	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	3.00
		University	50	2.25	2.25	2.25	2.25	2.25	2.25	2.25	
Computer PR	C210	Internal	50	0.25	0.250	0.25	0.50	0.50	0.50	0.37	2.62
		University	50	2.25	2.25	2.25	2.25	2.25	2.25	2.25	
Pharma.organic chemistry-II TH	C301	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	1.50
		University	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	
Physical pharma. -I TH	C302	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	1.50
		University	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	
Pharma. micro TH	C303	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	2.25
		University	50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	
Pharmaceutical engineering TH	C304	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	2.25
		University	50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	
Pharmaceutical organicchemistry-II PR	C305	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	3.00
		University	50	2.25	2.25	2.25	2.25	2.25	2.25	2.25	
Phy. pharma-I PR	C306	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	3.00
		University	50	2.25	2.25	2.25	2.25	2.25	2.25	2.25	
Pharm. micro PR	C307	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	3.00
		University	50	2.25	2.25	2.25	2.25	2.25	2.25	2.25	
Pharmaceutical engineering PR	C308	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	3.00
		University	50	2.25	2.25	2.25	2.25	2.25	2.25	2.25	
Pharma.Organic	C401	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75



chem.-III TH		University	50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Medicinal chemistry-I TH	C402	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
		University	50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Phy. ceutics-II TH	C403	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
		University	50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pharmacol-I TH	C404	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
		University	50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
P'cognosy and phyto-II TH	C405	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	1.25
		University	50	0.75	0.75	0.75	0.00	0.00	0.00	0.50	
Medicinal chemistry-I PR	C406	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	3.00
		University	50	2.25	2.25	2.25	2.25	2.25	2.25	2.25	
Phy pharma-II PR	C407	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	3.00
		University	50	2.25	2.25	2.25	2.25	2.25	2.25	2.25	
Pharmacology-I PR	C408	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	3.0
		University	50	2.25	2.25	2.25	2.25	2.25	2.25	2.25	
P'cognosy and phyto-II TH PR	C409	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	3.0
		University	50	2.25	2.25	2.25	2.25	2.25	2.25	2.25	
Medicinal chemistry-II TH	C501	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	2.25
		University	50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	
Industrial pharmacy-I TH	C502	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	2.25
		University	50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	
Pharmacology-II TH	C503	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	3.00
		University	50	2.25	2.25	2.25	2.25	2.25	2.25	2.25	
P'cognosy and phyto-II TH	C504	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	2.25
		University	50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	
Pharmaceutical jurisprudence TH	C505	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	3.00
		University	50	2.25	2.25	2.25	2.25	2.25	2.25	2.25	
I P-I PR	C506	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	3.00
		University	50	2.25	2.25	2.25	2.25	2.25	2.25	2.25	
Pharmacology-II PR	C507	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	3.00
		University	50	2.25	2.25	2.25	2.25	2.25	2.25	2.25	
P'cognosy and phyto-II TH	C508	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	3.00
		University	50	2.25	2.25	2.25	2.25	2.25	2.25	2.25	



Medicinal chemistry-III TH	C601	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	3.00
		University	50	2.25	2.25	2.25	2.25	2.25	2.25	2.25	
Pharmacology-III TH	C602	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	3.00
		University	50	2.25	2.25	2.25	2.25	2.25	2.25	2.25	
Herbal drug technology TH	C603	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	3.00
		University	50	2.25	2.25	2.25	2.25	2.25	2.25	2.25	
Biopharm and pckinetics TH	C604	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	3.00
		University	50	2.25	2.25	2.25	2.25	2.25	2.25	2.25	
Pharma biotech TH	C605	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	3.00
		University	50	2.25	2.25	2.25	2.25	2.25	2.25	2.25	
Quality assurance TH	C606	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	3.00
		University	50	2.25	2.25	2.25	2.25	2.25	2.25	2.25	
Medicinal chemistry-III PR	C607	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	3.00
		University	50	2.25	2.25	2.25	2.25	2.25	2.25	2.25	
Pharmacology-III PR	C608	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	3.00
		University	50	2.25	2.25	2.25	2.25	2.25	2.25	2.25	
Herbal drug technology PR	C609	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	3.00
		University	50	2.25	2.25	2.25	2.25	2.25	2.25	2.25	
Instrumental methods of analysis TH	C701	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	3.00
		University	50	2.25	2.25	2.25	2.25	2.25	2.25	2.25	
Industrial pharmacy-II TH	C702	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	3.00
		University	50	2.25	2.25	2.25	2.25	2.25	2.25	2.25	
Pharmacy practice TH	C703	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	3.00
		University	50	2.25	2.25	2.25	2.25	2.25	2.25	2.25	
Novel drug delivery system TH	C 704	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	3.00
		University	50	2.25	2.25	2.25	2.25	2.25	2.25	2.25	
Instrumental methods of analysis PR	C705	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	3.00
		University	50	2.25	2.25	2.25	2.25	2.25	2.25	2.25	
Practice school PR	C706	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	3.00
		University	50	2.25	2.25	2.25	2.25	2.25	2.25	2.25	

Biost TH	C801	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	3.00
		University	50	2.25	2.25	2.25	2.25	2.25	2.25	2.25	
SOC. & Prev. Pharm. TH	C802	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	3.00
		University	50	2.25	2.25	2.25	2.25	2.25	2.25	2.25	
Pharma marketing management TH	C803	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	3.00
		University	50	2.25	2.25	2.25	2.25	2.25	2.25	2.25	
Pharma regulatory science TH	C804	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	3.00
		University	50	2.25	2.25	2.25	2.25	2.25	2.25	2.25	
P'covigilance TH	C805	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	3.00
		University	50	2.25	2.25	2.25	2.25	2.25	2.25	2.25	
QC and std of herbs TH	C806	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	3.0
		University	50	2.25	2.25	2.25	2.25	2.25	2.25	2.25	
Experimental pharmacology TH	C807	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	3.00
		University	50	2.25	2.25	2.25	2.25	2.25	2.25	2.25	
Advanced instrumentation techniques TH	C808	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	3.00
		University	50	2.25	2.25	2.25	2.25	2.25	2.25	2.25	
Project work PR	C809	Internal	50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	3.00
		University	50	2.25	2.25	2.25	2.25	2.25	2.25	2.25	



3.3 Attainment of Program Outcomes (40)

3.3.1 Describe assessment tools and processes used for assessing the attainment of each PO (10)

(Describe the assessment tools and processes used to gather the data upon which the evaluation of each the Program Outcome is based indicating the frequency with which these processes are carried out. Describe the assessment processes that demonstrate the degree to which the Program Outcomes are attained and document the attainment levels)

Direct Attainment Tools

The various direct assessment tools for assessing the students and the PO attained are as follows:

Assessing Tool	Aim	Frequency	Program Outcome
Periodic Sessional examination	Assessing the understanding of the fundamental concepts and expression of the knowledge gained	Two per semester per Course at the Institute level.	All POs
Semester/Term End Examination	Assessing the understanding of the fundamental concepts and expression of the practical skills and knowledge gained.	One at the end of the semester at the University level.	All POs

Indirect Attainment Tools

The various indirect assessment tools for assessing the students and the PO attained are as follows:

Assessing Tool	Aim	Frequency	Program Outcome
Student Projects & Practice School	To assess the application of various pharmaceutical subject knowledge gathered to analyse a problem. It also helps in assessing the development leadership and communication skills	At the end of B.Pharm. sixth semester	All POs
Co-curricular Activities	It assesses the relevance of these activities in using pharmacy knowledge in promoting problem analysis, planning abilities and a life-long interest in the area. It also helps in assessing the improvement in operating modern computer tools and software as well as their leadership and communication skills	After every co-curricular activity	All POs
Extra-Curricular Activities	To assess the overall development in the personality of the students	After every extra-curricular activity	PO2, PO5, PO8 and PO9
Guest Lectures	To assess the impact of the lecture in relation to knowledge, problem solving ability, communication skills and pharmacy practice.	After every guest lecture	PO1, PO3, PO6, PO8 and PO9
Alumni Survey	To assess the effectiveness of Program for the career development of the graduates	Every year during Alumni Meet	PO1, PO5 and PO11
In-Plant Training	To assess the observation skills and ability to relate class room studies to the industrial scenario.	Once during the Program	PO1, PO4, PO6, PO7, PO8, PO9 and PO10
Industrial Visit	To assess the observation skills and ability to relate class room studies to industrial scenario.		

3.3.2 Provide results of evaluation of each PO (30)

Program shall set Program Outcome attainment levels for all POs.

(The attainment levels by direct (student performance) and indirect (surveys) are to be presented through Program level Course-PO matrix as indicated).

Direct assessment of PO from course outcomes (2018-22)

Course	Course code	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
HAP-I TH	C101	3	0	0	0	1.5	0.756	0.756	2.83	2.83	2	1.506
Pharm. Analysis I TH	C102	2.5	2.16	1.506	1.33	1.33	0.756	0.756	00	0.756	1.33	1.33
Pceutics I TH	C103	2.83	2.66	2.66	2.5	1.5	3.00	1.83	2.16	2.83	2.00	2.83
Pharm. Inorg TH	C104	3.00	0.00	0.00	0.00	1.33	0.756	0.756	2.83	2.83	2.00	1.506
Comm. Skill TH	C105	2.83	0.00	0.50	0.33	0.75	1.33	0.50	1.50	1.506	1.00	1.33
Rem. Bio/Math TH	C106	3.00	0.30	0.30	0.75	1.16	1.50	1.20	2.70	2.30	1.90	1.80
HAP-I PR	C107	3.00	0.00	0.33	0.00	2.66	1.33	0.50	1.506	1.506	1.00	1.16
Pharm. Analysis I R	C108	3.00	1.506	1.50	1.33	2.00	1	0.756	0	0.756	1.50	1.50
Pceutics I PR	C109	3.00	3.00	3.00	3.00	2.00	3.00	1.00	2.33	3.00	2.00	3.00
Pharm. Inorg PR	C110	2.83	0.00	0.33	0.00	0.00	1.33	0.50	1.506	1.506	1.00	1.16
Comm. Skill PR	C111	3.00	1.83	2.16	1.33	0.00	0.756	0.50	0.00	0.50	1.506	1.50
Rem. Bio/Math PR	C112	3.00	0.30	0.30	0.75	0.00	1.80	1.00	2.70	2.30	1.50	1.80
HAP -II TH	C201	3.00	1.00	0.5	2.00	0.166	2.16	0.00	1.16	3.00	3.00	3.00
Pharm. Org. Chem TH	C202	3.00	1.00	2.50	0.00	0.00	2.00	0.16	0.756	2.33	1.50	3.00
Biochem TH	C203	3.00	2.00	1.506	1.33	0.00	0.756	0.5	0.00	0.5	1.506	1.5
Pathophysiology TH	C204	3.00	0.00	1.83	0.00	0.00	1.506	0.753	2.66	2.66	1.16	2.00
Comp. Application TH	C205	2.83	0.00	0.50	0.33	0.00	1.33	0.50	1.50	1.506	1.00	1.33
EVS TH	C206	3.00	1.50	1.83	1.16	0.00	1.00	0.756	0.00	0.753	1.33	1.33
HAP II PR	C207	3.00	2.5	0.753	1.83	0.753	1.33	0.5	1.33	3.00	3.00	3.00
Pharm. Org. Chem PR	C208	3.00	1.00	3.00	0.00	0.00	1.00	0.00	1.506	1.506	0.00	3.00
Biochem PR	C209	3.00	1.5	1.7	1.3	0.00	1	0.756	0.00	0.75	0.756	0.756
Comp. Application PR	C210	2.83	0.00	0.50	0.33	0.00	1.33	0.50	1.50	1.506	1.00	1.33

Course	Course code	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
Pharm. Org. II TH	C301	3.00	1.506	3.00	1.33	0	0.75	0.5	0	0.5	1.506	1.50
PHYS. PHARM. I TH	C302	3.00	2.50	3.00	2.83	0.753	1.83	1.00	1.50	1.33	2.33	2.83
Pharm. Micro TH	C303	2.66	1.5	1.88	1.17	0.00	1.00	0.757	0.50	0.757	1.34	1.34
Pharm. Eng TH	C304	3.00	2.83	3.00	2.83	2.16	2.83	2.33	0.50	2.33	2.00	2.83
POC II PR	C305	3.00	3.00	3.00	0.50	0.50	1.83	1.83	0.756	2.00	1.50	3.00
PHYS. PHARM. I PR	C306	3.00	2.83	3.00	3.00	1.16	2.00	1.00	2.00	1.83	1.50	2.50
Pharm. Micro PR	C307	3.00	0.00	1.50	0.00	0.00	1.506	0.753	2.66	1.506	1.16	2.00
Pharm. Eng PR	C308	2.50	1.00	1.83	2.33	0.33	0.33	0.50	0.00	0.33	1.33	1.50
Pharm. Org. III TH	C401	3.00	1.33	1.50	2.33	0.50	1.00	0.753	1.16	1.50	2.33	2.83
Med. Chem. I TH	C402	2.66	1.00	0.753	2.16	0.33	2.16	0.50	1.16	3.00	3.00	3.00
PHYS. PHARM. II TH	C403	3.00	2.33	3.00	2.83	0.753	2.33	1.00	2.66	2.66	3.00	3.00
Pharmacology I TH	C404	3.00	0.0	0.0	1.00	0.0	1.00	3.00	3.00	3.00	3.00	3.00
Pcog & phyto I TH	C405	3.00	2.16	1.83	2.66	1.33	1.5	2.00	1.83	1.5	1.83	3.00
Med. Chem. I PR	C406	3.00	2.66	3.00	3.00	1.00	2.50	1.506	3.00	2.00	1.50	3.00
PHYS. PHARM. II PR	C407	3.00	2.66	3.00	3.00	1.00	2.50	1.506	3.00	2.00	1.50	3.00
Pharmacology I PR	C408	3.00	1.16	2.50	3.00	0.00	1.00	3.00	3.00	3.00	3.00	3.00
Pharm cog & phyto PR	C409	2.33	0.756	2.33	2.33	0.00	2.33	0.16	0.00	2.33	2.33	3.00
Med. Chem. II TH	C501	3.00	0.756	2.16	2.33	0.5	1.00	1.16	2.83	2.50	2.00	2.66
Ind. Pharm. I TH	C502	3.00	1.50	2.50	2.66	1.506	3.00	1.83	2.83	2.50	2.00	2.83
Pcology II TH	C503	3.00	1.00	2.10	2.25	0.00	2.90	1.00	1.20	2.70	1.50	2.20
P cog & phyto II TH	C504	3.00	3.00	3.00	2.66	1.5	1.5	2.16	1.33	1.506	1.506	3.00
P. Juris TH	C505	3.00	1.507	1.507	2.50	1.84	2.84	2.84	1.50	3.00	1.34	2.34
Ind. Pharm. I PR	C506	2.83	2.50	2.50	2.83	2.00	2.50	2.33	3.00	2.50	2.00	2.50
Pcology II PR	C507	3.00	1.10	1.83	1.90	0.50	2.90	0.50	1.16	1.90	1.90	2.20
Pcog & phyto IIPR	C508	2.83	2.66	2.66	2.33	1.00	1.00	1.00	1.00	1.00	1.00	3.00
Med. Chem. III TH	C601	1.5	2.16	1.83	1.33	1.50	0.756	0.756	00	0.756	1.33	1.33
Pcology III TH	C602	3.00	2.10	1.83	2.70	2.00	0.90	2.70	1.30	2.70	1.50	2.20
HDT TH	C603	2.16	1.33	1.33	1.00	1.33	1.33	1.33	1.00	1.00	1.00	1.83
Biopharm. TH	C604	3.00	0.753	1.83	0.33	1.50	1.506	0.753	2.50	2.66	1.16	1.50
Biopharm Biotech TH	C605	3.00	2.33	2.50	2.66	1.50	2.16	2.50	2.00	2.66	2.83	3.00
Quality Assurance TH	C606	3.00	2.50	2.33	2.33	1.50	2.16	2.33	1.83	2.33	2.00	2.50
Med. Chem. III PR	C607	3.00	1.506	1.33	1.506	1.50	1.33	0.756	00	0.756	1.33	1.50
Pcology III PR	C608	3.00	1.10	1.83	1.90	1.33	1.00	.50	1.16	1.90	1.90	2.20
HDT PR	C609	2.66	2.66	2.66	2.5	1.33	1.00	1.506	1.5	1.16	1.16	2.5
Inst. Method Analysis	C701	3.00	1.83	2.16	2.00	0.00	0.756	0.50	0.00	0.50	1.506	2.50
IP II TH	C702	3.00	3.00	3.00	2.66	2.66	3.00	3.00	3.00	2.00	3.00	3.00



Pharm. Practice TH	C703	3.00	1.00	0.756	0.753	2.50	3.00	3.00	3.00	3.00	3.00	3.00
NDDS TH	C704	3.00	2.83	2.33	2.83	0.33	2.16	2.50	2.16	3.00	2.00	2.33
Inst. Method Analysis PR	C705	3.00	1.50	1.50	1.3	1.5	1	0.75	0	0.9	1.2	1.506
Practice school	C706	3.00	3.00	3.00	2.50	3.00	3.00	3.00	3.00	2.83	2.00	3.00
Bio stast & Reasearch Method TH	C801	3.00	2.83	2.83	3.00	0.756	2.00	1.506	1.5	2.00	1.16	3.00
Social & preventive Pharm. TH	C802	2.83	2.00	2.66	2.66	1.506	2.00	1.83	3.00	2.83	1.83	2.66
Pharm. Marketing Management TH	C803	2.83	2.66	2.66	1.506	2.66	2.16	2.33	2.33	2.16	1.83	3.00
Pharm. Reg. Science TH	C804	3.00	3.00	3.00	2.50	3.00	3.00	3.00	3.00	2.83	2.00	3.00
P'vigilance TH	C805	3.00	0.50	1.16	1.33	2.50	3.00	3.00	3.00	3.00	3.00	3.00
QC & Std of herbals TH	C806	3.00	2.83	3.00	3.00	2.50	3.00	3.00	2.00	3.00	2.33	3.00
Exp Pcology TH	C807	3.00	1.10	1.83	1.90	1.50	2.90	0.50	1.16	1.90	1.90	2.20
Adv. Instrumentation Tech TH	C808	3.00	2.83	3.00	3.00	2.50	3.00	3.00	2.00	3.00	2.33	3.00
Project Work	C809	3.00	3.00	3.00	2.50	3.00	3.00	3.00	3.00	2.83	2.00	3.00
Direct Assessment Average		2.9	1.63	1.92	1.76	1.08	1.77	1.35	1.62	1.98	1.77	2.33
75 % of Direct Assessment Average		2.18	1.22	1.44	1.32	0.81	1.32	1.01	1.21	1.49	1.33	1.75
25 % of Indirect Assessment		0.63	0.63	0.50	0.50	0.38	0.44	0.38	0.50	0.38	0.44	0.63
Total		2.81	1.85	1.94	1.82	1.19	1.76	1.39	1.71	1.87	1.77	2.38

Indirect assessment of PO for Batch 2018-22

Tools	PO1	PO2	PO3	PO 4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
Exit survey	3	3	2	1	1	2	1	1	2	2	2
Employers survey	3	3	2	2	1	2	1	2	2	1	3
Co-curricular activity	3	2	3	3	2	2	2	3	1	2	2
Extracurricular activity	1	2	3	2	2	1	2	2	1	2	3
Indirect Assessment Average	2.5	2.50	2	2	1.5	1.75	1.5	2	1.5	1.75	2.5
25 % of Indirect Assessment	0.63	0.63	0.50	0.50	0.38	0.44	0.38	0.50	0.38	0.44	0.63



C101, C102 are indicative courses in the first semester. Similarly C801 is course in eight semester of study.

C101, C102 are indicative courses in the first year. Similarly, C409 is final year course. First numeric digit indicates year of study and remaining two digits indicate course nos. in the respective year of study.

Direct attainment level of a PO is determined by taking average across all courses addressing that PO. Fractional numbers may be used for example 1.55.

Indirect attainment level of a PO is determined based on the student exit surveys, employer surveys, co-curricular activities, extracurricular activities etc.

Example:

1. *It is assumed that a particular PO has been mapped to four courses C201, C302, C303, C401*
2. *The attainment level for each of the four courses will be as per the examples shown in 2.2.2*
3. *PO attainment level will be based on attainment levels of direct assessment and indirect assessment*
4. *It is assumed that while deciding on overall attainment level 80% weightage may be given to direct assessment and 20% weightage to indirect assessment through surveys from students (largely), employers (to some extent). Program may have different weightages with appropriate justification.*
5. *Assuming following actual attainment levels:*

Direct Assessment

C201 –High (3) C302 – Medium (2) C303 – Low (1) C401 – High (3)

Attainment level will be summation of levels divided by no. of courses $3+2+1+3/4 = 9/4 = 2.25$

Indirect Assessment

Surveys, Analysis, customized to an average value as per levels 1, 2 & 3.

Assumed level - 2

PO Attainment level will be 80% of direct assessment + 20% of indirect assessment i.e. $1.8 + 0.50 = 2.2$.



CRITERION 4**Students' Performance****180****4. Students' Performance (180)**

Item	CAY 2021 22	CAY m1 2020- 21	CAY m2 2019- 20	CAY m3 2018- 19
Sanctioned intake of the program (N)	100	100	100	100
Total number of students admitted in first year (N1)	111	102	101	99
Number of students admitted in 2nd year in the same batch via lateral entry (N2)	-	22	24	14
Total number of students admitted in the Program (N1 + N2)	-	124	125	113

4.1 Enrolment Ratio (20)

Enrolment Ratio= N1/N

Item (Students enrolled at the First Year Level on average basis during the previous three academic years starting from current academic year)	Marks
>=90% students enrolled	20
>=80% students enrolled	18
>=70% students enrolled	16
>=60% students enrolled	12
>=50% students enrolled	08
<50% students enrolled	00



Academic Year	Sanction Intake (N)	Total number of student enrolled (N1)	Enrolment Ratio (N1/N)	% student enrolled	Remark
CAY (2021-22)	100	111	1.11	111	>90% students enrolled
CAYm1 (2020-21)	100	102	1.02	102	>90% students enrolled
CAYm2 (2019-20)	100	101	1.01	101	>90% students enrolled
CAYm3 (2018-19)	100	99	0.99	99	>90% students enrolled

4.2 Success Rate in the stipulated period of the program (50)

Year of entry	Number of students admitted in 1st year + admitted via lateral entry in 2nd year (N1 + N2)	Number of students who have successfully graduated without backlogs in any year of study (Without backlog means no compartment/failure in any semester/year of study)			
		I year	II Year	III Year	IV Year
CAY 2021-22	111				
CAYm1 2020-21	124	124			
CAYm2 2019-20	125	87	121		
CAYm3 2018-19	113	61	86	106	
CAYm4(LYG) 2017-18	112	66	53	64	83
CAYm5 (LYGm1) 2016-17	110	58	62	68	95
CAYm6 (LYGm2) 2015-16	113	63	85	87	70



Year of entry	Number of students admitted in 1st year + admitted via lateral entry in 2nd year (N1 + N2)	Number of students who have successfully graduated (Students with backlog in stipulated period of study)			
		I Year	II Year	III Year	IV Year
CAY 2021-22	111				
CAYm1 2020-21	124	0			
CAYm2 2019-20	125	38	00		
CAYm3 2018-19	113	52	27	05	113
CAYm4 (LYG) 2017-18	112	43	56	22	29
CAYm5 (LYGm1) 2016-17	110	50	42	34	05
CAYm6 (LYGm2) 2015-16	113	44	09	07	00

4.2.1 Success rate without backlogs in any year of study (30)

$SI = \frac{\text{Number of students who graduated from the program without backlog}}{\{(\text{Number of students admitted in the first year of that batch}) \text{ plus } (\text{lateral entry students admitted in second year of study})\}}$

Average SI = Mean of success index (SI) for past three batches = 0.438

Success rate without backlogs in any year of study = $30 \times \text{Average SI}$

= $30 \times 0.438 = 13.14$



Item	Last Year of Graduation (LYG) Entry year 2017-18	Last Year of Graduation minus 1 (LYGm1) Entry year 2016-17	Last Year of Graduation minus 2 (LYGm2) Entry year 2015-16
Number of students admitted in the corresponding First Year + admitted in 2nd year via lateral entry	96+16=112	100+10=110	101+12=113
Number of students who have graduated without backlogs in the stipulated period	50	46	51
Success index (SI)	0.446	0.418	0.451
Average SI	0.438		

Average SI = Mean of success index (SI) for past three batches=0.438

Success rate without backlogs in any year of study = $30 \times 0.438=13.14$

Note: If 100% students clear without any backlog then also total marks scored will be 50 as both 4.2.1 & 4.2.2 will be applicable simultaneously.

4.2.2 Success rate with backlog in stipulated period of study (20)

SI = (Number of students who graduated from the program in the stipulated period of course duration) / {(Number of students admitted in the first year of that batch) plus (lateral entry students admitted in second year of study)}



Average SI = mean of success index (SI) for past three=0.302

batches Success rate = $20 \times \text{Average SI} = 20 \times 0.302 = 6.04$

Item	LYG (Entry Year 2017- 18)	LYGm1 (Entry Year 2016 17)	LYGm2 (Entry Year 2015-2016)
Number of students admitted in the corresponding First Year+admitted in 2nd year via lateral entry	96+16=112	100+10=110	101+12=113
Number of students who have graduated with backlog in the stipulated period	33	49	19
Success index (SI)	0.294	0.445	0.168
Average SI	0.302		
Success rate	$20 \times \text{Average SI} = 20 \times 0.302 = 6.04$		

4.3. Academic Performance in Final Year (10)

Academic Performance = Average API

Academic Performance Index (API) = ((Mean of Final Year Grade Point Average of all successful Students on a 10 point scale) or (Mean of the percentage of marks of all successful students in Final Year/10)) x (successful students/number of students appeared in the examination)

Successful students are those who passed in all the final year courses

Academic Performance	CAY 2020- 21	CAY m2 2019- 20	CAY m3 2018- 19
Mean of CGPA or Mean Percentage of all successful students (X)	7.95	9.54	6.85
Total number of successful students (Y)	86	95	70
Total number of students appeared in the examination (Z)	86	100	88
API = $X \cdot (Y/Z)$	7.95	9.06	5.44
Academic Performance = Average API = $AP1 + AP2 + AP3/3$	7.49		



4.4 Academic Performance in Third Year (10)

Academic Performance = Average API

Academic Performance Index = ((Mean of 3rd Year Grade Point Average of all successful Students on a 10 point scale) or (Mean of the percentage of marks of all successful students in Third Year/10)) x (successful students/number of students appeared in the examination)

Successful students are those who are permitted to proceed to the final year

Academic Performance	CAYm1 2020-21	CAYm2 2019-20	CAYm3 2018-19
Mean of CGPA or Mean Percentage of all successful students (X)	9.50	7.55	7.52
Total number of successful students (Y)	99	86	100
Total number of students appeared in the examination (Z)	111	86	102
API = X*(Y/Z)	8.47297	7.55	7.372549
Academic Performance=Average API= AP1+AP2+ AP3/3	7.798507331		

4.5 Academic Performance in Second Year (10)

Academic Performance = Average API

Academic Performance Index = (API) = ((Mean of 2nd Year Grade Point Average of all successful Students on a 10 point scale) or (Mean of the percentage of marks of all successful students in Second Year/10)) x (successful students/number of students appeared in the examination)

Successful students are those who are permitted to proceed to the third year

Academic Performance	CAYm1 2020-21	CAYm2 2019-20	CAY m3 2018- 19
Mean of CGPA or Mean Percentage of all successful students (X)	9.84	6.11	5.81
Total number of successful students (Y)	121	111	86
Total number of students appeared in the examination (Z)	121	111	109
API = X*(Y/Z)	9.84	6.11	4.584
Academic Performance=Average API= AP1+AP2+ AP3/3	6.844678899		



4.6 Academic Performance in First Year (20)

Academic Performance = $2.0 \times \text{Average API}$

Academic Performance Index (API) = ((Mean of 1st Year Grade Point Average of all successful Students on a 10 point scale) or (Mean of the percentage of marks of all successful students in first Year/ 10)) x (successful students/number of students appeared in the examination.

Successful students are those who are permitted to proceed to the second year

Academic Performance	CAYm1 2020-21	CAYm2 2019-20	CAYm3 2018-19
Mean of CGPA or Mean Percentage of all successful students (X)	9.771	8.49	4.40
Total number of successful students (Y)	124	125	113
Total number of students appeared in the examination (Z)	124	125	113
API = $X \cdot (Y/Z)$	9.771	8.49	4.40
Academic Performance = Average API = $AP1 + AP2 + AP3 / 3$	7.553667		
Mean of CGPA or Mean Percentage of all successful students (X)	15.10733333		

4.7 Placement and Higher Studies (40)

Assessment Points = $40 \times (x + y)/N$

Item	LYG (Entry Year 2017-18)	LYGm1 (Entry Year 2016 17)	LYGm2 (Entry Year 2015-2016)
Total no. of Final year students (N)	87	119	113
Number of Students Placed in Industries/hospitals/government sector through/on/off campus recruitment or opted for entrepreneurship (X)	47	50	60
Number of students admitted to higher studies (Y)	23	14	43
X+Y	70	64	103
Placement index: $(X+Y)/N$	0.80	0.54	0.91
T = Average of $(X+Y)/N$	0.75		
Assessment = $40 \cdot T$	30		



4.7.1 Provide the placement data in the below mentioned format with the name of the program and the assessment year:

Programs Name and assessment year B. Pharm 2018-2019				
Sr.No	Name of the student place	enrolment number	Name of the employer	Appointment letter reference number with date
1.	Ku.Poonam Rangnath Bansode.	1532568	KTBIOP Chikhli Buldana Lecturer	KTBIOP/2020-21/179 Dated :- 23-08-2021
2.	Pooja Sudhakar Rindhe	1532558	DRGCOP Malkapur	
3.	Gajanan Manohar Kale	1532542	NIPER Guwahati	
4.	Akshay Murlidhar Akmar	16325154	RV life sciences Aurangabad	
5.	Dilip Shrirang Gaikwad	1532529	Wipro. Hydrabad	
6.	Sanket Sunil Chordiya	1532574	Formulation Development officer Hamlai Industries Pvt Ltd Sanand Ahemdabad	
7.	Akshay lokhande	1532511	Raptim Research Pvt.ltd	
8.	Sharad Sheshrao Kale	1532536	Validation Consultant Sarla Advantech Mumbai	
9.	Shubhangi vasanta Patil	16325147	Sr.medical coder at Advantmed India LLP 402 pinnacle business park corporate road Prahlad Nagar ahemdabad 380015	Date:- 06-10-2021
10.	Vijay Pralhad Ingle	1532550	Medical Coder, Gebbs Healthcare Solution, Chikhalthana, Aurangabad.	
11.	Mohan Bhikaji Jumde	1532534	Mylan Laboratories limited, Pithampur, Dist. Dhar, Indore	
12.	Akash Avachar		Kopran Ltd, KhopoliDist Raigad	
13.	Harshada Ravindra Khandelwal		Medical writer at Pristyn Research Solutions Aurangabad	
14.	Amit Rinde	1532566	Hyderabad	
15.	Shubhada Gadade	1532517	Intern, Dr.reddys lab hyderabad	
16.	Kartik Vijay Somase	14325122	Visionary RCM Infotec Pvt Ltd	
17.	Shubham Shyam Jadhav	1732536	Officer, Serum Institute of India Pvt.Ltd., Pune	
18.	Akash Ramesh Dahale	1532560	Access healthcare solution pune	
19.	Vishal Ramesh Waghmare	1532546	Officer QA, Ajanta pharma Limited, Paithan MIDC, maharashtra	
20.	Shivshanakar sheshrao kharat	1532527	Gebbs Health care solutions Aurangabad	
21.	Vaibhav Pandurang Chopade	1532563	ENEM NOSTRUM REMEDIES Pvt Ltd Andheri East Mumbai	
22.	Mrinal Ramdas Gite	1532518	PristynResearch Solutions, Aurangabad	
23.	Anil Keshav Pawar	1532582	Drug Safety Associate, Parexel International India Pvt.Ltd	
24.	Mahesh Gajanan Umbarkar	1532541	Research Associate	
25.	Bhagyashree Chandrakant Jadhav	1532531	Qinecsa Solutions Mysore, Banglore, Karnataka, India.	Dated :-11-10-2021



26.	Kaushal Laxminarayan Khunere	15325159	Matoshri Medical SundarkhedBuldana	Entrepreneur,
27.	Sagar Suresh Ajabe	153257	Executive, Sava Healthcare Ltd (R&D Centre) ,Pune	
28.	Roshan Mahadeo Wagh	1532514	Medical Representative, Dr.Palleg Laboratories, Khamgaon	
29.	Siddheshwar Raghunath Kate	1532572	Medical Representative, Glennmark Pharmaceutical Ltd.	
30.	Shubham Bhagat	16325142		
31.	Rameshwar Ugale	1532578	Medical Representative, FDC PVT LTD	
32.	Pooja Sudhakar Rindhe	1532558		
33.	Gajanan Manohar Kale	1532542	Pharmacist (Allopathy) CGHS Kolkatta	
34.				
35.	Akshay Murlidhar Akmar	16325154	RV life sciences Aurangabad	
36.	Dilip Shrirang Gaikwad	1532529	Wipro. Hyderabad	
37.	Shubhangi Vasanta Patil	16325147	Advantmed India LLP 402 pinnacle business park corporate road Prahlad Nagar ahemdabad	
38.	Swati Dnyaneshwar Gaikwad	1532567	KTBIOP ChikhliBuldana Lecturer	KTBIOP/2020-21/185Dated :- 30-08-2021
39.	Vinay Raju Mahalle	1532571	VIVO LIFE SCIENCES AKOLA (MR)	Dated :-15-01-2021
40.	Sanjay Dhole	16325138	Glenmark Pharmaceutical ltd Aurangabad	Dated:- 17-10-2022
41.	Shaikh Rashed Shaik Taher	1532547	Life line medicoseHarsul Aurangabad	Lic no MZ-AZ1-449498 Dated :-10-09-2021 Entrepreneur
42.	Pavan Santosh Mhaske	1532573	Jay Gajanan Medical And general Stores	Entrepreneur
43.	Vitthal Ramdas Gawade	1532554	Entrepreneur, Jay malhar Medical ShelgaonAtol	Entrepreneur,
44.	Vaibhav Baban Dandge	16325146	Entrepreneur, Shri Gajanan medical And Agency	Entrepreneur,
45.	Ganesh Shalikram Sapkal	1532535	Entrepreneur, Shri Ganesh Medical and General Stores	Entrepreneur,
46.	Vipul Mandhana	1532576	Entrepreneur, Indraprassth Medical and Surgical Stores, Mehkar	Entrepreneur,
47.	Saphalata Shantilal Sakhla	153258	Entrepreneur, Santosh collection and Jain Medical D, Mahi	Entrepreneur,
48.	Bhumiraj rathod	1532585	Sun Pharmaceutical PVT LTD, Dadar Haweli	
49.	Akshay Gajanan Dongre	16325150	Indoco Remedies LTD, Santacruz Mumbai	NB/ESTV/OFF/V-196709 Dated 22.03.2022
50.	Pavan Belokar	153251630	Shankar Medical And General Stores, Dongaon, Mehkar	
51.	Bhagwat Ramkisan Thombare	1532510	Shalina laboratories PVT LTD, Nariman Point Mumbai	CIN-U24239-MH-1984-PTC034786 Dated 18/02/2020



52.	Vikas Sudhakar Suradkar	1532524	TCS, Mumbai	Id-1833434 Dated 16/12/2019
53.	Vikram Limbaji Musale	16325144	Gebbs Health care solutions Aurangabad	ID 52547
54.	Amol Jalam Giri	16325143	Samarth College of Pharmacy, D. Raja	SCOP/ESTT/APP/TCH/2021 Dated 01/10/2021
55.	Harshal Sudhakar Lahane	1532525	Shiv medical And general Stores, Khandala Road Chikhli	DL No. 20-430588 Valid till 12/07/2026, 21-430589- 12/07/2026

Programs Name and assessment year B. Pharm 2018-2019

Sr .No	Name of the student place	Endrolment number	Name of the employer	Appointment letter reference number with date
1.	Shyam Sudhakar Gomte	153251	Ph. D NIPER AHMEDABAD	Dated 16-08-2021
2.	Gopal Bhagwan Khodve	1532540	Ph. D NIPER Kolkata	
3.	Sheetal Dilip Lahane	153252	M. Pharm, RSCP, Buldana	
4	Akash shivhari Fullare	1532532	M. Pharm, RC PIPER, Shirpur	
5	Ajay Vitthal Bhutekar	15325162	M. Pharm, ACP Chikhli	
6	Pawan Vishnu Dahake	1532581	South east technological university, Carlow, Ireland	
7	Akshay Janardan Jumde	1532548	M. Pharm NDMVP, Nashik	
8	Priyanka Bhaskarrao Rathod	1532519	M. Pharm, ACP Chikhli	

4.7.1 Provide the placement data

Programs Name and assessment year B. Pharm 2019-2020 Doing Job

Sr.No	Name of the student place	Endrolment number	Name of the employer	Appointment letter reference number with date
1.	Kartik subhas pohakar	16325134	GeBBS health care pvt ltd Aurangabad	23-03-2021 Employee id.42804
2.	Kishor Ravindra pakhare	16325160	Biogen serum pvt ltd pune	Date -02-07-2022
3.	Suchita suresh dhumale	1632567	Nirav biosolutionpvt ltd pune	
4.	Mangesh bhagwan mate	16325107	Syngene international ltd banglore	
5.	Rushikesh dhuolat payghan	1632594	Synergy health care	
6.	Rushikesh kokate	16325109	GeBBS health care pvt ltd Aurangabad	
7.	Rupali rathod	1632569	Episourceindiapvt ltd	
8.	Ashwini Ravindra karhale	1632574	Bioclinicapvt ltd Maysoor	
9.	Shaik Mosim Shaik		Cognizant technology solution	



	Mahmood		indiapvt ltd pune	
10.	Tejas Kumar Kolwadkar	16325100	IQVIA india pvt ltd banglore	
11.	Pawan Rajesh Bhawanagare	1632575	Cipla ltd goa	
12.	Snehal Dhamodkar	1632571	Kings global biotech ltd pune	
13.	Akshay Thokare	16325115	Episource india pvt ltd Channai	
14.	Rushikesh Avinash Kokate	16325109	Kensists solution vishakhapattanam	
15.	Maroti Narayan Diwate	1632561	Sai life sciences ltd hydrabad	OL/2022-23/161DATED 09-05-2022
16.	Dipali Suresh Tayade	16325152	Hetero lab Hyderabad	
17.	Manohar Wamanrao Gadade	1632584	NOVO Excipient pvt ltd. Mahape Navi mumbai	Dated :-15-06-2022
18.	Kirti Shrihari Nagre	1632559	Apollo Healthcare LTD	Dated on 24/08/2022
19.	Bhagyashri Anil Bhutekar	1632572	GeBBS health care pvt ltd Aurangabad	46694 dated on 14/10/2021
20	Aniket vilas Gawande	1532577	Indechemie Health Specialities PVT LTD, HQ Jalna	HO/OL/2022 Dated 17/02/2022

Programs Name and assessment year B. Pharm - 2020-2021 Job

Sr .No	Name of the student place	enrolment number	Name of the employer	Appointment letter reference number with date
1.	Vishakha Surendra Gawai	1732518	Episourceindiapvt ltd	ESPM-2513-11-10-2021
2.	Vaishnavi Ashok Gajghane	1732550	Inventurus knowledge solution pvt ltd navi Mumbai (IKS Health)	06-10-2021
3.	Artee Hiralal Bhilawekar	18325153	TCSL pune	Ref.id CSL/DT20217729634/PUNE/DPS/BTN 18-01-2022
4.	Datatray Suhas Marode	173256	Episourceindiapvt ltd	ESPM-2513-11-10-2021
5.	Jyoti Vasudev Tangade	1732519	Episourceindiapvt ltd	ESPM-2513-11-10-2021
6.	Subham Dasarath Barade	1732574	Indoco remedies ltd Goa	Ref. HR/goa-II appt._ltr/2022/104 dated 06-06-2022
7.	Shilpa Rameshwar Kawahle	18325149	GeBBS health care pvt ltd Aurangabad	16-02-2022Employee id.50930
8.	Prajakta Prakash Chavan	18325154	GeBBS health care pvt ltd Aurangabad	16-02-2022Employee id 50922
9.	Vaibhav Rameshwar Haramkar	1732573	Enzene bioscience ltd pune	07-02-2022
10.	Sujata anil salve	1732531	Cognizant technology solution indiapvt ltdpune	Reference no. 17334798 30-08-2021
11.	Kazi bilal ansar	1832598	Episourceindiapvt ltd	ESPM-2498-11-10-2021
12.	Pawan Bhaskar bhopale	1732520	GeBBS health care pvt ltd Aurangabad	13-01-2022 Employee id.49955



13	Sarvari Shripad Kulkarni	1732546	Cognizant technology solution indiapt ltd pune	Reference no. 17334796 30-08-2021
14.	Vicky pandit salve	1732515	GeBBS health care pvt ltd Aurangabad	
15.	Anuja wagh	1732545	Advantmentpvt ltd Ahmadabad	
16.	Pratik Rajesh lokhande	1732563	Life point Research LLB, Wakad Pune	Joining dated on 07/12/2021
17.	Purva shrinivas kale	173252	Cognizant technology solution indiapt ltd pune	Joining dated on 14/08/2021
18.	Baliram Vishnu bhutekar	18325143	GeBBS health care pvt ltd Aurangabad	
19.	Ajay Subhash Vyavhare	1732521	MD Consultancy Solution Pvt Ltd Pune	Joining dated on 01/02/2022
20	Pooja Dilip Vairalkar	1732538	GeBBS health care pvt ltd Aurangabad	November 2021
21	Tushar Ganesh Jadhav	173259	Cognizant technology solution indiapt ltd.pune	Reference no. 17334796 07/10/2021
22.	Shivdarshan Arjun Nikas	1732539		
23.	Shital Santosh Tonde	1732576	Medline Industries, Shivajinagar Pune	November 2022
24	Anis Shah Akram Shah	18325145	Cognizant technology solution indiapt ltd pune	
25	Mayuri Ravindra Shelke	1732559	Cognizant technology solution indiapt ltd pune	Reference no. 17334796 07/10/2021
26.	Perna Sanjay Tarmale	1732580	GeBBS health care pvt ltd Aurangabad	November 2021
27.	Ganesh Muralidhar Kathore	1732551	Intas Pharmaceuticals ltd Ahemadabad Gujrat	IPL/APPT/INMA/2109868/2022 DATED 10/08/2022
28	Karan Gautam Joshi	1732542	EpisourceIndia Pvt Ltd	ESPM-2512 Dated on 21/06/2022
29	Karan Gajanan Bali	1732514	EpisourceIndia Pvt Ltd	ESPM-2494 Dated on 11/10/2022
30.	Shubham Meghraj Jadhao	1732536	EpisourceIndia Pvt Ltd	ESPM-2494 Dated on 11/10/2022
31.	Sonaji Subhash Bharudkar	18325144	Gebbs Health Care Pvt Ltd Aurangabad	
32.	Nisha Vilasrao Dhumal	18325151	GeBBSHealth Care Pvt Ltd Aurangabad	
33	Ravindra Ankush Pagare	18325148	Ajanta Pharma Ltd, Dahej Gujarat	September 2021
34	Yogeshwar Dilip Alhat	1732512	Ajanta Pharma Ltd, Dahej Gujarat	July 2022
35	Amol Dighole	1732578	VLMS, IT park, Kalyan Nagar Pune	Joining dated on 07/11/2022
36	Prashant Panditrao Ghuge	18325147	Entrepreneur, Radheshyam Medical And General Store, Kinhi Raja Washim	Entrepreneur
37	Mayuri Narayan Wayal	173258	MGM Medical College Hospital and Medical Centre	Ref. MGM/ MCH/2022/3907 Dated 20/08/2022



			research Institute, Cidco, Aurangabad	
38	Pallavi Kashinath Dinde	1732532		
39	Anuja Gajanan Wagh	1732545		
40	Shyam Ramkisan Mohite	1732583	Intas Pharmaceuticals ltd Ahemadabad Gujrat	IPL/offer Letter/IMT/4427/2022 DATED 01/09/2022

Programs Name and assessment year 2020-2021 MpharmHigher Education				
Sr.No	Name of the student place	Enrolment number	Name of the employer	Appointment letter reference number with date
1.	Akash Arun Shelke		DIPSAR delhi MBA	Admitted in AY 2021-22
2.	Vishal Dnyaneshwar Pimpale	1732522	GCOP Karad M-pharm Pharmaceutics	Admitted in AY 2021-22
3.	Ganesh Nandkishor Kute	1732544	NDMVP Nashik M-pharm Pharmaceutics	Admitted in AY 2021-22
4	Sayyad Nadeem Sayyad Karim	1732540	DIPSAR delhi MBA	Admitted in AY 2021-22
5.	Saloni Khandelwar	173257	Institute of future education	Admitted in AY 2021-22
6.	Ankita Ganesh Mahadik	1732564	M-pharm bhahartividyaapeetpune	Admitted in AY 2021-22
7.	Pallavi Raju Dandage	1732530	M-pharm india college of pharmacy pune	Admitted in AY 2021-22
8.	Rushikesh Suradkar	1732529	M-Pharm Niper Ahmedabad	Admitted in AY 2021-22
9.	Keshav Vinayak Tathe	1732547	M-pharm RC Patel shirpur	Admitted in AY 2021-22
10	Ankita Anil Kalaskar	1732535	M-pharm HR Patel shirpur	Admitted in AY 2021-22
11.	Santosh Sriram Jaybhaye	173253	M-pharm ACP Chikhli	Admitted in AY 2021-22
12.	Roma Dhiraj Golani	1732567	M-pharm ACP Chikhli	Admitted in AY 2021-22
13.	Akash Gajanan Ambhore		MBA Mitcon institute of managementpune	Admitted in AY 2021-22
14.	Maithili Prasant Deshmukh	1732557	M-pharm Morden college of pharmacy pune	Admitted in AY 2021-22
15.	Pratikshya Rajkumar More	1732527	Vidhyabharati college of pharmacy amravati	Admitted in AY 2021-22
16.	Jayshree Ramesh Divate		Vidhyabharati college of pharmacy amravati	Admitted in AY 2021-22
17.	Snehal Rajendra Shelke	1732525	M-pharm ACP Chikhli	Admitted in AY 2021-22
18.	Dnyaneswar Vasant Dhole	1732524	MS Niper Guwahati	Admitted in AY 2021-22
19.	Shrikrunshna Unhale	1732566	MBA trinity institute of management	Admitted in AY 2021-22



Programs Name and assessment year 2021-2022 Job				
Sr .No	Name of the student place	Enrolment number	Name of the employer	Appointment letter reference number with date
1.	Payal padmakar Kogade	1832559	Ozone Multispeciality Hospital And Critical Care Hospital	01-08-2022
2.	Kautuk Jijarao Wagh	1732589	TapshyaMedical And General Store Jalna	Refence letter application wide INW No-DF-10411811,Dated 22-02-2022,Inw Id-1041811
3.	Komal suresh wagh	1832565	Sai medical foundation pune	Registration no. F055708 pune
4.	Vaibhav Rameshwar dalavi	1832555	Leben Pvt Ltd Akola	With reference to our offer dated 01-08-2022
5.	Vishal Dashrath shinde	1832585	Leben Pvt Ltd Akola	With reference to our offer dated 01-08-2022
6.	Mangesh shrirang mohite	1832599	Leben Pvt Ltd Akola	With reference to our offer dated 01-08-2022
7.	Sominath Sukhdev shinde	19325143	Leben Pvt Ltd Akola	With reference to our offer dated 01-08-2022
8.	Neha baban surve	19325149	Leben Pvt Ltd Akola	With reference to our offer dated 01-08-2022
9.	Gauri Pramod shete	1832569	Ajanta Pharma Ltd PaithanAurangabad	APL/PIN/HR/2022-23/12504/466 dated on 07-09-2022
10.	Saurabh mohanappa bondre	18325122	Sai Corporation Wonder Group Himachal Pradesh	Ref. SAI/HR/OFFER/2022/May 11 Dated 23.05.2022
11.	Kanak bhojane	1832584	Sai Corporation Wonder Group Himachal Pradesh	Ref. SAI/HR/OFFER/2022/May 11 Dated 23.05.2022
12.	Ajay Bharatrao Mohite	18325117	Zydus Cadila, Goa	07/08/2022
13.	Rahul Shivaji Bhonde	1832588	Glennmarkpvt ltd, Nashik	
14.	Krushna Manish Dhote	18325113	Hospital Pharmacist, Dinanath Mangeshkar Hospital Pune	
15.	Pranav Vijay Khandare	1732579	Global Hospital Dattawadi Pune, Hospital Pharmacist	09.09.2022
16.	David Vasant Pendram	1732537	Hospital Pharmacist, Govt. Hospital Gadchiroli	26.09.2022
17.	Shubham Balkrushna Mahajan	18325127	Sai corporation wonder group Himachal Pradesh	Ref. SAI/HR/OFFER/2022/May 11 Dated 23.05.2022
18.	Yogesh Pundlikrao Ranjane	1832557	Advant Med India LLP, Gandhinagar, Gujrat	07.10.2022
19.	Rahul Dhanaji Sapkal	1832586	MSN Laboratories pvt ltd, Hyderabad	09/09/2022
20.	Snehal Baban Sardar	1832560	Yashaswi Acadami For Skill, Pune	Trainee no. 580132



Programs Name and assessment year 2021-2022Mpharm higher education				
Sr .No	Name of the student place	Enrolment number	Name of the employer	Appointment letter reference number with date
1.	Jayesh Sanjay Masane	1832570	M-PharmNiper SAS Nagar Mohali	Admitted in AY 2022-23
2.	Rupali Ramchandra pimpale	1732522	MS- pharmaceuticals Niper Calcutta	Admitted in AY 2022-23
3.	Dipak Uddhav Kale	19325138	MBA Niper SAS Nagar Mohali	Admitted in AY 2022-23
4.	Amol Parsram Satpute	1832551	M-pharm P.ceutic IIT-BHU, Varanasi	Admitted in AY 2022-23
5.	Manish Devlal Tayade	1832550	M-Pharm pharmaceuticals Niper SAS Nagar Mohali	Admitted in AY 2022-23
6.	Dhanshree Vinod Thakare	1832545	Clinical research in Pacifixs research llppune	13-07-2022 receipt id PR21-0716
7.	Ashwini Bhika Bhodakhe	1832562	Clinical research in Pacifixs research llppune	
8.	Shreya Ramesh Wadatkar	18325125	Participated in CAP round for M. Pharm admission	18-10-2022
9.	Sunil Kanadaje	18325101	Participated in CAP round for M. Pharm admission	17-10-2022
10	Swapnil Rajabhau Thigale	18325138	MITCON institute of manegmentbalewadipune MBA (PM)	12-08-2022
11.	Om Babanrao Pande	1832591	Participated in CAP round for M. Pharm admission	For AY 2022-23
12.	Akshata Suresh Bhonge	1832576	Participated in CAP round for M. Pharm admission	For AY 2022-23
13	Abhishek Ashok Wanere	18325116	Participated in CAP round for M. Pharm admission	For AY 2022-23
14	Aniket Ranjit Jadhav	18325130	Participated in CAP round for M. Pharm admission	For AY 2022-23
15	Gangadhar Bhagwan Shinde	1832573	MBA {PM} NIPER SAS Nagar	Admitted in AY 2022-23
16	Apeksha Prabhakar Awkale		Participated in CAP round for M. Pharm admission	For AY 2022-23
17	Gayatri Gajanan Raut	1832592	Participated in CAP round for M. Pharm admission	For AY 2022-23
18	Jagdish Parmanand Kabra	1832587	Participated in CAP round for M. Pharm admission	For AY 2022-23
19	Jitendra Pralhad Hiwarkar	1832561	Participated in CAP round for M. Pharm admission	For AY 2022-23
20	Mahesh Nilkanth Bhopale	1832572	Participated in CAP round for M. Pharm admission	For AY 2022-23
21	Mangesh Gajanan Sanap	18325136	Participated in CAP round for M. Pharm admission	For AY 2022-23
22	Mayur Kailas Masare	1832589	Participated in CAP round for M. Pharm admission	For AY 2022-23
23	Bhagyshri Kailas Ambhore	1732588	Clinical research in Pacifixs research LLP Pune	PR21-0882Dated 13.09.2022
24	Prajakta Shiram Nathe	18325115	M-pharm ongoing FC1133 process	For AY 2022-23



25.	Priya Siddheshwar Nawlakhe	18325128	Diploma in Clinical research, lifepoint Research Institute, Wakad Pune	Batch 05. Dated on 28.07.2022
26	Rasika Prakash Babhulkar	1832571	Participated in CAP round for M. Pharm admission	For AY 2022-23
27	Renuka Gangadha Zarekar	1832566	Participated in CAP round for M. Pharm admission	For AY 2022-23
28	Swanand Sanjay Pathak	18325129	Participated in CAP round for M. Pharm admission	For AY 2022-23
29	Sweta Suresh Wanere	1832567	Participated in CAP round for M. Pharm admission	For AY 2022-23
30	Vaishnavi Gopal Bora	19325151	Participated in CAP round for M. Pharm admission	For AY 2022-23
31	Vaibhav Gajanan Theng	18325133	Clinical research in Pacifix research lppune	PR21-0882Dated 13.09.2022
32	Akash Pramod Shinde	1832543	Participated in CAP round for M. Pharm admission	For AY 2022-23
33	Dipak Devsingh Daberao	1832580	Participated in CAP round for M. Pharm admission	For AY 2022-23
34	Yash Mohan Shegokar	1832597	Participated in CAP round for M. Pharm admission	For AY 2022-23
35	Dhamprasen Bhimrao Jadhao	1732572	Participated in CAP round for M. Pharm admission	For AY 2022-23
36	Godavari Digambar Gawali	18325134	Bridsang Institute pune	15/08/2022
37	Mrunal Baburao Chavhan	1832583	Clinical research in Pacifix research lppune	PR21-0862Dated 04.09.2022
38	Neha Rajesh Chavhan	18325106	Clinical Research Hepshine PVT LTD Pune	01/08/2022
39	Snehal Santosh Gayakwad	1832544	Participated in CAP round for M. Pharm	For AY 2022-23
40	Rupali Laxman Bhone	1832553	Participated in CAP round for M. Pharm	For AY 2022-23
41	Virendrasingh Rajusingh Chavhan	1832574	Participated in CAP round for M. Pharm	For AY 2022-23
42	Roshan Satyadev Tayde	1732585	Participated in CAP round for M. Pharm	For AY 2022-23

4.8 Professional Activities (20)

4.8.1 Professional societies / chapters and organizing pharmacy events (5)

(Provide the relevant details)

Date of Event	Event
01/08/2020	Induction Program
05/07/2021	Convocation ceremony
08/07/2021	Parents Meet
04/08/2021 to 07/08/2021	Workshop on Interview skills and personality traits



25/09/2021	Mr. P. M. ballal Asst. Commissioner Food & Drug Administration Nagpur Pharmacy: Always trusted for your health
13/08/2021	Dr. Pramod Tale, District Program Officer DAPCU Civil Hospital Buldhana, District supervisor, DAPCU, Counsellor Awareness drive about HIV and TB amongs the Youth
01/09/2021	One day Marketing Training Workshop
21/06/2021	Mr. Sunil Bhojwani Art of living trainer Immunity enhancement breath & meditation workshop
25/02/2019	Dr. Anandji Mervade Recent trends in development of chemical research in pharmaceutical industries
07/02/2019	Adv. Mahendraji Khillare Antisuperstition movement committee

4.8.2 Publication of technical magazines, newsletters, etc. (5)

(List the publications mentioned along with the names of the editors, publishers, etc.)

Name of Magazines & news letters	Name of Editors, Publishers	Period of Publication
Anudarpan Wall Magazine	Dr. K. R. Biyani, Principal, Dr. A. A. Gawai	Monthly 2 Articles
ANUDARPAN MAGAZINE	Dr. K. R. Biyani, Principal, Dr. P. B. Dudhe,	Yerly

4.8.3 Participation in inter-institute events by students of the program of study (10)

(Provide a table indicating those publications, which received awards in the events/conferences organized by other institutes)

Name of student/s	Title of the publication/presentation	Name of Event/Journal & Organizing Institute	Event Date	Whether received award (yes/no)
Anjali R. Ghuge	In detail study on selected tech & formulation of nanoparticles with its application	World Journal of Pharmacy & Pharmaceutical Sciences Volume 11, issue 1 2022	05 th DEC 2021	No
Jayashree Thorat	Review on current situation of corona virus covid 19	International Journal of advanced research in Science, communication & techniques (ISARSCT) volume 04 issue 1	Apr 2021	No
Shubham Suryawanshi Kalyani Shinde	Antidiabetic activity of Coccian grandis in alloxan induced diabetic rats	European Journal of Pharmaceutical & medical Research 2020, 7(1) 384-88	July 2020	No
Patil S.	Development & Validation of RPHPLC method for estimation of tenligliptin in pharmaceutical dosage form	International Journal of Biology pharmacy & affiliated Sciences (JBPS) Dec. Spec. issue 2021 10 (12) 61-67	Dec 2021	No



CRITERION 5

Faculty Information and
Contributions

175

5. Faculty Information and Contributions (175)

The details of faculty information and contribution is enclosed in the prescribed format in Annexure II

5.1 Student-Faculty Ratio (SFR) (20)

(To be calculated at Department Level; No of Faculty as per the sanctioned intake)

No. of UG Programs in the Department (n): 01

No. of PG Programs in the Department (m): 04

		Academic Year		
		2021-22	2020-21	2019-20
No. of Students in UG 1 st Year	=u1 =	112	102	100
No. of Students in UG 2 nd Year	=u2 =	121	122	112
No. of Students in UG 3 rd Year	=u3 =	122	124	87
No. of Students in UG 4 th Year	=u4 =	124	87	119
No. of Students in PG 1 st Year	=p1 =	60	60	43
No. of Students in PG 2 nd Year	=p2 =	58	43	47

No. of Students = Sanctioned Intake + Actual admitted lateral entry

(The above data to be provided considering all the UG and PG programs of the department)

S = Number of Students in the Department = UG1 + PG1 + PG2

F = Total Number of Regular Faculty Members in the Department

Student Faculty Ratio (SFR) = S/F

Year	CAY (2021-22)	CAYm1 (2020-21)	CAYm2 (2019-20)
u1.1	112	102	100
u1.2	121	122	112
u1.3	122	124	87
u1.4	124	87	119
UG1	479	435	418
p1.1	13	13	10
p1.2	13	10	11
PG1	26	23	21
p2.1	16	16	12
p2.2	16	12	14
PG2	32	28	26
p3.1	15	16	12
p3.2	16	12	11
PG3	31	28	23
p4.1	16	15	9
p4.2	13	09	11
PG4	29	24	20



.....			
pm.1	60	60	43
pm.2	58	43	47
PGm	118	103	90

Total No. of Students in the Department (S)	597	538	508
No. of Faculty in the Department (F)	34	33	32
Student Faculty Ratio (SFR)	17.55	16.30	15.87
Average SFR	$SFR=(SFR1+SFR2+SFR3)/3$		
		16.57	

Table B.5.1

Marks to be given proportionally from a maximum of 20 to a minimum of 10 for average SFR between 15:1 to 20:1, and zero for average SFR higher than 20:1. Marks distribution is given as below:

15.00 – 15.50	-	20 marks
15.51 – 16.50	-	18 marks
16.51 – 17.50	-	16 marks
17.51 – 18.50	-	14 marks
18.51 – 19.50	-	12 marks
19.51 – 20.00	-	10 marks

Note: All faculty whether regular or contractual (except Part-Time), will be considered. The contractual faculty (doing away with the terminology of visiting/adjunct faculty, whatsoever) who have taught for 2 consecutive semesters in the corresponding academic year on full time basis shall be considered. However, following will be ensured in case of contractual faculty:

- Shall have the AICTE prescribed qualifications and experience
- Shall be appointed on full time basis and worked for consecutive two semesters during the particular academic year under consideration.
- Should have gone through an appropriate process of selection and the records of the same shall be made available to the visiting team during NBA visit.



5.1 Faculty Cadre Proportion (20)

The reference Faculty cadre proportion is 1(F1):2(F2):6(F3)

F1: Number of Professors required = $1/9 \times$ Number of Faculty required to comply with 15:1 Student-Faculty ratio.

F2: Number of Associate Professors required = $2/9 \times$ Number of Faculty required to comply with 15:1 Student-Faculty ratio.

F3: Number of Assistant Professors required = $6/9 \times$ Number of Faculty required to comply with 15:1 Student-Faculty ratio

Year	Professors		Associate Professors		Assistant Professors	
	Required F1	Available	Required F2	Available	Required F3	Available
CAY (2021-22)	4.42	06	8.84	10	26.53	18
CAY _{m1} (2020-21)	3.98	06	7.97	10	23.91	17
CAY _{m2} (2019-20)	3.76	05	7.52	08	22.57	19
Average Numbers	RF1= 12.16/3= 4.05	AF1= 17/3 = 5.66	RF2= 4.33/3= 8.11	AF2= 28/3= 9.33	RF3=73.01/3 = 24.33	AF3= 54/3= 18
Cadre Proportion Ratio	AF1/RF1=5.66/4.05=1.3975		AF2/RF2*0.6=(9.33/8.11) *0.6=0.6902		(AF3/RF3*0.4)=(18/24.33) *0.4=0.2959	
Cadre Proportion Marks	$=[(AF1/RF1) + (AF2/RF2*0.6) + (AF3/RF3*0.4)]*10$ $= [1.3975+0.6902+0.2959] *10$ $=23.836$ =20 (Maximum marks to be limited if it exceeds the allocated marks)					

Cadre Proportion Marks $=[(AF1/RF1) + (AF2/RF2*0.6) + (AF3/RF3*0.4)]*10$

- If AF1 = AF2= 0 then zero marks
- Maximum marks to be limited if it exceeds the allocated marks

Example: Intake = 180; Required number of Faculty: 12; RF1= 1, RF2=2 and Rf3=9 Case 1: AF1/RF1= 1; AF2/RF2 = 1; AF3/RF3 = 1 Cadre proportion marks = $(1+0.6+0.4) \times 10 = 20$ Case 2: AF1/RF1= 1; AF2/RF2 = 3/2; AF3/RF3 = 8/9 Cadre proportion marks = $(1+0.9+0.3) \times 10 =$ limited to 20



5.2 Faculty Qualification (20)

FQ = $2 * (10X + 4Y) / F$ where X is no. of faculty with Ph.D., Y is no. of faculty with M.Pharm., F is no. of faculty required to comply 1:15 Faculty Student ratio (no. of faculty and no. of students required to be calculated as per 5.1)

	X	Y	F	FQ = $2 * [(10X + 4Y) / F]$
CAY (2021-22)	06	28	39.8	8.64
CAYm1 (2020-21)	06	27	35.87	9.36
CAYm2 (2019-20)	05	27	33.87	9.32
Average Assessment:			36.51	9.10

5.3 Faculty Retention (20)

Item	Marks
>= 90% of required Faculty members retained during the period of assessment keeping CAYm3 as base year	20
>= 75% of required Faculty members retained during the period of assessment keeping CAYm3 as base year	16
>= 60% of required Faculty members retained during the period of assessment keeping CAYm3 as base year	12
>= 50% of required Faculty members retained during the period of assessment keeping CAYm3 as base year	8
<50% of required Faculty members retained during the period of assessment keeping CAYm3 as base year	0

Faculty members retained during the period of assessment keeping CAYm3 (2018-19) as base year

Sr.No.	Name of Faculty	Date of Joining	Status during Academic Year 2021-22	Status during Academic Year 2020-21	Status during Academic Year 2019-20
1	Dr. K.R. Biyani	25-07-2005	Retained	Retained	Retained
2	Mr. U.M. Joshi	25-08-1994	Retained	Retained	Retained
3	Dr. R.R. Pagore	05-10-2005	Not Retained	Not Retained	Not Retained
4	Dr. A. A. Gawai	08-12-2011	Retained	Retained	Retained
5	Dr. A.A. Sheikh	23-06-2009	Retained	Retained	Retained
6	Dr. V.J. Chaware	18-06-2008	Not Retained	Not Retained	Retained
7	Dr. S.V. Deshmane	08-01-2003	Not Retained	Not Retained	Retained
8	Dr. S.C. Kale	25-07-2012	Retained	Retained	Retained
9	Mr. D.P. Ambhore	08-08-2004	Retained	Retained	Retained
10	Ms. S.G. Phalphale	18-08-2004	Retained	Retained	Retained
11	Mr. S.D. Sagrulle	11-11-2014	Retained	Retained	Retained
12	Mr. P.N. Folane	01-01-2017	Retained	Retained	Retained
13	Mrs. R.A. Ingle	03-01-2017	Retained	Retained	Retained
14	Mrs. S.S. Deshmane	10-11-2014	Not Retained	Retained	Retained
15	Mrs. M.G. Chitte	03-01-2017	Retained	Retained	Retained
16	Mr. S.R. Kamble	01-07-2012	Not Retained	Not Retained	Not Retained
17	Ms. P.P. Udupurkar	01-07-2010	Not Retained	Not Retained	Not Retained
18	Mr. P.R. Tathe	08-06-2012	Not Retained	Not Retained	Not Retained
19	Mr. P.R. Laddha	25-06-2003	Not Retained	Not Retained	Retained
20	Ms. B.P. Chaudhari	18-07-2008	Not Retained	Not Retained	Retained
21	Mr. G.R. Sitaphale	07-11-2007	Not Retained	Not Retained	Retained
22	Mr. D.T. Panjwani	08-03-2010	Not Retained	Retained	Retained
23	Mr. N.M. Gawai	26-06-2006	Not Retained	Not Retained	Retained
24	Mr. K.B. Charhate	07-09-2008	Not Retained	Not Retained	Retained
25	Mr. R.D. Pawar	01-01-2019	Retained	Retained	Retained
26	Ms. V.D. Deshmane	01-01-2019	Retained	Retained	Retained
27	Ms. P.V. Bodkhe	01-01-2019	Retained	Retained	Retained
28	Mr. K.S. Tayde	05-02-2016	Retained	Retained	Retained
29	Mr. C.P. Nagwani	05-02-2016	Retained	Retained	Retained
30	Mr. S.S. Bharad	05-02-2016	Retained	Retained	Retained
31	Mrs. J.B. Khedekar	25-07-2018	Retained	Retained	Retained
32	Ms. P.R. Gawandar	27-07-2018	Retained	Retained	Retained
33	Mr. S.S. Harlalka	01-01-2019	Retained	Retained	Retained
34	Ms. P. C. Rathi	01-07-2018	Retained	Retained	Retained
35	Ms. M. D. Usar	01-07-2018	Retained	Retained	Retained
36	Ms. A. R. Kale	01-07-2018	Retained	Retained	Retained
37	Ms. P. V. Sonune	01/08/2019	Retained	Retained	Retained
Number of faculty members retained			24	26	33
% Faculty members retained during the period of assessment			64.86 %	70.27 %	89.19 %
Avg % Faculty members retained during the period of assessment keeping CAYm3 as base year			75.01 %		



5.4 Innovations by the Faculty in Teaching and Learning (15)

Innovations by the Faculty in teaching and learning shall be summarized as per the following description.

Contributions to teaching and learning are activities that contribute to the improvement of student learning. These activities may include innovations including, however not limited to, use of ICT, in instruction delivery, instructional methods, assessment, evaluation and inclusive class rooms that lead to effective, efficient and engaging instruction. Any contributions to teaching and learning should satisfy the criteria:

- *The work must be made available on Institute website*
- *The work must be available for peer review and critique*
- *The work must be able to be reproduced and built on by other scholars*

The institution may set up appropriate processes for making the contributions available to the public, getting them reviewed and for rewarding. These may typically include statement of clear goals, adequate preparation, use of appropriate methods, significance of results, effective presentation and reflective critique.

The common measures undertaken are listed below.

- 6 Creation of audio visuals and animations.
- 7 Power point presentation.
- 8 Creation of new models for easy understanding of the concept.
- 9 Project work is assigned to every students of B.Pharm final year.
- 10 Individual seminar on topic is assigned to every students of B.Pharm final year.

5.5 Faculty as participants in Faculty Development/Training Activities (15)

- A Faculty scores maximum five points for participation
- Participant in 2 to 5 days Workshop/Faculty Development Program: 3 Points
- Participant >5 days Workshop/Faculty Development Program: 5 points

Name of the Faculty	Max. 5 per Faculty		
	CAY (2021-22)	CAYm1 (2020-21)	CAY m2 (2019-20)
Dr. K. R. Biyani	-	05	-
Prof. U. M. Joshi	-	05	-
Prof. D. P. Ambhore	-	05	-
Dr. Ashish A. Gawai	05	05	-
Dr. Gopal V. Bihani	05	-	-
Dr. S.C. Kale	00	05	03



Dr. P. B. Dudhe	03	-	-
Dr. A. A. Shaikh	-	05	05
Ms. S.G. Phalphale	05	03	-
Mr. P.N. Folane	03	05	05
Mrs. S. P. Dudhe	03	-	-
Ms. P.R. Gawandar	-	05	03
Ms. P.D. Gadekar	-	-	03
Ms. R. A. Ingale	-	-	03
Ms. M. G. Chitte	-	05	-
Sum	24	38	22
RF=Number of Faculty required to comply with 15:1 Student-Faculty ratio as per 5.1	39.8	35.87	33.87
<i>Assessment = 3 × Sum / (0.5 RF)</i>	3.62	6.35	3.89
Average assessment over three years (Marks limited to 15) = 4.62			

5.6 Research and Development (40)

5.6.1 Academic Research (10)

Academic research includes research paper publications, Ph.D. guidance, and faculty receiving Ph.D. during the assessment period.

- Number of quality publications in refereed/SCI Journals, citations, Books/Book Chapters etc. (6)
- Ph.D. guided /Ph.D. awarded during the assessment period while working in the institute (4)

All relevant details shall be mentioned.

(Details of Paper Publications)

Sr. No.	Name of Faculty	Publication Details		Citation Details			
		Total no. of publications till date	No. of publications assessment period (2019-22)	Total no. of citations till date		No. of citations for assessment period (2019-22)	
				Google Scholar	Scopus	Google Scholar	Scopus
1	Dr. K.R. Biyani	148	49	873	198	476	81
2	Mr. U.M. Joshi	12	-	190	74	64	22
3	Dr. A. A. Gawai	42	11	52	14	14	4
4	Dr. A.A. Sheikh	40	12	108	46	61	29
5	Dr. S.C. Kale	9	2	13	10	10	9
6	Dr. G.V. Bihani	18	10	83	53	50	32
7	Dr. P.B. Dudhe	24	6	877	507	6	0
8	Mr. D.P. Ambhore	9	1	4	0	0	0
9	Ms. S.G. Phalphale	1	-	-	-	-	1
10	Mr. S.D. Sargule	4	4	-	-	-	-



11	Mr. P.N. Folane	25	20	10	-	10	-
12	Mrs. J.B. Khedekar	3	3	-	-	-	-
13	Ms. P.R. Gawandar	4	3	-	-	-	-
14	Mrs. S.P. Dudhe	7	-	-	-	-	-
15	Ms. P.C. Rathi	3	-	-	-	-	-
16	Mr. G.S. Bhojane	1	-	-	-	-	-
17	Mrs. R.A. Ingle	3	2	-	-	-	-
18	Mr. S.S. Bharad	2	-	-	-	-	-
19	Ms. P.P. Dusad	2	2	-	-	-	-

Ph.D. Guided / Awarded during the assessment year while working in the institute

Name of Faculty	Number of Student/Faculty		
	2019-2020	2020-2021	2021-2022
Dr. K.R. Biyani	06	00	03

Ph.D. awarded during assessment year while working in the institutes

Sr. No.	Name of Faculty	Ph.D. awarded year
1	Dr. Dinesh R. Chandak	2019-2020
2	Dr. Purushottam R. Laddha	2019-2020
3	Mr. Sharad V. Usnale	2021-2022
4	Mr. Abhaykumar D. Sakhare	2021-2022
5	Mr. Vikas Bhausahab Gawali	2021-2022

Books/Book Chapters publications

Sr.No.	Name of Faculty	Publication Details	
		Total no. of Books/ Book chapters Publications	No. of Books / Book chapters publications during assessment year (2019-2022)
1.	Dr. K.R. Biyani	13	11
2.	Dr. A.A. Gawai	03	03
3.	Dr. A.A. Shaikh	07	07



4.	Dr. P. B. Dudhe	07	02
5.	Ms. S. P. Dudhe	01	01
6.	Mr. R.D. Kalwe	02	02
7.	Ms. P.P. Dusad	01	01

5.6.2 Sponsored Research (10)

Funded research:

(Provide a list with Project Title, Funding Agency, Amount and Duration)

Funding amount (Cumulative during CAYm1, CAYm2 and CAYm3):

Amount > 25 Lacs – 10 Marks

Amount \geq 22 Lacs and \leq 25 lacs – 9 Marks

Amount \geq 19 Lacs and < 22 lacs – 8 Marks

Amount \geq 16 Lacs and < 19 lacs – 7 Marks

Amount \geq 13 Lacs and < 16 lacs – 6 Mark

Amount \geq 10 Lacs and < 13 lacs – 5 Marks

Amount \geq 08 Lacs and < 10 lacs – 4 Mark

Amount \geq 06 Lacs and < 08 lacs – 3 Mark

Amount \geq 05 Lacs and < 06 lacs – 2 Marks

Amount \geq 04 Lacs and < 05 lacs – 1 Mark

Amount \leq 4 Lacs – 0 Mark

Sponsored Research: NIL

5.6.3. Consultancy (from Industry) (10)

(Provide a list with Project Title, Funding Agency, Amount and Duration)

Funding amount (Cumulative during CAYm1, CAYm2 and CAYm3):

Amount > 25 Lacs – 10 Marks

Amount \geq 22 Lacs and \leq 25 lacs – 9 Marks

Amount \geq 19 Lacs and < 22 lacs – 8 Marks

Amount \geq 16 Lacs and < 19 lacs – 7 Marks

Amount \geq 13 Lacs and < 16 lacs – 6 Mark

Amount \geq 10 Lacs and < 13 lacs – 5 Marks

Amount \geq 08 Lacs and < 10 lacs – 4 Mark

Amount \geq 06 Lacs and < 08 lacs – 3 Mark

Amount \geq 05 Lacs and < 06 lacs – 2 Marks

Amount \geq 04 Lacs and < 05 lacs – 1 Mark

Amount \leq 4 Lacs – 0 Mark

5.6.4 Honorary Consultancy from Central/State/Local Government Organizations(5)

NIL



5.6.5 Development activities (5)

Provide details:

- Product Development
- Research laboratories
- Instructional materials
- Working models/charts/monograms etc.

Continuous development of students and faculty members is the prime focus of our institute. Research and development is a continuous activity conducted by our faculty members and students are also involved in this activity. Fully furnished and well developed Research laboratories are available to conduct the research activities. Continuous upgradation of the research laboratories with new machines and sophisticated instruments is a plus for the research. The standard operating procedure is provided for the guidance of students and faculty members for all the machines and analytical instruments. National and International journals are made available for the referencing of new research and development in the pharmaceutical sciences. Different working models like FTIR digital diagram, UV cabinet for TLC, different charts on lymphatic system, heart, circulatory system, ANS, charts of microscopy of herbal drugs, Bacteria, viruses. Museum of herbal drugs prepared by students and faculty members are displayed in the laboratories as a reference for understanding of various procedures and working of instrument. Students and faculty members of our institute participate in various social awareness program such as HIV AIDS awareness, polio, Beti Bachao Beti Padhao, Swacha Bharat Abhiyan and Digital banking. Every year eye check-up and treatment camp is also organized by our institute. Our institute is probably the only institute in Maharashtra to run its own generic medical mall which avails the opportunity and knowledge for our students such as Retailing counseling with experience of running a community pharmacy before completion of their degree.

5.7 Faculty Performance Appraisal and Development System (FPADS) (20)

Faculties of Higher Education Institutions today have to perform a variety of tasks pertaining to diverse roles. In addition to instruction, Faculty needs to innovate and conduct research for their self-renewal, keep abreast with changes in technology, develop expertise for the effective implementation of curricula. They are also expected to provide services to the hospitals/ industry and community in large for understanding and contributing to the solution of real life problems. Another role relates to the shouldering of administrative responsibilities to co-operation with other Faculty, heads-of-departments and the Head of Institute. An effective performance appraisal system for Faculty is vital for optimizing the contribution of individual Faculty to institutional performance



The assessment is based on

- A well defined system instituted for all the assessment years
- Its implementation and effectiveness

Faculty appraisal plays an important role in the evaluation of performance. Self appraisal form is collected from individual faculty every year. Student's feedback is also collected every year, which are later reviewed by Principal and discussed with individual faculty at personal level. Results of subject taught by individual faculty, number of seminars, conferences attended, books, paper published is also taken into consideration for faculty performance appraisal. Faculty members are also involved in social activities conducted by the institute which helps them to get in contact with the society for their personal development.

5.8 Visiting/Adjunct Faculty (5)

Adjunct faculty also includes experts from Industry, Research Organizations/Universities and other Government Organizations. Provide details of participation and contributions in teaching and learning and

/or research by visiting/adjunct faculty for all the assessment years.

- Provision of visiting/adjunct faculty (2)
- Minimum 50 hours interaction in a year will result in 1 mark for that year; 1 marks x 3years = 3 marks.

Assessment Year 2021-2022				
Class	Semester	Subject	Name of Visiting Faculty	No. of Interaction
B.Pharm	I	Remedial Mathematics	Mr. A. Ailani	32
B.Pharm	I	Communication Skill	Mr. Tushar Dodia	30
B.Pharm	II	Computer Applications in Pharmacy	Mr. S. Narwade	45
Total				107

Assessment Year 2020-2021				
Class	Semester	Subject	Name of Visiting Faculty	No. of Interaction
B.Pharm	I	Remedial Mathematics	Mr. A. Ailani	31
B.Pharm	I	Communication Skill	Mr. B.M. Jadhao	32
B.Pharm	II	Computer Applications in Pharmacy	Mr. S. Narwade	26
B.Pharm	II	Computer Applications in Pharmacy	Mr. S. Bhusari	20
Total				109

Assessment Year 2019-2020				
Class	Semester	Subject	Name of Visiting Faculty	No. of Interaction
B.Pharm	I	Remedial Mathematics	Mr. A. Ailani	32
B.Pharm	I	Communication Skill	Mr. B.M. Jadhao	31
B.Pharm	II	Computer Applications in Pharmacy	Mr. S. Narwade	25
B.Pharm	II	Computer Applications in Pharmacy	Mr. S. Bhusari	22
Total				110



6 Facilities

6.1 Availability of adequate, well-equipped classrooms to meet the curriculum requirements (20)

(Facilities for conducting theory classes)

The college has:

- Sufficient class rooms for conducting lectures and tutorials for the first to final year students
- Class rooms with good ventilation, LCD, podium and uninterrupted power supply.
- Sufficient tutorial rooms to conduct tutorial and remedial classes for students having backlogs.
- A seminar hall with a capacity of 160 to conduct seminars, guest lectures and workshops.
- Teaching aids – Green boards, OHP multimedia projectors, etc.

6.2 Faculty rooms (10)

(Conducive sitting place)

Availability of faculty rooms

- Adequate rooms and cabins are available to accommodate faculty members.
- Faculty members have been provided with compute and internet facility.
- The staff room and staff cabins are well furnished.



6.3 Laboratories including preparation room (wherever applicable), instrument/machine room and computer labs along with equipment and relevant facilities (60)

(Scientific Experiments Conducting/Computing facilities; availability, adequacy & effectiveness)

S.N.	Lab Description in the Curriculum	Batch size	Availability of lab manuals	Quality of Instruments	Safety measure/s
01	Pharmaceutical Chemistry Lab I	25	Yes	State of the Art	Fume cupboard First aid kits Fire extinguisher
02	Pharmacology Lab I	25	Yes	State of the Art	Fire extinguisher First aid kits
03	Instrument room	25	Yes	State of the Art	Fire extinguisher First aid kits
04	Pharmaceutics Lab I	25	Yes	State of the Art	Fire extinguisher First aid kits
05	Machine Room	25	Yes	State of the Art	Fire extinguisher First aid kits
06	Pharmacognosy Lab	25	Yes	State of the Art	Fire extinguisher First aid kits
07	Pharmaceutics Lab II	25	Yes	State of the Art	Fire extinguisher First aid kits
08	Pharmaceutics Lab III	25	Yes	State of the Art	Fire extinguisher First aid kits
09	Pharmacology Lab II	25	Yes	State of the Art	Fire extinguisher First aid kits
10	Pharmaceutical Chemistry Lab II	25	Yes	State of the Art	Fire extinguisher
11	Computer lab	25	Yes	State of the Art	Fire extinguisher
12	Pharmacy Practice Lab	25	Yes	State of the Art	Fire extinguisher First aid kits
13	Pharmaceutical Chemistry Lab III	25	Yes	State of the Art	Fire extinguisher First aid kits
14	Pharmaceutical Chemistry Lab IV	25	Yes	State of the Art	Fire extinguisher First aid kits
15	Pharmaceutics Lab IV	25	Yes	State of the Art	Fire extinguisher First aid kits
16	Pharmaceutics Lab V	25	Yes	State of the Art	Fire extinguisher First aid kits
17	Pharmaceutics Lab VI	25	Yes	State of the Art	Fire extinguisher First aid kits
18	Pharmacology Lab III	25	Yes	State of the Art	Fire extinguisher First aid kits
19	Pharmacology Lab IV	25	Yes	State of the Art	Fire extinguisher First aid kits

Instrument Room

Sr. No.	Instrument/Equipment	Make and model	SOP	Log book
1	UV Visible spectrophotometer	Shimadzu Japan,UV1601	Yes	Yes
2	Brookfield Viscometer	Brookfield Engineering Lab Model No. LVT 110 160	Yes	Yes
3	Digital Analytical Balance	Shimadzu, JapanAUX220	Yes	Yes
4	FTIR spectrophotometer	Shimadzu, JapanIR Affinity-1S	Yes	Yes
5	HPLC quaternary gradient with auto-sampler	Water Astrica, 717plus Auto Sampler	Yes	Yes
6	Flame Photometer	Systronic, Mediflame 127	Yes	Yes
7	Potentiometer	Veego	Yes	Yes
8	PH meter	Labline Mumbai	Yes	Yes
9	UV Cabinet	Labline Mumbai	Yes	Yes
10	Photocolorimeter	Labline Mumbai EQ 870	Yes	Yes
11	Spectrophotometer	106 Systronic, Sr 3232	Yes	Yes
12	Clinical chemistry analyser	Systronic,171	Yes	Yes
13	Digital Colorimeter	Hans 251	Yes	Yes
14	Magnetic Stirrer	Labline Mumbai	Yes	Yes
15	Polarimeter	Metzel Optical	Yes	Yes
16	KF tritator	Systronic, 349	Yes	Yes
17	Digital Balance	Aczet CG 602	Yes	Yes
18	Electrophoresis	Systronic	Yes	Yes
19	Refractometer,	Dolphin	Yes	Yes
20	Nepheloturbidity meter	Systronic 131	Yes	Yes
21	Conductometer	Systronic	Yes	Yes
22	Single Pan Electronic Balance	K roy Selux	Yes	Yes

Machine room

S.N.	Instrument/Equipment	Make and model	SOP	Log book
1	Tablet Coating pan and polishing pan	Labline, Mumbai	Yes	Yes
2	Rotary Tablet Press machine	Cemach, 12 Station multi tolling	Yes	Yes
3	Tablet punching machine	Labline, Mumbai Single Punch, Manual	Yea	Yes
3	Horizontal main drive with the following attachments: Sieve shaker Double cone blender	Labline, Mumbai	Yes	Yes
4	High speed homogenizer	Remi Model : SP- Lab Cap- 50LPH	Yes	Yes
5	BOD incubator conversion of humidity control oven to BOD incubator (1)	Labline, Mumbai	Yes	Yes
6	Hot Air Oven	Dolphin	Yes	Yes
7	Laminar Flow System	Labline , Mumbai	Yes	Yes
8	Tablet Dissolution Unit	Labline , Mumbai	Yes	Yes
9	Stability Chambar	Labline , Mumbai	Yes	Yes
10	Tray Dryer	Labline , Mumbai	Yes	Yes
11	Ball Mill	Labline , Mumbai	Yes	Yes
12	Duble cone Blender	Labline , Mumbai	Yes	Yes
13	Incubator	Shreeji	Yes	Yes
14	Autoclave	Oswall	Yes	Yes
15	Bottle Washing Machine	Labline , Mumbai	Yes	Yes
16	Vernier Caliper	Mitutoyo Japan	Yes	Yes
17	Capsule Filling Machine	Shreeji Pharma Scintific Lab	Yes	Yes
18	Hot extraction three flask Heater	Lab Hosp	Yes	Yes
19	Tablet Friability tester	Labline , Mumbai	Yes	Yes
20	Ampoule Clarity App.	Dolphin	Yes	Yes
21	Ampoule Filling Machine	Dolphin	Yes	Yes
22	Tablet Disintegration App.	Labline, Mumbai	Yes	Yes
23	Filtration Assembly	Labline, Mumbai	Yes	Yes
24	Bottle Filling Machine	Labline, Mumbai	Yes	Yes

25	Colabsibal Filling Machine	Remi	Yes	Yes
26	Electronic Balance	ACZEL	Yes	Yes
27	Tablet Hardness Tester	Dolphin	Yes	Yes
28	Tube Sealing Machine	Dolphin	Yes	Yes
29	Colony Counter	Labline, Mumbai	Yes	Yes
30	Centrifuge	Remi	Yes	Yes
31	Bulk Density App.	Labline, Mumbai	Yes	Yes

Note: Give a separate table for Instrument room and Machine room listing all the instruments/equipment present with their make and model, existence of SOPs and Log Books for individual equipment.

6.4 Drug Museum (5)

(Type & quality of collection in the museum with proper labeling and display)

The college has well-established and well-maintained museums. One museum is composed of marketed formulations which have been broadly classified as medicated and cosmetic formulations. The second museum is for the display of drugs from a variety of origins and the third museum is dedicated to the display of common laboratory equipments used in the field of pharmacy. In addition to this, various informative charts pertaining to the history of pharmacy, sources of drugs and other information pertaining to drugs have been put up in well-lit cases in prominent places in the college. The total area dedicated to these museums is approximately 60 sq.mt.

6.5 Medicinal Plant Garden (5)

(Area, demarcation, temporary/permanent arrangement, planting of plants under the shade in demarcated areas, adequacy of the plants)

- **Area:** The area of medicinal plant garden is 300 sq. m. in which various medicinal plants are maintained. (In addition to this, medicinal plants are also planted in campus area)
- **Demarcation:** Yes
- **Arrangement :** Permanent
- **Adequacy of plant:** Adequate



Types, varieties and number of plants, available in garden

Sr.No	Name of Medicinal Plant	Botanical Name
1	PandhariKorati	<i>Barleriaprionitis</i>
2	PandhariKanher	<i>Neriumoleander</i>
3	JamalGotta	<i>Crotoniglum</i>
4	Barhmaras	<i>Bacopamonniari</i>
5	Kandvel	<i>CissusquadrangularisL.</i>
6	Panfuti	<i>Bryophyllumpinnatum</i>
7	Adulsa	<i>AdhatodavasicaNees</i>
8	Putrajivika	<i>Putranjivaroxburghii Wall</i>
9	Gulvel	<i>Tinosporacordifolia</i>
10	Ashwagandha	<i>Withaniasomnifera</i>
11	Kulanjan	<i>Alpinia galanga</i>
12	WhiteHibiscus	<i>Hibiscusrosasinensis</i>
13	KandhuCakka	<i>EhretiaLaevisRoxb</i>
14	MaineMula	<i>Coleus barbatus</i>
15	Chitraka	<i>Plumbagozeylanica</i>
16	Aloe	<i>AloebarbadensisMiller</i>
17	Shatavari	<i>Asparagusracemosus</i>
18	Alangium	<i>Alangiumsalvifolium Wang</i>
19	BlackDhatura	<i>Daturametel</i>
20	Umbar	<i>Ficusracemosa</i>
21	JambhaliGokarn	<i>Clitoriaternatea</i>
22	Gugulu	<i>Commiphorawightii</i>
23	Ritha	<i>Sapindusmukorossi</i>
24	Karanji	<i>Millettiapinnata</i>
25	Lanjvati	<i>Mimosapudica</i>
26	Barleria Spicata	Barleria prionitis
27	Veld Grape	Cissus quadrangularis L.
28	White Oleander	Nerium oleander
29	Miracle Lea	Bryophyllum pinnatum
30	True Croton	Croton tiglium
31	Vasaka	Adhatoda vasica Nees
32	Brahmi	Bacopa monniari
33	Kuduru	Putranjiva roxburghii Wall
34	Giloy	Tinospora cordifolia
35	Patharchur	Coleus barbatus
36	Winter Cherry	Withania somnifera

37	Ceylon Leadwort	Plumbago zeylanica
38	Galangal	Alpinia galangal
39	Aloe	Aloe barbadensis Miller
40	Jasvandi	Hibiscus rosa sinensis
41	Satavari	Asparagus racemosus
42	Khandu Chakka	Ehretia Laevis Roxb
43	Alangium	Alangium salvifolium Wang
44	Angel's Trumpet	Datura metel
45	Pongame Oiltree	Millettia pinnata
46	Gular	Ficus racemosa
47	Shameplant	Mimosa pudica
48	Asian Pigeonwings	Clitoria ternatea
49	Lemongrass	Cymbopogon citratus
50	Guggul	Commiphora wightii
51	Water hyssop	Bacopa monnieri
52	Wild Mint	Mentha Arvensis
53	Tulsi	Ocimum tenuiflorum
54	Green Chiretta`	Andrographis paniculata
55	Toothache Plant	Acmella oleracea
56	Wild Garlic	Allium ursinum
57	China Rose	Hibiscus Sinensis

Overall look and maintenance of the medicinal plant garden

The Medicinal Plant garden is well maintained regularly watered and fertilizers are used as per the need at suitable intervals. All the different varieties of plants are suitably labelled.



6.6 Non Teaching Support (20)

Sr. No	Name of the Technical Staff	Designation	Date of Joining	Qualification		Other technical skills gained	Responsibility
				At Joining	Now		
1	Mr. Satish M. Bondre	Accountant	11/09/1995	M.Com.	M.Com.	Able to handle computers	Looking after the accounts, preparing balance sheets etc
2	Mr. Siddharth P. Nikalje	Office Superintendent	17/10/2010	B.A.	B.A.	Able to handle computers, internet	Office administration
3	Mr. Sudhakar S. Sapkal	Clerk	05/11/1998	B.A.	B.A.	Able to handle computers, internet	Student related University work
4	Mr. Ramekisan L. Misal	Clerk	01/11/1997	B.A.	B.A.	Able to handle computers, internet	Maintaining admission documents & issuing them as required
5	Mr. Vikas P. Gavhad	Cashier	06/08/2004	B.A.	B.A.	Able to handle computers, internet & online transactions	Students fees collection, providing receipts
6	Mr. Narendra G. Jadhao	Computer Data Operator	19/07/2005	B.A.	B.A.	Able to handle computers, internet & online transactions	Computer work related to account sections
7	Mr. Arjun R. Burkul	Asst. Librarian	13/01/1999	Diploma in Library	Diploma in Library	Able to handle library software, e journal etc	Maintaining library records, book purchasing, journal subscriptions etc.
8	Mr. Vishnu D Patil	Laboratory Technician	20/09/1996	D.Pharm	D.Pharm	Able to Operate Sophisticated instruments, such as HPLC, FTIR, UV	1. Preparation of required reagents. 2. Maintenance of equipments instruments. 3. Maintain stock registers. 4. Keep the lab neat and clean.
9	Mr. Abdul Khalid Mo. Anis	Laboratory Technician		D.Pharm	D.Pharm	Able to handle Sophisticated instruments,	1. Preparation of required reagents. 2. Maintenance of equipments and instruments. 3. Maintain stock registers. 4. Keep the lab neat and clean
10	Mr. Rahul S. Shirsole	Laboratory Technician		D.Pharm	D.Pharm	Able to handle Sophisticated instruments	1. Preparation of required reagents. 2. Maintenance of equipments



11	Mr. Rajesh P. Fulzade	Store Keeper	16/11/2005	B.A.	B.A.	Able to handle computers, internet & online transactions	Maintenance of store records, providing chemicals, glassware, stationary as per requisition
12	Mr. Sanjay D. Saraf	Laboratory Attendant	25/12/2001	B.Sc.	B.Sc.	Able to Operate Sophisticated instruments, in pharmaceuticals department	<ol style="list-style-type: none"> 1. Preparation of required reagents. 2. Maintenance of equipments and instruments. 3. Maintain stock registers. 4. Keep the lab neat and clean
13	Mr. Sanjay A. Patil	Laboratory Attendant	01/07/2002	HSC	HSC	Able to Operate Sophisticated instruments	<ol style="list-style-type: none"> 1. Preparation of required reagents. 2. Maintenance of equipments and instruments. 3. Keep the lab neat and clean
14	Mr. R. T. Gande	Laboratory Attendant	03/01/1997	SSC	SSC	Able to Operate Sophisticated instruments	<ol style="list-style-type: none"> 1. Preparation of required reagents. 2. Maintenance of equipments and instruments. 3. Keep the lab neat and clean
15	Mr. Sharad K. Shinde	Laboratory Attendant	01/10/2003	HSC	HSC	Able to Operate Sophisticated instruments	<ol style="list-style-type: none"> 1. Preparation of required reagents. 2. Maintenance of equipments and instruments 3. Keep the lab neat and clean
16	Mr. Dilip P. Solanki	Laboratory Attendant	17/09/1994	B.A.	B.A.	Able to Operate Sophisticated instruments	<ol style="list-style-type: none"> 1. Preparation of required reagents. 2. Maintenance of equipments and instruments. 3. Keep the lab neat and clean



17	Mr. Madhav D. Mandalkar	Laboratory Attendant	01/07/2002	B.A.	B.A.	Able to Operate Sophisticated instruments	1. Preparation of required reagents. 2. Maintenance of equipments and instruments 3. Keep the lab neat and clean
18	Mr. Nitin N. Deshmukh	Laboratory Attendant	03/10/2011	HSC	HSC	Able to Operate Sophisticated instruments	1. Preparation of required reagents. 2. Maintenance of equipments and instruments. 3. Keep the lab neat and clean
19	Mr. Kailas P. Bhonde	Laboratory Attendant	15/11/1995	HSC	HSC	Able to Operate Sophisticated instruments	1. Preparation of required reagents. 2. Maintenance of equipments and instruments. 3. Keep the lab neat and clean
20	Mr. Motiram J. Gaikwad	Laboratory Attendant	01/04/1996	SSC	SSC	Able to Operate Sophisticated instruments	1. Preparation of required reagents. 2. Maintenance of equipments and instruments. 3. Keep the lab neat and clean
21	Mr. Nilesh Pralhad Gavate	Laboratory Attendant	27/04/2022	HSC	HSC	Able to Operate Sophisticated instruments	1. Preparation of required reagents. 2. Maintenance of equipments and instruments. 3. Keep the lab neat and clean
22	Mr. Rakesh B. Tundlyat	Peon	01/11/1996	HSC	HSC	Softskills like answering queries at reception	Houskeeping, maintainance of office
23	Mr. Vijay P. Dukare	Gardener	07/01/1996	SSC	SSC	Knowledge about medicinal palnrts	Mainntainace of medicinal garden
24	Mr. Ab.Hadi Ab. Rajjak Deshmukh	Driver	13/06/2014	7th Class	7th Class	Preliminary maintenance of bus	Transportation of students by college bus



6.6.1 Availability of adequate and qualified technical supporting staff for programspecific laboratories (10)

(Assessment based on the information provided in the preceding table)

For fulfilment of the above criteria college has sufficient technical staff as per Pharmacy Council of India norms

6.6.2 Incentives, skill upgrade, and professional advancement (10)

(Assessment based on the information provided in the preceding table)

For skill upgradation and professional advancement of the Non- Teaching staff, the college conducted various seminars, demonstrations and training sessions as follows:

Year	Date	Title
2019-20	08/04/2019	Workshop on “Laboratory Safety”.
	10/06/2020	Workshop on “Using self-techniques for dealing with stress”.
	1/07/2020	One day training on “Safety measures and fire- fighting”.
2020-21	09/10/2020	Seminar on “English communication skill development”.
	15/12/2020	Demonstration and training for “Animal handling and various tissue preparation required in pharmacology laboratory”.
	11/07/2021	Demonstration and training for “Handling of various analytical instruments such as colorimeter, pH meter, U.V. Spectroscopy
2021-22	12/09/2021	Demonstration and training for “Laboratory reagents preparations”.
	15/12/2021	Demonstration and training for “Animal handling and various tissue preparation required in pharmacology laboratory”.
	02/04/2022	Demonstration and training for “Handling and maintenance of microscopes”

CRITERION 7**Continuous Improvement****75****7. Continuous Improvement (75)****7.1 Improvement in Success Index of Students without the backlog (15)**

Items	LYG (Entry Year 2017-18)	LYGm1 (Entry Year 2016 17)	LYGm2 (Entry Year 2015-2016)
success index (from 4.2.1)	0.446	0.418	0.451

$SI = (\text{Number of students who graduated from the program without backlog}) / (\text{Number of students admitted in the first year of that batch and admitted in 2nd year via lateral entry})$

Assessment shall be based on improvement trends in success indices. Marks are awarded accordingly.

7.2 Improvement in Placement and Higher Studies (15)

Assessment is based on improvement in:

- *Placement: number, quality placement, core industry, pay packages etc.*
- *Higher studies: performance in GPAT etc., and admissions in premier institutions*

Year	GPAT	No. of student qualified in GPAT	No. of students opted for higher studies
2021-22	GPAT 2022	18	15
2020-21	GPAT 2021	33	23
2019-20	GPAT 2020	29	14

Items	LYG (Entry Year 2017-18)	LYGm1 (Entry Year 2016 17)	LYGm2 (Entry Year 2015-2016)
Placement Index (from 4.7)	0.80	0.54	0.91



7.3 Improvement in the API of the Final Year Students (10)

In addition to the information provided above, our faculty educates students in a well planned manner by organizing guest lectures, workshops, seminars, industry-institute interaction, Students and staff are encouraged to attend National and International conferences, personality development programs and summer projects (the detailed information by these programmes are given in Criterion II: Evaluation and Teaching-Learning Process). The following table provides the outcome of improvement in academic performance of students at our institute.

Academic Performance Index = ((Mean of Final Year Grade Point Average of all successful Students on a 10 point scale) or (Mean of the percentage of marks of all successful students in Final Year/10)) x (successful students/number of students appeared in the examination)
Successful students are those who passed in all the final year courses

Academic Performance	CAYm1 2020-21	CAYm2 2019-20	CAYm3 2018-19
Mean Percentage of all successful students (X)	7.95	9.54	6.85
Total number of successful students (Y)	86	95	70
Total number of students appeared in the examination (Z)	86	100	88
API = X*(Y/Z)	7.95	9.06	5.44

7.4 Improvement in the quality of students admitted to the program (15)

Assessment is based on improvement in terms of ranks/score in qualifying state level/national level entrances tests, percentage marks in Physics, Chemistry and Mathematics in 12th Standard and percentage marks of the lateral entry students.



Item		CAY m1 2020-21	CAY m2 2019-20	CAY m3 2018-19
National Level Entrance Examination (Name of the Entrance Examination)	No. of Students Admitted	08	07	07
	Opening Score/Rank	90.43	78.89	79.96
	Closing Score/Rank	57.34	50.81	74.03
State/University/Level Entrance Examination/Others (MH-CET)	No. of Students Admitted	93	93	92
	Opening Score/Rank	97.98	98.12	119
	Closing Score/Rank	0.16	1.43	39
Name of the Entrance Examination for Lateral Entry or lateral entry details (Diploma examination)	No. of Students Admitted	24	14	16
	Opening Score/Rank	98.10	86.17	85
	Closing Score/Rank	67.70	67.60	60.80
Average CBSE/ Any other board result of admitted students (Physics, Chemistry and Maths)		203.31	198.51	205.50

7.5 Actions taken based on the results of evaluation of each of the POs (20)

Identify the areas of weaknesses in the program based on the analysis of evaluation of POs attainment levels. Measures identified and implemented to improve POs attainment levels for the assessment years.

Actions to be written as per table in 3.3.2.

Examples of analysis and proposed action

Sample 1-Course outcomes for a laboratory course in Pharmaceutical analysis did not measure up, as some of the laboratory instruments are not calibrated, standardized and not optimally used, as there was no laboratory work involving the use of HPLC and UV-visible spectrophotometer.

Action taken-The practical work in Pharmaceutical analysis has been upgraded by inclusion of analytical experiments involving the use of HPLC and UV-visible spectrophotometer with the help of SOPs generated.

Sample 2-In a course on Pharmaceutics theory, student performance has been consistently low with respect to some COs as analysis of answer scripts and discussions with the students revealed that this could be attributed to a weaker course and its delivery on GMP, GLP and Drug Regulatory Affairs.



Action taken-The theory course in Pharmaceutics and its delivery has been strengthened by including specific topics on quality control and quality assurance taught by experts drawn from Industry, Academia and Drug Regulatory Authorities.

Sample 3-In a course of Bio-pharmaceutics theory and practical, the students' performance has been low with respect to attainment of some COs as it was revealed that theory and practical component in physical pharmacy is weak and contributed to poor basic concepts and their applications in higher classes.

Action taken- Extra classes were arranged for the students on the emphasis of the basic concepts in physico-chemical properties like PKA, Partition Coefficient, Biopharmaceutical Classification System(BCS) and other terms.

- The Po attainment was consider on the basis of direct and indirect assessment (as per criteria 3.3.2)
- The assessment was done on a three point scale.(High= 3, Moderate = 2 & Low= 1)
- The target level For PO attainment was 50-70% of the maximum that is 1.5-2.1 for different Pos
- The courses in which the PO attainment was less than 60% of the average attainment for that PO were consider for corrective action

POs Attainment Levels and Actions for improvement –

POs	Target Level	Attainment Level	Observations
PO1: Pharmacy Knowledge: Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.			
PO1	1.5	2.81	More than the target level
In C601 Action 1: The students were asked to repeat the pharmaceutical applications of various principles studied in the subject			



PO2: Planning Abilities: Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.			
PO2	1.5	1.85	More than target level
<p>In C101, C104, C105, C107, C110 & C204 Action1: The students were given time bound task.</p> <p>In C205, C302, C307, C402, C404 & C405 Action 1: The students were asked to repeat the Pharmaceutical applications of various processes studied in the subject.</p> <p>In C501, C503, C604 & C610 Action 1: The students were asked to prepare the flowcharts for some important processes and mechanisms.</p> <p>In C703, C805, C807 Action 1: The students were asked to prepare previous question papers in the form of assignments.</p>			
PO3: Problem analysis: Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate and apply information systematically and shall make defensible decisions.			
PO3	1.5	1.94	More than target level
<p>In C101, C104, C105 & C201 Action 1: : Revision of difficult topics were conducted Each student would be given a related problem and they would be encouraged to give a solution to it.</p> <p>Action 2: C205, C402, C404, C607, C703: Different topics from theory were discussed in groups and debate was carried out on the same.</p>			
PO4: Modern tool usage: Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.			
PO4	1.5	1.82	More than the target level

<p>IN C101, C104,C105, C107, C110,</p> <p>Action 1: The students were asked to apply latest technologies and collect information for that using internet, various scientific websites.</p> <p>IN C202, C204,C205 Action 1: Revision of difficult topics were conducted .</p>			
<p>PO5: Leadership skills: Understand and consider the human reaction to change, motivation issues, leadership and team-building when planning changes required for fulfillment of practice, professional and societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and well- being.</p>			
PO5	1.5	1.19	Less than target level
<p>IN C105, C110, C111, C202, C203, C204, C205, C206, C208, C209, C210,</p> <p>Action 1: Oral presentation will be conducted on the practice of ethical frameworks; apply ethical principles while making decisions and take responsibility for the outcomes associated with the decisions.</p> <p>Action 2: Extra practice were given for solving problems where decisions must be made.</p> <p>IN C301, C302, C303, C307, C308,</p> <p>Action 1:The students will be asked to solve the related problems where they learn to make the decisions.</p> <p>IN C401, C402, C404, 406, C407, C408, C409</p> <p>Action 1: In order to improve basics extra classes will be conducted</p> <p>Action 2: Different topics from theory were discussed in groups and debate was carried out on the same.</p> <p>IN C701, C7704, C801 :</p> <p>Action 1: Revision of difficult topics that are related to understand importance of application of ethical principles in professional context.</p>			
<p>PO6: Professional Identity: Understand, analyze and communicate the value of their professional roles in society (e.g. health care professionals, promoters of health, educators, managers, employers, employees).</p>			
PO6	1.5	1.76	More than target level
<p>IN C101, C102, C104, C203, C301, C404 :</p> <p>Action 1:The applications of mathematical principles with special reference to pharmacy were revised</p>			

PO7: Pharmaceutical Ethics: Honor personal values and apply ethical principles in professional and social contexts. Demonstrate behavior that recognizes cultural and personal variability in values, communication and lifestyles. Use ethical frameworks; apply ethical principles while making decisions and take responsibility for the outcomes associated with the decisions.			
PO7	1.5	1.39	Less than target level
IN C101, C102, C104, C105, C202, 203, C204, C205, 206, C207, C301, C302, C303, C304, Action1: Oral presentations were conducted on major topics contributing to understand importance of professional ethics. IN C401, C402, C403, C503, C601, 701 : Action 1: Oral presentation were conducted on the practice of ethical frameworks Action2: In order to improve basics extra classes were conducted Action 3: Revision of difficult topics that are related to understand importance of application of ethical principles in professional context.			
PO8: Communication: Communicate effectively with the pharmacy community and with society at large, such as, being able to comprehend and write effective reports, make effective presentations and documentation, and give and receive clear instructions.			
PO8	1.5	1.71	More than target level
IN C102, C203, C206, C301, C301, 303, 304, C601, C701 Action 1: Revision of difficult topics that are related to understand importance of application of ethical principles in professional context.			
PO9: The Pharmacist and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety and legal issues and the consequent responsibilities relevant to the professional pharmacy practice.			
PO9	1.5	1.87	More than target level
IN C102, C203, C206, C301, C303, C601 : Action 1: Students were promoted to participate actively in Blood donation camps Action2 : Students were promoted to participate actively in different health checkup camps , Eye checkup camps Action 3: extra practice were given for solving problems where decisions must be made.			
PO10 Environment and sustainability: Understand the impact of the professional pharmacy solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.			
PO10	1.5	1.77	More than target level
PO11: Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self-access and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis.			
PO11	1.5	2.78	More than the target level

CRITERION 8**Student Support Systems****50****8.1 Mentoring system to help at individual levels (5)**

Type of mentoring: Professional guidance / career advancement / course work specific / laboratory specific / all-round development
 Number of faculty mentors: Number of students per mentor:
 Frequency of meeting:

(Details of the mentoring system that has been developed for the students for various purposes and also state the efficacy of such system)

An effective Student mentoring system (SMS) has already been implemented in our college. The guardian teachers are appointed for the first to final year classes. Each faculty member is assigned a fixed number of students, right at the time of their joining of the Program .i.e. approximately 25 students per mentor.

The faculty conducts periodical meeting with students in order to evaluate their academic performance and proper orientation towards the Program, as well as guide them to rectify any short comings and to solve any problems.

Following issues are discussed with students:

1. Attendance
2. Economic status
3. Behavior
4. Personal study time table
5. Study pattern
6. Extra hobby classes etc.
7. Travelling details and difficulties
8. Difficulty in writing / speech
9. Confidence level
10. Ragging
11. Hostel / Food issues
12. Girls related issues
13. In case of any other observations, it is noted and discussed.
14. Students are motivated to participate in co-curricular and extra-curricular activities.

Any discrepancies in the student behavior will be questioned and will be counseled with care



Staff will be submitting the register to the high level Mentoring /Counseling committee with members like Head of the institution, HOD

The committees will scrutinize case by case and suggest corrective measures.

If necessary the committee will have discussions with the Parents and Medical Counselor

8.2 Feedback analysis and reward /corrective measures taken, if any (10)

Feedback collected for all courses: YES/NO Specify the feedback collection process:

Percentage of students who participated: Specify the feedback analysis process: Basis of reward / corrective measures, if any: Number of corrective actions taken in the last three years:

(The institution needs to design an effective feedback questionnaire. It needs to justify that the feedback mechanism developed by the institution really helps to evaluate teaching, and finally, contributes to the quality of teaching and ensure attainment of set levels for each PO)

Feedback about the teaching staff is collected every semester. The mechanism and implementation is as described hereunder.

METHOD FOR STUDENTS' FEEDBACK COLLECTION

- This is taken at the end of each semester in the specified format.
- The feedback is analyzed for each faculty for every subject by HOD and Principal.
- However, the feedback is not shared with the teachers until the beginning of the following semester.
- As a corrective measure against possible prejudices, 10% of worst opinions are not considered while analysing the feedback.

Method of feedback Analysis

- Students' feedback format was devised after a number of discussions with the faculty and undergoes modifications as and when required.
- All students of each class are given an opportunity to express their opinion with regards to effectiveness in teaching by a teacher, which are detailed in the feedback format.
- There are always possibilities of certain students developing prejudices against a teacher if he/ she is a strict disciplinarian. This may lead to a negative impression



about the teacher concerned. This factor is taken into consideration while analysing the final students' feedback.

- There are other channels by which students can voice their grievances. These include a suggestion box. Students are also encouraged to share their views and suggestion with the mentor to whom they are assigned. If all else fails, students have an easy access to the Principal, wherein they can directly go and complain/ share their views with him.
- Regular meetings of the Principal, HOD and a few students from each class are held to get an update on syllabus completion, teaching methodology, and conduct of teaching, non-teaching and administrative staff, facilities and infrastructure. Prompt action is taken in case of any issues brought to notice by students.

Actions taken:

The following actions are taken on basis of the feedback collected.

Corrective actions

1. Teachers receiving between 50-60 % in their feedback would be counselled.
2. Strict action would be taken against teachers with less than 50% in their feedback.

8.3 Feedback on facilities (5)

(Assessment is based on feedback collection, analysis and corrective action taken in respect of library, computing facilities, canteen, sports etc.)

Feedback about all the facilities like library, laboratory, canteen, computer and internet facility etc provided by the college is collected once every semester through suggestion box. The feedback is kept anonymous and the concerned department, committee or individuals are counseled and steps are taken for corrective measures. A periodic review is conducted by the Principal along with the Vice Principals to check the changes made and if they are continued. A repeat feedback is taken verbally from a representative audience directly by the Principal wherein the students can voice their view in a confidential environment.

8.4 Self Learning (5)

(Specify the facilities, materials and scope for self-learning / learning beyond syllabus and creation of facilities for self-learning / learning beyond syllabus)



Internet facility is provided at the college; many e- journals are subscribed and made available to the students at the college library to help them develop the habit of self-learning and learning beyond syllabus.

Students are generally encouraged to attend seminars/ workshops conducted in /outside college to enable learning beyond syllabus for UG and PG students.

Following facilities are provided to students:

- Internet access to computers for the benefit of students.
- Students are motivated to prepare/attend many local, national and international conferences.
- Projects and seminars are given to students
- Accession of Journals
- Newspaper of major languages
- Digital Library

8.5 Career Guidance, Training, Placement (10)

(Specify the facility, its management and its effectiveness for career guidance including counseling for higher studies, campus placement support, industry interaction for training/internship/placement, etc.)

FACILITY:

- Experienced industry professionals in the respective domain of job profiles are invited for guest lectures.
- Through these activities, the students are made aware of the opportunities in various fields along with the required job profile. At the same time, they get a chance to interact with these industry professionals to take advantage of their experience in respective field of expertise.

FACILITY MANAGEMENT

- The students are groomed through lectures on aspects of pre-requisites for facing interviews such as preparing an effective prototype resume and effective measures and presentation skills to face an interview.
- The students are also counselled for taking up higher studies in India as well as abroad.



- A Training and placement cell is constituted for counseling career guidance including counseling for higher studies, campus placement support, industry interaction for training/internship/placement

Sr. No.	Name	Designation
1	Prof. U. M. Joshi	Placement Officer
2	Dr. P. B. Dudhe	Member
3	Prof. P. N. Folane	Member
4	Prof. P. R. Gawander	Member

EFFECTIVENESS:

- These measures have proven to be effective as it is evident that the numbers of reputed pharma companies and academicians visiting our campus have increased significantly over past three years.
- A number of pharma companies visiting the campus for campus recruitments is also increased. Many pharma companies of repute have conducted campus placement drive at our college and many students are effectively placed.
- The important companies visiting the college for campus recruitment are as follows.
 - 1) Cognizant technological solutions
 - 2) Tata Consultancy services
 - 3) Episource Mumbai
 - 4) Pritam International, Haridwar
 - 5) Sai Corporation, Kalaamb
 - 6) One Asia Network, Khamgaon
 - 7) Leben Laboratories Private LTD. Akola



S. N.	Date	Name of Speaker	Designation and Address	Seminar Topic
Academic Year 2021-22				
1	04/03/2022	Dr. Dipak Bharati	Associate Professor Saint Johns Institute of Pharmacy Palghar,	Pharmacology of Antihypertensive drugs GPAT webinar 24
2	07/02/2022	Dr. Nazma Inamdar	Prof. Govt. College of Pharmacy, Amravati	Chemistry, SAR, Pharmacology of NSAIDs GPAT webinar 23
3	24/01/2022	Dr. Harun Patel	Associate Professor R. C. Patel College of Pharmacy, Shirpur	Preparation of GPAT webinar 22
4	14/01/2022	Mr. Sunil Bhojwani	Art of living trainer	Suryanamskar for Vitality
5	09/01/2022	Mr. Niraj Thakur	Operation Specialist 1 IQVIA, Thane	TCS aptitude test Pattern & preparation
6	01/01/2022	Dr. Nazma Inamdar	Prof. Govt. College of Pharmacy, Amravati	GPAT webinar 21
7	20/12/2021	Dr. Sagar Firke	Asst. Professor Nanded College of Pharmacy Nanded	Pharmaceutical Dosage Form 20
8	18/12/2021	Dr. Rajendra B. Patil	Associate Professor JSPM's Rajshri Shahu College of Pharmacy & Research Pune	GPAT webinar 19
9	06/12/2021	Dr. Pramod Tale	District Program Officer DAPCU Civil Hospital Buldhana	Youth and HIV AIDS
10	04/12/2021	Dr. Nazma Inamdar	Prof. Govt. College of Pharmacy, Amravati	GPAT webinar 18
11	25/11/2021	Mr. Gautav Budhiraja, Mr. Yatharth Budhiraja, Mrs. Kalyani Singh	M. D. NV organics Chief Development officer NV organics Senior Manager NV organics	Future of Cosmetics: A step Closer towards organicity & sustainability
12	20/11/2021	Dr. Rajendra B. Patil	Associate Professor JSPM's Rajshri Shahu College of Pharmacy & Research Pune	GPAT webinar 17
13	29/10/2021	Dr. Rajendra B. Patil	Associate Professor JSPM's Rajshri Shahu College of Pharmacy & Research Pune	GPAT webinar 16
14	13/10/2021	Dr. Nazma Inamdar	Prof. Govt. College of Pharmacy, Amravati	How to prepare for GPAT 15
15	27/09/2021	Mr. Pawankumar P. Wankhede	Asst. Professor D. Y. Patil College of Pharmacy Akurdi	Targets of Drug Action GPAT webinar 14
16	25/08/2021	Dr. Rajendra B. Patil	Associate Professor JSPM's Rajshri Shahu College of Pharmacy & Research Pune	Pharmacology of Adrenergic drugs GPAT webinar 13
17	06/08/2021	Dr. Rajendra B. Patil	Associate Professor JSPM's Rajshri Shahu College of Pharmacy & Research Pune	GPAT webinar 12
18	05/08/2021	Dr. Nazma Inamdar	Prof. Govt. College of Pharmacy, Amravati	Anticancer drugs GPAT webinar 11



19	02/08/2021	Mr. Tushar Dodia	Personality Trainer	Interview tips
20	17/07/2021	Dr. Rajendra B. Patil	Associate Professor JSPM's Rajshri Shahu College of Pharmacy & Research Pune	Pharmacology of Cholinergic drugs GPAT webinar 10
21	09/07/2021	Dr. Nazma Inamdar	Prof. Govt. College of Pharmacy, Amravati	GPAT webinar 09
22	05/07/2021	Hon. Harishbhai Shah	Managing Director Leben Life Sciences Akola	Convocation Address
23	03/07/2021	Mr. Aijaz Nathani	Panacea Biotech Limited, Mumbai	GPAT webinar 08
24	01/07/2021	Dr. Nazma Inamdar	Prof. Govt. College of Pharmacy, Amravati	GPAT webinar 07
Academic Year 2020-21				
1	28/06/2021	Dr. Rajendra B. Patil	Associate Professor JSPM's Rajshri Shahu College of Pharmacy & Research Pune	GPAT webinar 06
2	25/06/2021	Dr. Nazma Inamdar	Prof. Govt. College of Pharmacy, Amravati	Nomenclature of heterocyclic compounds GPAT webinar 05
3	19/06/2021	Mr. Niraj Thakur and Mr. Vishal Mahajan	Operation Specialist 1 IQVIA, Thane	Interview tips for Jobs in Pharmacovigilance
4	19/06/2021	Mr. Chandrakant Sabe	Group Safety Manager, Novartis limited, Mumbai	Introduction to Pharmacovigilance
5	18/06/2021	Dr. Rajendra B. Patil	Associate Professor JSPM's Rajshri Shahu College of Pharmacy & Research Pune	Autocoids and their Antagonists GPAT webinar 04
6	10/06/2021	Dr. Rajendra B. Patil	Associate Professor JSPM's Rajshri Shahu College of Pharmacy & Research Pune	Pharmacology of CNS drugs Part 2 GPAT webinar 03
7	04/06/2021	Dr. Rajendra B. Patil	Associate Professor JSPM's Rajshri Shahu College of Pharmacy & Research Pune	Pharmacology of CNS drugs Part 1 GPAT webinar 02
8	29/05/2021	Mr. Satish Deokar	Manager Quality Compliance USV private LTd. Mumbai	Quality assurance : an essential step in pharmaceutical manufacturing
9	27/05/2021	Dr. Rajendra B. Patil	Associate Professor JSPM's Rajshri Shahu College of Pharmacy & Research Pune	Pharmacology of Diuretics GPAT webinar 01
10	17/04/2021	Dr. Mastan Sheikh	Global Team Lead, Pharmacokinetic services, Novotech, Brisbane, Australia	Role of Pharmacokinetics in drug discovery & Scope of Pharmacy in Australia
11	08/04/2021	Mr. Harshal Harlalka	Associate Director, Banner Health USA	Pharma Graduates: Opportunities Abroad
12	01/04/2021	Mr. Pankaj P. Patil	Production Manager, Alkem Labs, Baddhi	Pharmaceutical Production: the Core of Pharma Industry
13	03/03/2021	Mr. Sandeep B. Shelke	Area Manager UP, Alkon Lukhnow	Pharma Marketing: Opportunities and potential



14	22/02/2021	Mr. Krishna Jadhav	PhD Scholar NIPER Mohali	Preparation for NIPER
15	22/02/2021	Dr. Rajendra B. Patil	Associate Professor JSPM's Rajshri Shahu College of Pharmacy & Research Pune	How to prepare for GPAT
16	20/02/2021	Mr. Himanshu C. Joshi	Associate Director (Biologicals and biosimillars) Dr. Reddys Lab Hyderabad	Pharma Industry: A Freshers perspective
Academic Year 2019-20				
1	23/02/2019	Dr. M. V. Zope	Associate Vice president (Analytical Research Sunpharma, Vadodara)	Novel practice in HPLC development

8.6 Entrepreneurship Cell (5)

(Describe the facility, its management and its effectiveness in encouraging entrepreneurship and incubation)

The Entrepreneurship Development Cell aims to improve and generate a culture of innovation and development of entrepreneurial spirit amongst the students and budding entrepreneurs and start their own enterprise. It also attempts to train and equip them with the knowledge and resources they need to build a successful business.

Sr. No.	Name	Designation
1	Dr. K. R. Biyani	Chairman
2	Prof. S. D. Sargule	Member
3	Prof. D. P. Ambhore	Member
4	Prof. S. G. Phalphale	Member



FACILITY:

The Entrepreneurship Cell is formed by institute which is attached to Siddhivinayak Medical Mall and counseling centre run by trust in town. All the members of the cells are available throughout the day for the students to help them regarding starting up their own business venture. The activities are not just limited to the current students but even the alumni are encouraged to take benefits of the services offered by the cell.

TRAINING:

The students are allowed to frequent visits, seminars and interactive sessions to make them a perfect entrepreneur.

8.7 Co-curricular and Extra-curricular Activities

Apart from the academic activities, the students are also involved in various extra-curricular and co - curricular activities organized at Inter-Collegiate as well as Intra-collegiate level. Student council committee is in-charge for organizing, co-ordinating and conduction of all these activities. The Anuradha College of pharmacy arranging a different cultural as well as sports events for development of skills of students and empower students' imagination and creativity.

A] EXTRA-CURRICULAR ACTIVITIES:**a) CULTURAL ACTIVITIES :**

- **Academic Year: 2021-22**

S. N.	Event	Date
1	Orientation program	01 st August 2021
2	Pharma Ganesh Festival	10 September 2021 to 12 September 2021
3	Teachers Day	05 th September 2021
4	Health Camp	12 th Sept. 2021
5	Blood Donation Camp	25 th Sept 2021
6	Eye Checkup Camp	01 st May 2022
7	Jaipur Foot Camp	08 th May 2022
8	Dahi handi Celebration	30 th August 2021
9	Azadi ka amrut mahostav	12 th August 2022



- **Academic Year: 2020-21**

S. N.	Event	Date
1	Orientation program	01 August 2020
2	Teachers Day	05 th September 2020
3	Ayush Kadha Distribution	12 th Sept. 2020
4	Eye Checkup Camp	01 st May 2020
5	Blood Donation Camp	25 th Sept 2020
6	Ayush Kadha Distribution	08 th May 2020

Academic Year: 2019-20

S. N.	Event	Date
1	Orientation program	01 August 2019
2	Teachers Day	05 th September 2019
3	Blood Donation Camp	25 th Sept 2019
4	Eye Checkup Camp	01 st May 2020
5	Jaipur Foot Camp	08 th May 2019
6	Dahihandi Celebration	24 th Aug 2019
7	Ganesh Festival	02 th Sept. 2019
8	University Youth Festival	October 2019
9	University Sports Activity	September 2019



b) NSS ACTIVITIES:

NSS unit is successfully run by the college under SGB Amravati University with an intake capacity of 100 students

Following activities were conducted frequently under NSS

- Blood Donation camps
- Health checkup camps
- Tree plantation program
- Aids Awareness program
- Pulse polio program
- Save girl child
- Clean India Mission
- Soak pit preperation
- Sewage water management

c) SPORTS ACTIVITIES:**Following sports were conducted**

- Cricket
- Volley-ball
- Foot ball
- Badminton
- Table-tennis
- Chess
- Carom
- Athletics



CRITERION 9	Governance, Institutional Support and Financial Resources	100
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9. Governance, Institutional support and Financial Resources (100)**9.1 Organization, Governance and Transparency (50)****9.1.1 Governing body, administrative setup, functions of various bodies, service rules procedures, recruitment and promotional policies (10)**

List the governing, senate, and all other academic and administrative bodies; their memberships, functions, and responsibilities; frequency of the meetings; and attendance therein, participation of external members in a tabular form. A few sample minutes of the meetings and action-taken reports should be annexed.

The published rules, policies and procedures; year of publication and its implementation shall be listed. Also state the extent of awareness among the employees/students

Governing Body**Constitution:**

The Governing Body of Anuradha College of Pharmacy is constituted as per the directives of The Council (AICTE). The body consists of 11 members. The body is a good blend of nominees from the parent society, representatives of The Council, The Government and The affiliating University. The renowned educationists from the region are also nominated on The Governing Body. The constitution of The Governing Body is as follows

S.N.	Name of the member	Designstion
1	Shri. Siddhavinayakji K. Bondre	Chairman
2	Dr. V. R. Yadav	Member
3	Shri. Rahulbhau S. Bondre	Member
4	Shri. S. M. Wanere	Member
6	Shri. Harishbhai Shah	Member (Advisory board)
7	Dr. Tatyaroji Lahane	Member (Advisory board)
8	Shri. Omprakash Shete	Member (Advisory board)
9	Prof. (Dr.) K. R. Biyani	Member Secretary (Ex-officio)

The Principal of the college is ex-officio secretary of the Governing Body.



Functions of the Governing Body:

The Governing Body as stated earlier is the Supreme Body responsible for the management of the Institution. Its function shall include the following:

- To form the following Sub-Committees and consider the recommendations made by them:
 1. Finance Committee
 2. Equipment Committee
 3. Building Committee
 4. Staff Selection Committee
- To approve the budget estimates- recurring and non- recurring for the financial year in advance.
- To scrutinize and accept the audited statement of account yearly.
- To estimate the workload, approve the staff requirement for teaching and non- teaching (technical and administrative) for the Institute.
 - To consider and approve the proposals for creation of infrastructure such as building, equipment, library on continuous basis.
 - To consider and make provisions for meeting the general and specific conditions laid by the Council (AICTE), the State Government and Affiliating Body and monitor the progress in fulfilling the conditions.
 - To consider the report of the Principal on status of admission.
 - To consider the report of the Principal on the academic performance of the students.
 - To monitor the working conditions of the Staff as prescribed by the Affiliating Body/Government.
 - To consider the proposals of the Principal for improvement in academic performance of the Staff.
 - To consider any other matter that enhances the academic atmosphere in the Institution.
 - To consider any proposal for expansion of educational activities to be made to the Council/Government/Affiliating Body.

Frequency of meeting-

- Governing Council meets twice in a year. (Refer Annexure - IV for minutes)
- The college has a well-marked administrative set up conforming to the norms of the AICTE /PCI.
- A sample copy of Minutes of Meeting of the Governing Body is attached as Annexure-IV.

Published rules, procedures, recruitment and promotional policies, etc.

1. The rules are well defined. The policies and procedures are made clear. Rules concerned with the general administration of the college, recruitment procedure and service conditions of the staff, leave rules of the staff, policies of promotion and increment are framed properly.
2. All the newly recruited staff and the newly admitted students are made aware of these rules through orientation Programs. These are also made available on the college website.
3. Recruitment is done in transparent manner purely on the basis of merit, after notifying the vacancies in the leading newspapers.
4. Recruitment of faculty and staff for regular appointment is done by the Sant Gadge Baba Amravati University Staff Selection Committee comprising of the subject experts, the management representative and the Principal.
5. In case of immediate requirement, recruitment is done by the college Staff Selection Committee consisting of the management members, Principal and the subject experts.
6. The published rules, policies and procedures with regard to faculty and staff recruitment, promotions, leaves and retirement are made available with the college office.



9.1.2 Decentralization in working and grievance redressal mechanism (15)

List the names of the faculty members who are administrators/decision makers for various responsibilities. Specify the mechanism and composition of grievance redressal cell.

Decentralization in working is achieved by constitution of following sub committees.

1. Finance Committee

Sr.	Name	Designation
1	Shri. Rahulbhau S. Bondre	Chairman
2	Prof. (Dr.) K. R. Biyani	Member
3	Shri. S. M. Wanere	Member
4	Shri.. S. M. Bondre	Member

2. Equipment Committee

Sr.	Name	Designation
1	Prof. (Dr.) K. R. Biyani	Chairman
2	Prof. (Dr.) A. A. Gawai	Member
3	Prof. (Dr) A. A. Shaikh	Member
4	Prof. (Ms.) S. G. Phalphale	Member

3. Building Committee

Sr.	Name	Designation
1	Shri. Rahulbhau S. Bondre	Chairman
2	Prof. (Dr.) K. R. Biyani	Member
3	Shri.. S. M. Wanere	Member
4	Shri.. Narayan Patil	Site Engineer

4. Staff Selection Committee

Sr.	Name	Designation
1	Shri. Rahulbhau S. Bondre	Chairman
2	Shri. S. M. Wanere	Member
3	Prof. (Dr.) K. R. Biyani	Member
4	Shri.. U. M. Joshi	Member



Grievance is addressed by the presence and functioning of the following bodies in the college:

Grievance Redressal Committee

The college has a Grievance Redressal Cell; the committee members are nominated by the Principal of the college and it works under his supervision, for solving grievance of students, staff & parents. The composition of the cell is as given below:

Sr.	Name	Designation
1	Prof. (Dr.) K. R. Biyani	Chairman (Principal)
2	Dr. S. C. Kale	Member (Teaching staff representative)
3	Mr.D. P. Ambhore	Member (Teaching staff representative)
4	Miss. S. D. Tupkar	Member (Teaching staff representative)
5	Mr. V. D. Patil	Member(Non teaching staff representative)
6	Mr. Santosh Hake	Member (Parent Representative)
7	Miss. Pranjal Tupkar	Member(Student Representative)
8	Mr. Mahesh Kale	Member(Student Representative)

Mechanism

The students are the main stakeholders in any institution imparting education, and it is our endeavor to make all efforts to ensure transparency in all the activities at different stages.

The grievances may broadly include the following complaints of the aggrieved students

a. Academic (Grievance related to assessment, Grievance related to victimization

Grievance related to attendance, Grievance related to charging of fees, Grievance regarding conducting of examinations, completion of syllabus, teaching methods etc)

b. Non-Academic (Harassment by colleague /students or the teachers complaints regarding class room teaching, class room management etc.)

Complaints by students, parents and staff can be made in writing or oral to the Principal/ Staff.

This complaint is then resolved by discussion in meeting by the committee and if required the aggrieved may be involved



Anti - Ragging Committee

The committee members are nominated by the Principal of the college and they work under his supervision.

Sr.	Name	Designation
01	Prof (Dr.) K. R. Biyani	Chairman
02	Prof. U. M. Joshi	Faculty Member
03	Mr. D. P. Ambhore	Faculty Member
04	Mr. V. F. Kakad	Police Representative
05	Mr. Samadhan Gadekar	Media Representative
06	Mr. V. D. Patil	Non-teaching staff
07	Mr. D. N. Tupkar	Civil Representative
08	Mr. Mohanappa Bondre	Parent Representative
09	Miss. Snehal Kedar	Student Representative
10	Mr. Saurabh Bondre	Student Representative

Anti-Ragging Squad

Sr.	Name
01	Prof. U. M. Joshi
02	Prof. D. P. Ambhore
03	Miss. S. G. Phalphale
04	Miss. P. R. Gawandar
05	Mr. V. D. Patil

Mechanism:

- The committee has a mechanism in place by means of which it ensures compliance with the UGC regulation 2009 for curbing the menace of ragging at institute level.
- The committee monitors and oversees the performance of Anti-ragging squad in prevention of ragging in the institution
- Every student admitted to the course is asked to submit an on-line affidavit stating that he/she will not indulge in any act of ragging.
- Posters have been displayed in the campus indicating that ragging is strictly prohibited in the institution and the penalty measures to be taken thereof.
- List of Anti-ragging committee members along with their personal contact numbers have been displayed on college notice board so that the victims may approach any of these members to address the issue of ragging.



Implementation

- An Anti-ragging squad is nominated by the Principal with the representation from the campus community.
- It makes surprise raids in girls' and boys' common rooms and hostels and other places vulnerable to incidents of and having the potential of ragging.
- It conducts on the spot enquiry in to any incident of ragging.
- The committee maintains alert vigil at all times and ensures that the Anti- ragging squad of the institution carry out their functions properly.

Committee For SC & ST

Sr.	Name	Designation
01	Prof.(Dr.) K. R. Biyani	Chairman
02	Adv. Mr. Vilas N. Nanhai	Liaison Officer
03	Prof. (Dr.) A. A. Gawai	Member
04	Prof. Dr. A. A. Shaikh	Member
05	Mr. N. G. Jadhao	Member
06	Mr. S. B. Jadhao	Member
07	Miss. Renuka Zarekar	Student Representative
08	Mr. Shubham Mahajan	Student Representative

Mechanism:

- Any staff or student from college who wants to file a complaint can write to members of SC/ST committee or file an oral or written complaint addressed to the Chairman of the Cell.
- The complaint shall include the specific nature of the incident, date and the place of the incident, name of all parties involved as well as a detailed report of all pertinent facts.
- If any oral or written complaint is made to the Principal or any of the Committee members, they may forward it to the Chairman of the Committee.
- Investigation will be conducted as quickly as possible and confidentiality shall be maintained during investigation.
- The committee in consultation with the management can take the following putative actions.



Punitive Action: Depending on the nature and severity of the offence, one or more of the following putative action(s) may be implemented:

For Employees:

- Written apology
- Warning
- Withholding of increments.
- Demotion / transfer to lower / other service, grade or post.
- Compulsory retirement.
- Termination of service / Dismissal from service

For Students:

- Written apology
- Warning
- Withholding / withdrawing Scholarship / Fellowship and Other Benefits.
- Rustication from the college for a known period.
- Expulsion from the college.

Women Development Cell (Internal Complaint Committee)

Grievances related to women are addressed by a women development cell. The college has formed an internal complaints committee (Sexual harassment of women at work place prevention prohibition and redressal act 2013). The composition is as given below:

S.N.	Name	Designation
1	Miss. S. G. Phalphale	Chairperson
2	Prof. S. P. Dudhe	Faculty Member
3	Prof. R. A. Ingle	Faculty Member
4	Mr. S. P. Nikalje	Non teaching staff Member
5	Adv. Sau. Vrushalitali Bondre	Member
6	Miss. Snehal Chavhan	Student nominee
7	Rnuka Zarekar	Student nominee



Mechanism:

- Any woman or girl student from college who wants to file a complaint can write to members of anti-Sexual Harassment Cell/ CWDC/Internal complaints committee or file an oral or written complaint addressed to the Chairperson of the Cell.
- The complaint shall include the specific nature of the incident, date and the place of the incident, name of all parties involved as well as a detailed report of all pertinent facts.
- If any oral or written complaint is made to the Principal or any of the Committee members, they may forward it to the Chairperson of the Committee.
- Investigation will be conducted as quickly as possible and confidentiality shall be maintained during investigation.
- The committee in consultation with the management can take the following putative actions.

Putative Action: Depending on the nature and severity of the offence, one or more of the following putative action(s) may be implemented:

For Employees:

- Written apology
- Warning
- Withholding of increments.
- Demotion / transfer to lower / other service, grade or post.
- Compulsory retirement.
- Termination of service / Dismissal from service

For Students:

- Written apology
- Warning
- Withholding / withdrawing Scholarship / Fellowship and Other Benefits.
- Rustication from the college for a known period.
- Expulsion from the college.



9.1.3. Delegation of financial powers (15)

Explicitly mention financial powers delegated to the Principal, Heads of Departments and relevant in-charges. Demonstrate the utilization of financial powers for each year of the assessment years.

1. The financial sub-committee comprises of Shri Rajesh S. Bondre (Secretary, PRMSS) as the Chairman, Shri S.M. Wanere (Trustee), The Principal, one teaching and one non teaching staff members.
2. The Governing body has delegated financial powers to the Member Secretary.
3. Budget allocation is decided by the above committee.
4. The budget is utilized for purchase of equipment, maintenance, consumables and other miscellaneous expenses.
5. Accounts are audited once in a year.

9.1.4 Transparency and availability of correct/unambiguous information in public domain (10)

Information on the policies, rules, processes is to be made available on web site.

All faculty and staff are aware of the rules and regulations and various policies announced from time to time. All committees as indicated above function and report to the management for smooth running of the institution and its activities. The instructions both academic and administrative are announced in a systemic manner through notice boards and circulations. Most of the notices are circulated online through emails and Whats app.

The following rules and codes of conduct have been displayed on the website.

- 1) Rules for admissions to diploma course in pharmacy are as per DTE norms.
- 2) Rules for reservation
- 3) Rules for fee structure
- 4) Reimbursement of tuition fee
- 5) Cancellation of admission and refund of fees
- 6) Code of conduct
- 7) Rules for attendance
- 8) Rules for examination
- 9) Rules for detention



9.2 Budget Allocation, Utilization, and Public Accounting at Institute level (30)

Summary of current financial year's budget and actual expenditure incurred (for the institution exclusively) in the three previous financial years.

Total Income at Institute level: For CFY, CFYm1, CFYm2 & CFYm3

CFY: Current Financial Year, CFYm1 (Current Financial Year minus 1), CFYm2 (Current Financial Year minus 2) and CFYm3 (Current Financial Year minus 3)

B. Pharm For CFY(2021-22*)

Total Income 37,735,516				Actual Expenditure 27,059,055			Total Number of students 479
Fees	Govt.	Grants	Other sources	Recurring including salaries	Non Recurring	Special projects/any other specify	Expenditure per student
33133189	-	-	4602327	23537271	3521784	-	56490.72

*Audit of balance sheet for F.Y. 2017-18 is in progress, hence there may be some changes in the above figures

B. Pharm For CFY m1 (2020-21)

Total Income 534136268				Actual Expenditure 26320039			Total Number of students 435
Fees	Govt.	Grants	Other sources	Recurring including salaries	Non Recurring	Special projects/any other specify	Expenditure per student
28578814	-	-	5557454	24522375	1807664	-	60528.82



B. Pharm For CFY m2(2019-20)

Total Income 29958656				Actual Expenditure 29657961			Total Number of students 418
Fees	Govt.	Grants	Other sources	Recurring including salaries	Non Recurring	Special projects/any other specify	Expenditure per student
26926976	-	-	3031680	24077783	5580178	-	70952.05

B. Pharm For CFYm 3 (2018-19)

Total Income 32364279				Actual Expenditure 29937719			Total Number of Students 399
Fees	Govt.	Grants	Other sources	Recurring including salaries	Non Recurring	Special projects/any other specify	Expenditure per student
29364771	-	-	2999508	21722140	8215579	-	75031.87



Note: Similar tables are to be prepared for CFYm1, CFYm2 & CFYm3. For B. Pharmacy

Items	Budgeted in CFY 2021-22	Actual expenses in CFY (till 2021-22 ...)	Budgeted in CFYm1 2020-21	Actual Expenses in CFYm1 2020-21	Budgeted in CFYm2 2019-20	Actual Expenses in CFYm2 2019-20	Budgeted in CFYm3 2018-19	Actual Expenses in CFYm3 2018-19
Infrastructure Built-Up	1300000	1266442	750000	725099	550000	514483	900000	883283
Library	300000	282325	70000	66640	500000	471478	100000	-
Laboratory Equipment	150000	165277	150000	125620	250000	212272	900000	862890
Laboratory consumables	100000	29650	100000	-	100000	30671	500000	501177
Teaching and non-teaching staff salary	22500000	22403837	20250000	20248050	21000000	20613629	20000000	19372162
Maintenance and spares	360000	353987	150000	125398	700000	693536	900000	877718
R&D	-	-	-	-	-	-	-	-
Training and Travel	350000	323070	20000	16500	300000	273539	200000	194068
Miscellaneous expenses *	100000	82055	300000	290108	900000	864683	700000	681298
Others, Specify	2200000	2152412	5000000	4732624	6000000	5983670	7000000	6565123
Total	27160000	27059055	26790000	26330039	30300000	29657961	31200000	29937719

9.2.1 Adequacy of budget allocation (10)

Justify that the budget allocated over the years was adequate.

Financial Year	Budget Allocated	Actual Expenses	% utilization	Adequate/inadequate
CFY(2021-22)	27160000	27059055	99.62	Adequate
CFYm1(2020-21)	26790000	26330039	88.20	Adequate
CFYm2(2019-20)	30300000	29657961	97.87	Adequate
CFYm3(2018-19)	31200000	29937719	95.95	Adequate

As the actual expenses incurred during the above financial years were just close to the budgeted amount the budget was consider adequate

9.2.2 Utilization of allocated funds (15)

State how the budget was utilized during the last three years.

Items	Budgeted in CFY 2021-22	Actual expenses in CFY (till 2021-22 ...)	Budgeted in CFYm1 2020-21	Actual Expenses in CFYm1 2020-21	Budgeted in CFYm2 2019-20	Actual Expenses in CFYm2 2019-20	Budgeted in CFYm3 2018-19	Actual Expenses in CFYm3 2018-19
Infrastructure Built-Up	1300000	1266442	750000	725099	550000	514483	900000	883283
Library	300000	282325	70000	66640	500000	471478	100000	-
Laboratory Equipment	150000	165277	150000	125620	250000	212272	900000	862890
Laboratory consumables	100000	29650	100000	-	100000	30671	500000	501177
Teaching and non-teaching staff salary	22500000	22403837	20250000	20248050	21000000	20613629	20000000	19372162
Maintenance and spares	360000	353987	150000	125398	700000	693536	900000	877718
R&D	-	-	-	-	-	-	-	-
Training and Travel	350000	323070	20000	16500	300000	273539	200000	194068
Miscellaneous expenses *	100000	82055	300000	290108	900000	864683	700000	681298
Others, Specify	2200000	2152412	5000000	4732624	6000000	5983670	7000000	6565123
Total	27160000	27059055	26790000	26330039	30300000	29657961	31200000	29937719

The above table indicates the budget heads and the corresponding expenses during last three financial years. The figures indicates appropriate expenditure against each financial year

9.2.3 Availability of the audited statements on the institute's website (5)

Needs to make audited statements available on its website.

The Audited statements for the last three financial years (2019-20, 2020-21, 2021-22)are available.

9.3 Library and Internet (20)

It is assumed that zero deficiency report was received by the institution, Effective availability and utilization to be demonstrated.

9.3.1 Quality of learning resources (hard/soft) (10)

Relevance of available learning resources including e-resources Accessibility to students

1. Library is automated with: SOFTLIB 5.0 with barcode system

2. Relevance of available learning resources including e-resources

- ❖ No. of Volumes:15169
- ❖ No. of Titles:4310
- ❖ No. of newspaper: 05
- ❖ National Journals: 15
- ❖ International Journals-10
 - DELNET (Developing Library Network)

3. E-information resource

- CDS - 25

4. Digital Library

- No. of PCs: 10
- Internet facility available : 100 mbps speed

Accessibility to students: **10.00 am to 6.00 pm**

9.3.2 Internet (10)

- Name of the Internet provider : Orange
- Available bandwidth: 100 mbps
- Wi Fi availability : Yes
- Internet access in labs, classrooms, library and other offices: Yes
- Security arrangements: Yes (Quickheal)



Declaration

The head of the institution needs to make a declaration as per the format given below:

I undertake that, the institution is well aware about the provisions in the NBA's accreditation manual concerned for this application, rules, regulations, notifications and NBA expert visit guidelines in force as on date and the institute shall fully abide by them.

It is submitted that information provided in this Self Assessment Report is factually correct. I understand and agree that an appropriate disciplinary action against the Institute will be initiated by the NBA in case any false statement/information is observed during pre-visit, visit, post-visit and subsequent to grant of accreditation.

Date: 21/10/2022

Place: CHIKHLI



Signature, Name and Designation
of the Head of the Institution with seal

Dr. K. R. Biyani

Principal

Anuradha College of Pharmacy
Chikhli Dist. Buldana

ANNEXURE-I (PROGRAM OUTCOMES)



ANNEXURE I: PROGRAM OUTCOMES

- 1. Pharmacy Knowledge:** Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.
- 2. Planning Abilities:** Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.
- 3. Problem analysis:** Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate and apply information systematically and shall make defensible decisions.
- 4. Modern tool usage:** Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.
- 5. Leadership skills:** Understand and consider the human reaction to change, motivation issues, leadership and team-building when planning changes required for fulfillment of practice, professional and societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and well-being.
- 6. Professional Identity:** Understand, analyze and communicate the value of their professional roles in society (e.g. health care professionals, promoters of health, educators, managers, employers, employees).
- 7. Pharmaceutical Ethics:** Honour personal values and apply ethical principles in professional and social contexts. Demonstrate behavior that recognizes cultural and personal variability in values, communication and lifestyles. Use ethical frameworks; apply ethical principles while making decisions and take responsibility for the outcomes associated with the decisions.
- 8. Communication:** Communicate effectively with the pharmacy community and with society at large, such as, being able to comprehend and write effective reports, make



effective presentations and documentation, and give and receive clear instructions.

- 9. The Pharmacist and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety and legal issues and the consequent responsibilities relevant to the professional pharmacy practice.
- 10. Environment and sustainability:** Understand the impact of the professional pharmacy solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
- 11. Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self-assess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis



ANNEXURE-II

(FACULTY INFORMATION AND CONTRIBUTION)

(AS PER CRITERION 5)



Academic Year 2021-2022

Sr. No.	Name of the Faculty Member	Qualification			Association with the Institution	Designation	Date of Joining the Institution	Department	Specialization	Academic Research				
		Degree (highest degree)	University	Year of Graduation						Research Paper Publications	Ph.D. Guidance	Faculty Receiving Ph.D. during the Assessment Years	Sponsored Research (Funded Research)	Consultancy and Product
1.	Dr. K.R. Biyani	Ph.D.	SGBAU, Amravati	1994	17 Yrs	Principal	25-07-2005	P'cology	P'cology	49	12	1	-	-
2.	Mr. U.M. Joshi	M.Pharm	SGBAU, Amravati	1994	28 Yrs	Asso. Professor	25-08-1994	P'ceutics	P'ceutics	0	-	-	-	-
3.	Dr. A. A. Gawai	Ph.D.	Dibrugarh Uni. Dibrugarh	2004	10 Yrs	Professor	08-12-2011	Pharma. Chemistry	Pharma. Chemistry	11	-	-	-	-
4.	Dr. A.A. Sheikh	Ph.D.	JJTU, Jhunjunu	2005	13 Yrs	Professor	23-06-2009	P'ceutics	Industrial Pharmacy	12	-	-	-	-
5.	Dr. S.C. Kale	Ph.D.	MRJP Uni. Jaipur	2006	10 Yrs	Professor	25-07-2012	Pharma. Chemistry	Pharma. Chemistry	2	-	-	-	-
6.	Dr. G.V. Bihani	Ph.D.	Bharti Vidyapeeth Deemed Uni. Pune	2010	01 Yr	Professor	16-01-2021	P'cology	P'cology	10	-	-	-	-
7.	Dr. P.B. Dudhe	Ph.D.	Nirma University, Ahmedabad	2004	02 Yrs	Professor	27-11-2020	Pharma. Chemistry	Pharma. Chemistry	6	-	-	-	-
8.	Mr. D.P. Ambhore	M.Pharm	Bharti Vidyapeeth Deemed Uni. Pune	2002	18 Yrs	Asso. Professor	08-08-2004	Pharma. Chemistry	Pharma. Chemistry	1	-	-	-	-
9.	Ms. S.G. Phalphale	M.Pharm	University of Pune. Pune	2003	18 Yrs	Asso. Professor	18-08-2004	P'cology	P'cology	-	-	-	-	-
10.	Mr. S.D. Sagrule	M.Pharm	SGBAU, Amravati	2012	08 Yrs	Asso. Professor	11-11-2014	P'cognosy	P'cognosy	4	-	-	-	-
11.	Mr. P.N. Folane	M.Pharm	SGBAU, Amravati	2013	05 Yrs	Asso Professor	01-01-2017	P'cology	P'cology	20	-	-	-	-



12.	Mrs. R.A. Ingle	M.Pharm	SGBAU, Amravati	2014	05 Yrs	Asst. Professor	03-01-2017	P'cology	P'cology	-	-	-	-	-
13.	Mr. K.S. Tayde	M.Pharm	SGBAU, Amravati	2010	05 Yrs	Asso. Professor	05-02-2016	Pharma. Chemistry	Quality Assurance	-	-	-	-	-
14.	Mrs. M.G. Chitte	M.Pharm	SGBAU, Amravati	2011	05 Yrs	Asst. Professor	03-01-2017	Pharma. Chemistry	Pharma. Chemistry	-	-	-	-	-
15.	Mr. C.P. Nagwani	M.Pharm	SGBAU, Amravati	2014	05 Yrs	Asso. Professor	05-02-2016	P'ceutics	P'ceutics	-	-	-	-	-
16.	Mr. S.S. Bharad	M.Pharm	SGBAU, Amravati	2014	05 Yrs	Asso. Professor	05-02-2016	P'ceutics	P'ceutics	-	-	-	-	-
17.	Mrs. J.B. Khedekar	M.Pharm	SGBAU, Amravati	2011	04 Yrs	Asst. Professor	25-07-2018	P'ceutics	P'ceutics	3	-	-	-	-
18.	Ms. P.R. Gawandar	M.Pharm	Dr. B.A.M. Uni., Aurangabad	2015	04 Yrs	Asst. Professor	27-07-2018	P'ceutics	P'ceutics	3	-	-	-	-
19.	Mr. S.P. Popalghat	M.Pharm	SGBAU, Amravati	2014	03 Yrs	Asst. Professor	01-08-2019	P'ceutics	P'ceutics	0	-	-	-	-
20.	Ms. P.P. Dusad	M.Pharm	K.B.C. N.M.Uni. Jalgaon	2017	02 Yrs	Asst. Professor	01-07-2020	Pharma. Chemistry	Quality Assurance	-	-	-	-	-
21.	Mr. G.V. Theng	M.Pharm	SGBAU, Amravati	2018	02 Yrs	Asst. Professor	21-10-2020	Pharma. Chemistry	Quality Assurance	-	-	-	-	-
22.	Mrs. S.P. Dudhe	M.Pharm	University of Pune. Pune	2008	02 Yrs	Asst. Professor	27-11-2020	Pharma. Chemistry	Pharma. Chemistry	-	-	-	-	-
23.	Mr. V.S. Dhote	M.Pharm	SRTM Uni. Nanded	2018	01 Yr	Asst. Professor	01-12-2021	Pharma. Chemistry	Quality Assurance	-	-	-	-	-
24.	Ms. P.D. Gadekar	M.Pharm	K.B.C. N.M.Uni. Jalgaon	2018	02 Yrs	Asst. Professor	01-07-2020	P'cology	P'cology	-	-	-	-	-
25.	Mr. R.D. Kalwe	M.Pharm	SGBAU, Amravati	2009	01 Yr	Asso. Professor	30-01-2021	P'ceutics	P'ceutics	-	-	-	-	-
26.	Mrs. A.R. Kale	M.Pharm	SGBAU, Amravati	2012	03 Yrs	Asso. Professor	19-08-2019	P'ceutics	P'ceutics	-	-	-	-	-
27.	Ms. M.D. Usar	M.Pharm	SGBAU, Amravati	2013	03 Yrs	Asst. Professor	01-08-2019	P'ceutics	P'ceutics	-	-	-	-	-
28.	Ms. P.C. Rathi	M.Pharm	RTM Nagpur Uni. Nagpur	2010	03 Yrs	Asst. Professor	14-11-2019	P'ceutics	P'ceutics	-	-	-	-	-
29.	Mr. R.D. Pawar	M.Pharm	SGBAU, Amravati	2017	03 Yrs	Asst. Professor	01-01-2019	P'ceutics	P'ceutics	-	-	-	-	-



30.	Mr. N.S. Waghmare	M.Pharm	SGBAU, Amravati	2014	01 Yr	Asst. Professor	01-12-2021	P'ceutics	P'ceutics	-	-	-	-	-
31.	Ms. P.V. Sonune	M.Pharm	Savitribai Phule Pune Uni. Pune	2012	02 Yrs	Asst. Professor	01-01-2020	Pharma. Chemistry	Quality Assurance	-	-	-	-	-
32.	Ms. V.D. Deshmane	M.Pharm	SGBAU, Amravati	2016	03 Yrs	Asst. Professor	01-01-2019	P'ceutics	P'ceutics	-	-	-	-	-
33.	Mr. S.B. Patil	M.Pharm	SGBAU, Amravati	2018	01 Yr	Asst. Professor	19-11-2021	Pharma. Chemistry	Quality Assurance	-	-	-	-	-
34.	Mr. G.S. Bhojane	M.Pharm	SGBAU, Amravati	2010	01 Yr	Asst. Professor	16-01-2022	P'cognosy	P'cognosy	-	-	-	-	-
35.	Mr. S.S. Harlalka	B.Pharm	SGBAU, Amravati	2016	03 Yrs	Lecturer	01-01-2019	Pharmacy	Pharmacy	-	-	-	-	-
36.	Mr. S.R. Solanke	B.Pharm	SGBAU, Amravati	2015	01 Yr	Lecturer	01-12-2021	Pharmacy	Pharmacy	-	-	-	-	-
37.	Mr. Firoj Abdul Hadi Deshmukh	B.Pharm	SGBAU, Amravati	2018	01 Yr	Lecturer	01-12-2021	Pharmacy	Pharmacy	-	-	-	-	-
38.	Mr. A.N. Sulakhe	B.Pharm	SGBAU, Amravati	2008	01 Yr	Lecturer	01-12-2021	Pharmacy	Pharmacy	-	-	-	-	-
39.	Mr. D.S. Belokar	B.Pharm	SGBAU, Amravati	2016	01 Yr	Lecturer	16-12-2021	Pharmacy	Pharmacy	-	-	-	-	-
40.	Mr. P.S. Lambe	B.Pharm	SGBAU, Amravati	2012	01Yr	Lecturer	01-12-2021	Pharmacy	Pharmacy	-	-	-	-	-

Table B.5



Academic Year 2020-2021

Sr. No.	Name of the Faculty Member	Qualification			Association with the Institution	Designation	Date of Joining the Institution	Department	Specialization	Academic Research				
		Degree (highest degree)	University	Year of Graduation						Research Paper Publications	Ph.D. Guidance	Faculty Receiving Ph.D. during the Assessment Years	Sponsored Research (Funded Research)	Consultancy and Product
1.	Dr. K.R. Biyani	Ph.D.	SGBAU, Amravati	1994	16 Yrs	Principal	25-07-2005	P'cology	P'cology	49	12	1	-	-
2.	Mr. U.M. Joshi	M.Pharm	SGBAU, Amravati	1994	27 Yrs	Asso. Professor	25-08-1994	P'ceutics	P'ceutics	-	-	-	-	-
3.	Dr. A. A. Gawai	Ph.D.	Dibrugarh Uni. Dibrugarh	2004	09 Yrs	Professor	08-12-2011	Pharma. Chemistry	Pharma. Chemistry	11	-	-	-	-
4.	Dr. A.A. Sheikh	Ph.D.	JJTU, Jhunjunu	2005	12 Yrs	Professor	23-06-2009	P'ceutics	Industrial Pharmacy	12	-	-	-	-
5.	Dr. S.C. Kale	Ph.D.	MRJP Uni. Jaipur	2006	09 Yrs	Professor	25-07-2012	Pharma. Chemistry	Pharma. Chemistry	2	-	-	-	-
6.	Dr. G.V. Bihani	Ph.D.	Bharti Vidyapeeth Deemed Uni. Pune	2010	01 Yr	Professor	16-01-2021	P'cology	P'cology	10	-	-	-	-
7.	Dr. P.B. Dudhe	Ph.D.	Nirma University, Ahmedabad	2004	01 Yrs	Professor	27-11-2020	Pharma. Chemistry	Pharma. Chemistry	6	-	-	-	-
8.	Mr. D.P. Ambhore	M.Pharm	Bharti Vidyapeeth Deemed Uni. Pune	2002	17 Yrs	Asso. Professor	08-08-2004	Pharma. Chemistry	Quality Assurance	1	-	-	-	-
9.	Ms. S.G. Phalphale	M.Pharm	University of Pune. Pune	2003	17 Yrs	Asso. Professor	18-08-2004	P'cology	P'cology	-	-	-	-	-
10.	Mr. S.D. Sagrule	M.Pharm	SGBAU, Amravati	2012	07 Yrs	Asso. Professor	11-11-2014	P'cognosy	P'cognosy	4	-	-	-	-
11.	Mr. P.N. Folane	M.Pharm	SGBAU, Amravati	2013	04 Yrs	Asso. Professor	01-01-2017	P'cology	P'cology	20	-	-	-	-
12.	Mrs. R.A. Ingle	M.Pharm	SGBAU, Amravati	2014	04 Yrs	Asst. Professor	03-01-2017	P'cology	P'cology	-	-	-	-	-
13.	Mr. K.S. Tayde	M.Pharm	SGBAU, Amravati	2010	04 Yrs	Asso. Professor	05-02-2016	Pharma. Chemistry	Quality Assurance	-	-	-	-	-
14.	Mrs. M.G. Chitte	M.Pharm	SGBAU, Amravati	2011	04 Yrs	Asst. Professor	03-01-2017	Pharma. Chemistry	Pharma. Chemistry	-	-	-	-	-
15.	Mr. C.P. Nagwani	M.Pharm	SGBAU, Amravati	2014	04 Yrs	Asso. Professor	05-02-2016	P'ceutics	P'ceutics	-	-	-	-	-
16.	Mr. S.S. Bharad	M.Pharm	SGBAU, Amravati	2014	04 Yrs	Asso. Professor	05-02-2016	P'ceutics	P'ceutics	-	-	-	-	-
17.	Mrs. J.B. Khedekar	M.Pharm	SGBAU, Amravati	2011	03 Yrs	Asst. Professor	25-07-2018	P'ceutics	P'ceutics	3	-	-	-	-



18.	Ms. P.R. Gawandar	M.Pharm	Dr. B.A.M. Uni., Aurangabad	2015	03 Yrs	Asst. Professor	27-07-2018	P'ceutics	P'ceutics	3	-	-	-	-
19.	Mr. S.P. Popalghat	M.Pharm	SGBAU, Amravati	2014	02 Yrs	Asst. Professor	01-08-2019	P'ceutics	P'ceutics	-	-	-	-	-
20.	Ms. P.P. Dusad	M.Pharm	K.B.C. N.M.Uni. Jalgaon	2017	01 Yrs	Asst. Professor	01-07-2020	Pharma. Chemistry	Quality Assurance	-	-	-	-	-
21.	Mr. G.V. Theng	M.Pharm	SGBAU, Amravati	2018	01 Yrs	Asst. Professor	21-10-2020	Pharma. Chemistry	Quality Assurance	-	-	-	-	-
22.	Mrs. S.P. Dudhe	M.Pharm	University of Pune. Pune	2008	01 Yrs	Asst. Professor	27-11-2020	Pharma. Chemistry	Pharma. Chemistry	-	-	-	-	-
23.	Mr. D.T. Panjwani	M.Pharm	Dr. MGR Medical Uni. Chennai	2008	10 Yrs	Asso. Professor	08-03-2010	P'ceutics	Pharma. Biotechnology	2	-	-	-	-
24.	Ms. P.D. Gadekar	M.Pharm	K.B.C. N.M.Uni. Jalgaon	2018	01 Yrs	Asst. Professor	01-07-2020	P'cology	P'cology	-	-	-	-	-
25.	Mr. R.D. Kalwe	M.Pharm	SGBAU, Amravati	2009	01 Yr	Asso. Professor	30-01-2021	P'ceutics	P'ceutics	-	-	-	-	-
26.	Mrs. A.R. Kale	M.Pharm	SGBAU, Amravati	2012	02 Yrs	Asso. Professor	19-08-2019	P'ceutics	P'ceutics	-	-	-	-	-
27.	Ms. M.D. Usar	M.Pharm	SGBAU, Amravati	2013	02 Yrs	Asst. Professor	01-08-2019	P'ceutics	P'ceutics	-	-	-	-	-
28.	Ms. P.C. Rathi	M.Pharm	RTM Nagpur Uni. Nagpur	2010	02 Yrs	Asst. Professor	14-11-2019	P'ceutics	P'ceutics	-	-	-	-	-
29.	Mr. R.D. Pawar	M.Pharm	SGBAU, Amravati	2017	02 Yrs	Asst. Professor	01-01-2019	P'ceutics	P'ceutics	-	-	-	-	-
30.	Ms. P.P. Ambhore	M.Pharm	SGBAU, Amravati	2017	02 Yrs	Asst. Professor	01-08-2019	Pharma. Chemistry	Quality Assurance	-	-	-	-	-
31.	Ms. P.V. Sonune	M.Pharm	Savitribai Phule Pune Uni. Pune	2012	01 Yrs	Asst. Professor	01-01-2020	Pharma. Chemistry	Quality Assurance	-	-	-	-	-
32.	Ms. V.D. Deshmane	M.Pharm	SGBAU, Amravati	2016	02 Yrs	Asst. Professor	01-01-2019	P'ceutics	P'ceutics	-	-	-	-	-
33.	Mrs. S.S. Deshmane	M.Pharm	SGBAU, Amravati	2011	03 Years	Asst. Professor	10-11-2014	Pharma. Chemistry	Quality Assurance	-	-	-	-	-
34.	Mr. S.S. Harlalka	B.Pharm	SGBAU, Amravati	2016	02 Yrs	Lecturer	01-01-2019	Pharmacy	Pharmacy	-	-	-	-	-

Table B.5



Academic Year 2019-2020

Sr. No.	Name of the Faculty Member	Qualification			Association with the Institution	Designation	Date of Joining the Institution	Department	Specialization	Academic Research			Sponsored Research (Funded Research)	Consultancy and Product Development
		Degree (highest degree)	University	Year of Graduation						Research Paper Publications	Ph.D. Guidance	Faculty Receiving Ph.D. during the Assessment Years		
1.	Dr. K.R. Biyani	Ph.D.	SGBAU, Amravati	1994	15 Yrs	Principal	25-07-2005	P'cology	P'cology	49	12	1	-	-
2.	Mr. U.M. Joshi	M.Pharm	SGBAU, Amravati	1994	26 Yrs	Asso. Professor	25-08-1994	P'ceutics	P'ceutics	-	-	-	-	-
3.	Dr. A. A. Gawai	Ph.D.	Dibrugarh Uni. Dibrugarh	2004	8 Yrs	Professor	08-12-2011	Pharma. Chemistry	Pharma. Chemistry	11	-	-	-	-
4.	Dr. A.A. Sheikh	Ph.D.	JJTU, Jhunjunu	2005	11 Yrs	Professor	23-06-2009	P'ceutics	Industrial Pharmacy	12	-	-	-	-
5.	Dr. V.J. Chaware	Ph.D.	Dr. MGR Medical Uni. Chennai	2002	12 Yrs	Professor	18-06-2008	P'cology	P'cology	9	-	-	-	-
6.	Dr. S.V. Deshmane	Ph.D.	SGBAU, Amravati	2003	18 Yrs	Professor	08-01-2003	P'ceutics	P'ceutics	19	-	-	-	-
7.	Dr. S.C. Kale	Ph.D.	R.G.U.H.S. Banglore	2006	8 Yrs	Asst. Professor	25-07-2012	Pharma. Chemistry	Pharma. Chemistry	2	-	-	-	-
8.	Mr. D.P. Ambhore	M.Pharm	Bharti Vidyapeeth Deemed Uni. Pune	2002	16 Yrs	Asso. Professor	08-08-2004	Pharma. Chemistry	Quality Assurance	1	-	-	-	-
9.	Ms. S.G. Phalphale	M.Pharm	University of Pune. Pune	2003	16 Yrs	Asst. Professor	18-08-2004	P'cology	P'cology	-	-	-	-	-
10.	Mr. S.D. Sagrule	M.Pharm	SGBAU, Amravati	2012	06 Yrs	Asst. Professor	11-11-2014	P'cognosy	P'cognosy	4	-	-	-	-
11.	Mr. P.N. Folane	M.Pharm	SGBAU, Amravati	2013	03 Yrs	Asst. Professor	01-01-2017	P'cology	P'cology	20	-	-	-	-
12.	Mrs. R.A. Ingle	M.Pharm	SGBAU, Amravati	2014	03 Yrs	Asst. Professor	03-01-2017	P'cology	P'cology	-	-	-	-	-
13.	Mr. K.S. Tayde	M.Pharm	SGBAU, Amravati	2010	03 Yrs	Asso. Professor	05-02-2016	Pharma. Chemistry	Quality Assurance	-	-	-	-	-
14.	Mrs. M.G. Chitte	M.Pharm	SGBAU, Amravati	2011	03 Yrs	Asst. Professor	03-01-2017	Pharma. Chemistry	Pharma. Chemistry	-	-	-	-	-
15.	Mr. C.P. Nagwani	M.Pharm	SGBAU, Amravati	2014	03 Yrs	Asst. Professor	05-02-2016	P'ceutics	P'ceutics	-	-	-	-	-
16.	Mr. S.S. Bharad	M.Pharm	SGBAU, Amravati	2014	03 Yrs	Asst. Professor	05-02-2016	P'ceutics	P'ceutics	-	-	-	-	-
17.	Mrs. J.B. Khedekar	M.Pharm	SGBAU, Amravati	2011	02 Yrs	Asst. Professor	25-07-2018	P'ceutics	P'ceutics	3	-	-	-	-
18.	Ms. P.R. Gawandar	M.Pharm	Dr. B.A.M. Uni., Aurangabad	2015	02 Yrs	Asst. Professor	27-07-2018	P'ceutics	P'ceutics	3	-	-	-	-
19.	Mr. S.P. Popalghat	M.Pharm	SGBAU, Amravati	2014	01 Yrs	Asst. Professor	01-08-2019	P'ceutics	P'ceutics	-	-	-	-	-



20.	Mr. P.R. Laddha	M.Pharm	M.S. University, Baroda	1999	17 Yrs	Asso. Professor	25-06-2003	Pharma. Chemistry	Pharma. Chemistry	2	-	-	-	-
21.	Ms. B.P. Chaudhari	M.Pharm	N.M. University, Jalgaon	2004	09 Yrs	Asst. Professor	18-07-2008	Pharma. Chemistry	Quality Assurance	1	-	-	-	-
22.	Mr. G.R. Sitaphale	M.Pharm	SGBAU, Amravati	2001	10 Yrs	Asso. Professor	07-11-2007	P'cognosy	P'cognosy	4	-	-	-	-
23.	Mr. D.T. Panjwani	M.Pharm	Dr. MGR Medical Uni. Chennai	2008	09 Yrs	Asso. Professor	08-03-2010	P'ceutics	Pharma. Biotechnology	2	-	-	-	-
24.	Mr. N.M. Gawai	M.Pharm	SGBAU, Amravati	2002	11 Yrs	Asso. Professor	26-06-2006	P'ceutics	Industrial Pharmacy	2	-	-	-	-
25.	Mr. K.B. Charhate	M.Pharm	R.T.M. Uni. Nagpur	2005	09 Yrs	Asso. Professor	07-09-2008	P'ceutics	P'ceutics	1	-	-	-	-
26.	Mrs. A.R. Kale	M.Pharm	SGBAU, Amravati	2012	01 Yrs	Asst. Professor	19-08-2019	P'ceutics	P'ceutics	-	-	-	-	-
27.	Ms. M.D. Usar	M.Pharm	SGBAU, Amravati	2013	01 Yrs	Asst. Professor	01-08-2019	P'ceutics	P'ceutics	-	-	-	-	-
28.	Ms. P.C. Rathi	M.Pharm	RTM Nagpur Uni. Nagpur	2010	01 Yrs	Asst. Professor	14-11-2019	P'ceutics	P'ceutics	-	-	-	-	-
29.	Mr. R.D. Pawar	M.Pharm	SGBAU, Amravati	2017	01 Yrs	Asst. Professor	01-01-2019	P'ceutics	P'ceutics	-	-	-	-	-
30.	Ms. P.P. Ambhore	M.Pharm	SGBAU, Amravati	2017	01 Yrs	Asst. Professor	01-08-2019	Pharma. Chemistry	Quality Assurance	-	-	-	-	-
31.	Ms. V.D. Deshmane	M.Pharm	SGBAU, Amravati	2016	01 Yrs	Asst. Professor	01-01-2019	P'ceutics	P'ceutics	-	-	-	-	-
32.	Mrs. S.S. Deshmane	M.Pharm	SGBAU, Amravati	2011	03 Yrs	Asst. Professor	10-11-2014	Pharma. Chemistry	Quality Assurance	-	-	-	-	-
33.	Mr. S.S. Harlalka	B.Pharm	SGBAU, Amravati	2016	01 Yrs	Lecturer	01-01-2019	Pharmacy	Pharmacy	-	-	-	-	-
34.	Ms. S.S. Chandrawanshi	B.Pharm	SGBAU, Amravati	2019	01 Yr	Lecturer	01-01-2019	Pharmacy	Pharmacy	-	-	-	-	-
35.	Mr. A.G. Ghaywat	B.Pharm	SGBAU, Amravati	2017	01 Yr	Lecturer	01-01-2019	Pharmacy	Pharmacy	-	-	-	-	-
36.	Mr. S.G. Shende	B.Pharm	SGBAU, Amravati	2017	01 Yr	Lecturer	01-01-2019	Pharmacy	Pharmacy	-	-	-	-	-
37.	Mr. S.S. Palaskar	B.Pharm	SGBAU, Amravati	2017	01 Yr	Lecturer	01-01-2019	Pharmacy	Pharmacy	-	-	-	-	-
38.	Ms. P.A. Nikam	B.Pharm	SGBAU, Amravati	2017	01 Yr	Lecturer	01-01-2019	Pharmacy	Pharmacy	-	-	-	-	-
39.	Mr. D.S. Wagh	B.Pharm	SGBAU, Amravati	2018	01 Yr	Lecturer	01-08-2019	Pharmacy	Pharmacy	-	-	-	-	-

Table B.5



ANNEXURE-III

(B. PHARM. SYALLABUS)

(PRESCRIBED BY SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI)



CHAPTER- I: REGULATIONS

Short Title and Commencement

These regulations shall be called as “The Revised Regulations for the B. Pharm. Degree Program (CBCS) of the Pharmacy Council of India, New Delhi”. They shall come into effect from the Academic Year 2016-17. The regulations framed are subject to modifications from time to time by Pharmacy Council of India.

1. Minimum qualification for admission

First year B. Pharm:

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

1. B. Pharm lateral entry (to third semester):

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

2. Duration of the program

The course of study for B.Pharm shall extend over a period of eight semesters (four academic years) and six semesters (three academic years) for lateral entry students. The curricula and syllabi for the program shall be prescribed from time to time by Pharmacy Council of India, New Delhi.

3. Medium of instruction and examinations

Medium of instruction and examination shall be in English.

4. Working days in each semester

Each semestershall consist of not less than 100 working days. The odd semesters shall be conducted from the month of June/July to November/December and the even semesters shall be conducted from December/January to May/June in every calendar year.

5. Attendance and progress



A candidate is required to put in at least 80% attendance in individual courses considering theory and practical separately. The candidate shall complete the prescribed course satisfactorily to be eligible to appear for the respective examinations.

7. Program/Course credit structure

As per the philosophy of Credit Based Semester System, certain quantum of academic work viz. theory classes, tutorial hours, practical classes, etc. are measured in terms of credits. On satisfactory completion of the courses, a candidate earns credits. The amount of credit associated with a course is dependent upon the number of hours of instruction per week in that course. Similarly, the credit associated with any of the other academic, co/extra-curricular activities is dependent upon the quantum of work expected to be put in for each of these activities per week.

Credit assignment

Theory and Laboratory courses

Courses are broadly classified as Theory and Practical. Theory courses consist of lecture (L) and /or tutorial (T) hours, and Practical (P) courses consist of hours spent in the laboratory. Credits (C) for a course is dependent on the number of hours of instruction per week in that course, and is obtained by using a multiplier of one (1) for lecture and tutorial hours, and a multiplier of half (1/2) for practical (laboratory) hours. Thus, for example, a theory course having three lectures and one tutorial per week throughout the semester carries a credit of 4. Similarly, a practical having four laboratory hours per week throughout semester carries a credit of 2.

Minimum credit requirements

The minimum credit points required for award of a B. Pharm. degree is 208. These credits are divided into Theory courses, Tutorials, Practical, Practice School and Project over the duration of eight semesters. The credits are distributed semester-wise as shown in Table IX. Courses generally progress in sequences, building competencies and their positioning indicates certain academic maturity on the part of the learners. Learners are expected to follow the semester-wise schedule of courses given in the syllabus.



The lateral entry students shall get 52 credit points transferred from their D. Pharm program. Such students shall take up additional remedial courses of

‘Communication Skills’ (Theory and Practical) and ‘Computer Applications in Pharmacy’ (Theory and Practical) equivalent to 3 and 4 credit points respectively, a total of 7 credit points to attain 59 credit points, the maximum of I and II semesters.

8. Academic work

A regular record of attendance both in Theory and Practical shall be maintained by the teaching staff of respective courses.

9. Course of study

The course of study for B. Pharm shall include Semester Wise Theory & Practical as given in Table – I to VIII. The number of hours to be devoted to each theory, tutorial and practical course in any semester shall not be less than that shown in Table – I to VIII.

Table-I: Course of study for semester I

Course code	Name of the course	No. of hours	Tutorial	Credit points
BP101T	Human Anatomy and Physiology I– Theory	3	1	4
BP102T	Pharmaceutical Analysis I – Theory	3	1	4
BP103T	Pharmaceutics I – Theory	3	1	4
BP104T	Pharmaceutical Inorganic Chemistry – Theory	3	1	4
BP105T	Communication skills – Theory *	2	-	2
BP106RBT BP106RMT	Remedial Biology/ Remedial Mathematics – Theory*	2	-	2
BP107P	Human Anatomy and Physiology – Practical	4	-	2
BP108P	Pharmaceutical Analysis I – Practical	4	-	2
BP109P	Pharmaceutics I – Practical	4	-	2
BP110P	Pharmaceutical Inorganic Chemistry – Practical	4	-	2
BP111P	Communication skills – Practical*	2	-	1
BP112RBP	Remedial Biology – Practical*	2	-	1
Total		32/34[§]/36[#]	4	27/29[§]/30[#]

[#]Applicable ONLY for the students who have studied Mathematics / Physics / Chemistry at HSC and appearing for Remedial Biology (RB)course.

[§]Applicable ONLY for the students who have studied Physics / Chemistry / Botany / Zoology at HSC and appearing for Remedial Mathematics (RM)cours

* Non University Examination (NUE)



Table-II: Course of study for semester II

Course Code	Name of the course	No. of hours	Tutorial	Credit points
BP201T	Human Anatomy and Physiology II – Theory	3	1	4
BP202T	Pharmaceutical Organic Chemistry I – Theory	3	1	4
BP203T	Biochemistry – Theory	3	1	4
BP204T	Pathophysiology – Theory	3	1	4
BP205T	Computer Applications in Pharmacy – Theory *	3	-	3
BP206T	Environmental sciences – Theory *	3	-	3
BP207P	Human Anatomy and Physiology II –Practical	4	-	2
BP208P	Pharmaceutical Organic Chemistry I– Practical	4	-	2
BP209P	Biochemistry – Practical	4	-	2
BP210P	Computer Applications in Pharmacy – Practical*	2	-	1
Total		32	4	29

*Non University Examination (NUE)

Table-III: Course of study for semester III

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



Table-IV: Course of study for semester IV

Course code	Name of the course	No. of hours	Tutorial	Credit points
BP401T	Pharmaceutical Organic Chemistry III– Theory	3	1	4
BP402T	Medicinal Chemistry I – Theory	3	1	4
BP403T	Physical Pharmaceutics II – Theory	3	1	4
BP404T	Pharmacology I – Theory	3	1	4
BP405T	Pharmacognosy and Phytochemistry I– Theory	3	1	4
BP406P	Medicinal Chemistry I – Practical	4	-	2
BP407P	Physical Pharmaceutics II – Practical	4		2
BP408P	Pharmacology I – Practical	4	-	2
BP409P	Pharmacognosy and Phytochemistry I – Practical	4	-	2
Total		31	5	28

Table-V: Course of study for semester V

Course code	Name of the course	No. of hours	Tutorial	Credit points
BP501T	Medicinal Chemistry II – Theory	3	1	4
BP502T	Formulative Pharmacy– Theory	3	1	4
BP503T	Pharmacology II – Theory	3	1	4
BP504T	Pharmacognosy and Phytochemistry II– Theory	3	1	4
BP505T	Pharmaceutical Jurisprudence – Theory	3	1	4
BP506P	Formulative Pharmacy – Practical	4	-	2
BP507P	Pharmacology II – Practical	4	-	2
BP508P	Pharmacognosy and Phytochemistry II – Practical	4	-	2
Total		27	5	26



Table-VI: Course of study for semester VI

Course code	Name of the course	No. of hours	Tutorial	Credit points
BP601T	Medicinal Chemistry III – Theory	3	1	4
BP602T	Pharmacology III – Theory	3	1	4
BP603T	Herbal Drug Technology – Theory	3	1	4
BP604T	Biopharmaceutics and Pharmacokinetics – Theory	3	1	4
BP605T	Pharmaceutical Biotechnology – Theory	3	1	4
BP606T	Quality Assurance –Theory	3	1	4
BP607P	Medicinal chemistry III – Practical	4	-	2
BP608P	Pharmacology III – Practical	4	-	2
BP609P	Herbal Drug Technology – Practical	4	-	2
Total		30	6	30

Table-VII: Course of study for semester VII

Course code	Name of the course	No. of hours	Tutorial	Credit points
BP701T	Instrumental Methods of Analysis – Theory	3	1	4
BP702T	Industrial Pharmacy – Theory	3	1	4
BP703T	Pharmacy Practice – Theory	3	1	4
BP704T	Novel Drug Delivery System – Theory	3	1	4
BP705P	Instrumental Methods of Analysis – Practical	4	-	2
BP706PS	Practice School*	12	-	6
Total		28	5	24

* Non University Examination (NUE)



Table-VIII: Course of study for semester VIII

Course code	Name of the course	No. of hours	Tutorial	Credit points
BP801T	Biostatistics and Research Methodology	3	1	4
BP802T	Social and Preventive Pharmacy	3	1	4
BP803ET	Pharmaceutical Marketing	3 + 3 = 6	1 + 1 = 2	4 + 4 = 8
BP804ET	Pharmaceutical Regulatory Science			
BP805ET	Pharmacovigilance			
BP806ET	Quality Control and Standardizations of Herbals			
BP807ET	Computer Aided Drug Design			
BP808ET	Cell and Molecular Biology			
BP809ET	Cosmetic Science			
BP810ET	Experimental Pharmacology			
BP811ET	Advanced Instrumentation Techniques			
BP812PW	Project Work	12	-	6
Total		24	4	22

Table-IX: Semester wise credits distribution

Semester	Credit Points
I	27/29 ^{\$} /30 [#]
II	29
III	26
IV	28
V	26
VI	26
VII	24
VIII	22
Extracurricular/ Co curricular activities	01*
Total credit points for the program	209/211^{\$}/212[#]



*The credit points assigned for extracurricular and or co-curricular activities shall be given by the Principals of the colleges and the same shall be submitted to the University. The criteria to acquire this credit point shall be defined by the colleges from time to time.

§Applicable ONLY for the students studied Physics / Chemistry / Botany / Zoology at HSC and appearing for Remedial Mathematics course.

#Applicable ONLY for the students studied Mathematics / Physics / Chemistry at HSC and appearing for Remedial Biology course.

10. Program Committee

1. The B. Pharm. program shall have a Program Committee constituted by the Head of the institution in consultation with all the Heads of the departments.
2. The composition of the Program Committee shall be as follows:
A senior teacher shall be the Chairperson; One Teacher from each department handling B.Pharm courses; and four student representatives of the program (one from each academic year), nominated by the Head of the institution.
3. Duties of the Program Committee:
 - i. Periodically reviewing the progress of the classes.
 - ii. Discussing the problems concerning curriculum, syllabus and the conduct of classes.
 - iii. Discussing with the course teachers on the nature and scope of assessment for the course and the same shall be announced to the students at the beginning of respective semesters.
 - iv. Communicating its recommendation to the Head of the institution on academic matters.
 - v. The Program Committee shall meet at least thrice in a semester preferably at the end of each sessionalexam (Internal Assessment) and before the end semester exam.



11. Examinations/Assessments

The scheme for internal assessment and end semester examinations is given in Table – X.

End semester examinations

The End Semester Examinations for each theory and practical course through semesters I to VIII shall be conducted by the university except for the subjects with asterix symbol (*) in table I and II for which examinations shall be conducted by the subject experts at college level and the marks/grades shall be submitted to the university.



Tables-X: Schemes for internal assessments and end semester examinations semester wise

Semester I

Course code	Name of the course	Internal Assessment				End Semester Exams		Total Marks
		Continuous Mode	Sessional Exams		Total	Marks	Duration	
			Marks	Duration				
BP101T	Human Anatomy and Physiology I – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP102T	Pharmaceutical Analysis I – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP103T	Pharmaceutics I – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP104T	Pharmaceutical Inorganic Chemistry – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP105T	Communication skills – Theory *	5	10	1 Hr	15	35	1.5 Hrs	50
BP106RBT BP106RMT	Remedial Biology/ Mathematics – Theory*	5	10	1 Hr	15	35	1.5 Hrs	50
BP107P	Human Anatomy and Physiology – Practical	5	10	4 Hrs	15	35	4 Hrs	50
BP108P	Pharmaceutical Analysis I – Practical	5	10	4 Hrs	15	35	4 Hrs	50
BP109P	Pharmaceutics I – Practical	5	10	4 Hrs	15	35	4 Hrs	50
BP110P	Pharmaceutical Inorganic Chemistry – Practical	5	10	4 Hrs	15	35	4 Hrs	50
BP111P	Communication skills – Practical*	5	5	2 Hrs	10	15	2 Hrs	25
BP112RBP	Remedial Biology – Practical*	5	5	2 Hrs	10	15	2 Hrs	25
Total		70/75[§]/80[#]	115/125[§]/130[#]	23/24[§]/26[#] Hrs	185/200[§]/210[#]	490/525[§]/ 540[#]	31.5/33[§]/ 35[#] Hrs	675/725[§]/ 750[#]

[#]Applicable ONLY for the students studied Mathematics / Physics / Chemistry at HSC and appearing for Remedial Biology (RB)course.

[§]Applicable ONLY for the students studied Physics / Chemistry / Botany / Zoology at HSCand appearing for Remedial Mathematics (RM)course.



*** Semester II**

Course code	Name of the course	Internal Assessment				End Semester Exams		Total Marks
		Continuous Mode	Sessional Exams		Total	Marks	Duration	
			Marks	Duration				
BP201T	Human Anatomy and Physiology II – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP202T	Pharmaceutical Organic Chemistry I – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP203T	Biochemistry – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP204T	Pathophysiology – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP205T	Computer Applications in Pharmacy – Theory*	10	15	1 Hr	25	50	2 Hrs	75
BP206T	Environmental sciences – Theory*	10	15	1 Hr	25	50	2 Hrs	75
BP207P	Human Anatomy and Physiology II –Practical	5	10	4 Hrs	15	35	4 Hrs	50
BP208P	Pharmaceutical Organic Chemistry I– Practical	5	10	4 Hrs	15	35	4 Hrs	50
BP209P	Biochemistry – Practical	5	10	4 Hrs	15	35	4 Hrs	50
BP210P	Computer Applications in Pharmacy – Practical*	5	5	2 Hrs	10	15	2 Hrs	25
Total		80	125	20 Hrs	205	520	30 Hrs	725

The subject experts at college level shall conduct examinations



Semester III

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



Semester IV

Course code	Name of the course	Internal Assessment				End Semester Exams		Total Marks
		Continuous Mode	Sessional Exams		Total	Marks	Duration	
			Marks	Duration				
BP401T	Pharmaceutical Organic Chemistry III– Theory	10	15	1 Hr	25	75	3 Hrs	100
BP402T	Medicinal Chemistry I – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP403T	Physical Pharmaceutics II – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP404T	Pharmacology I – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP405T	Pharmacognosy I – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP406P	Medicinal Chemistry I – Practical	5	10	4 Hr	15	35	4 Hrs	50
BP407P	Physical Pharmaceutics II – Practical	5	10	4 Hrs	15	35	4 Hrs	50
BP408P	Pharmacology I – Practical	5	10	4 Hrs	15	35	4 Hrs	50
BP409P	Pharmacognosy I – Practical	5	10	4 Hrs	15	35	4 Hrs	50
Total		70	115	21 Hrs	185	515	31 Hrs	700



Semester V

Course code	Name of the course	Internal Assessment				End Semester Exams		Total Marks
		Continuous Mode	Sessional Exams		Total	Marks	Duration	
			Marks	Duration				
BP501T	Medicinal Chemistry II – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP502T	Formulative Pharmacy – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP503T	Pharmacology II – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP504T	Pharmacognosy II – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP505T	Pharmaceutical Jurisprudence – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP506P	Formulative Pharmacy – Practical	5	10	4 Hr	15	35	4 Hrs	50
BP507P	Pharmacology II – Practical	5	10	4 Hr	15	35	4 Hrs	50
BP508P	Pharmacognosy II – Practical	5	10	4 Hr	15	35	4 Hrs	50
Total		65	105	17 Hr	170	480	27 Hrs	650



Semester VI

Course code	Name of the course	Internal Assessment				End Semester Exams		Total Marks
		Continuous Mode	Sessional Exams		Total	Marks	Duration	
			Marks	Duration				
BP601T	Medicinal Chemistry III – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP602T	Pharmacology III – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP603T	Herbal Drug Technology – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP604T	Biopharmaceutics and Pharmacokinetics – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP605T	Pharmaceutical Biotechnology– Theory	10	15	1 Hr	25	75	3 Hrs	100
BP606T	Quality Assurance– Theory	10	15	1 Hr	25	75	3 Hrs	100
BP607P	Medicinal chemistry III – Practical	5	10	4 Hrs	15	35	4 Hrs	50
BP608P	Pharmacology III – Practical	5	10	4 Hrs	15	35	4 Hrs	50
BP609P	Herbal Drug Technology – Practical	5	10	4 Hrs	15	35	4 Hrs	50
Total		75	120	18 Hrs	195	555	30 Hrs	750



Semester VII

Course code	Name of the course	Internal Assessment				End Semester Exams		Total Marks
		Continuous Mode	Sessional Exams		Total	Marks	Duration	
			Marks	Duration				
BP701T	Instrumental Methods of Analysis – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP702T	Industrial Pharmacy – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP703T	Pharmacy Practice – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP704T	Novel Drug Delivery System – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP705 P	Instrumental Methods of Analysis – Practical	5	10	4 Hrs	15	35	4 Hrs	50
BP706 PS	Practice School*	25	-	-	25	125	5 Hrs	150
Total		70	70	8Hrs	140	460	21 Hrs	600

* The subject experts at college level shall conduct examinations



Semester VIII

Course code	Name of the course	Internal Assessment				End Semester Exams		Total Marks
		Continuous Mode	Sessional Exams		Total	Marks	Duration	
			Marks	Duration				
BP801T	Biostatistics and Research Methodology – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP802T	Social and Preventive Pharmacy – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP803ET	Pharmaceutical Marketing – Theory	10 + 10 = 20	15 + 15 = 30	1 + 1 = 2 Hrs	25 + 25 = 50	75 + 75 = 150	3 + 3 = 6 Hrs	100 + 100 = 200
BP804ET	Pharmaceutical Regulatory Science – Theory							
BP805ET	Pharmacovigilance – Theory							
BP806ET	Quality Control and Standardizations of Herbals – Theory							
BP807ET	Computer Aided Drug Design – Theory							
BP808ET	Cell and Molecular Biology – Theory							
BP809ET	Cosmetic Science – Theory							
BP810ET	Experimental Pharmacology – Theory							
BP811ET	Advanced Instrumentation Techniques – Theory							
BP812PW	Project Work							
	Total	40	60	4 Hrs	100	450	16 Hrs	550



Internal assessment: Continuous mode

The marks allocated for Continuous mode of Internal Assessment shall be awarded as per the scheme given below.

Table-XI: Scheme for awarding internal assessment: Continuous mode

Theory		
Criteria	Maximum Marks	
Attendance (Refer Table – XII)	4	2
Academic activities (Average of any 3 activities e.g. quiz, assign open ent, book test, field work, group discussion and seminar)	3	1.5
Student – Teacher interaction	3	1.5
Total	10	5
Practical		
Attendance (Refer Table – XII)	2	
Based on Practical Records, Regular viva voce, etc.	3	
Total	5	

Table- XII: Guidelines for the allotment of marks for attendance

Percentage of Attendance	Theory	Practical
95 – 100	4	2
90 – 94	3	1.5
85 – 89	2	1
80 – 84	1	0.5
Less than 80	0	0

Sessional Exams

Two Sessional exams shall be conducted for each theory / practical course as per the schedule fixed by the college(s). The scheme of question paper for theory and practical Sessional examinations is given below. The average marks of two Sessional exams shall be computed for internal assessment as per the requirements given in tables – X. Sessional exam shall be conducted for 30 marks for theory and shall be computed for 15 marks. Similarly Sessional exam for practical shall be conducted for 40 marks and shall be computed for 10 marks.

Question paper pattern for theory Sessional examinations**For subjects having University examination**

I. Multiple Choice Questions (MCQs)

(Answer all the questions) = 10 x 1 = 10

I. Long Answers (Answer 1 out of 2) = 1 x 10 = 10



II. Short Answers (Answer 2 out of 3)	=	2 x 5 = 10
	
Total	=	30 marks

For subjects having Non University Examination

I. Long Answers (Answer 1 out of 2)	=	1 x 10 = 10
II. Short Answers (Answer 4 out of 6)	=	4 x 5 = 20
	
Total	=	30 marks

Question paper pattern for practical sessional examinations

I. Synopsis	=	10
II. Experiments	=	25
III. Viva voce	=	05
	
Total	=	40 marks

12. Promotion and award of grades

A student shall be declared PASS and eligible for getting grade in a course of B.Pharm. program if he/she secures at least 50% marks in that particular course including internal assessment. For example, to be declared as PASS and to get grade, the student has to secure a minimum of 50 marks for the total of 100 including continuous mode of assessment and end semester theory examination and has to secure a minimum of 25 marks for the total 50 including internal assessment and end semester practical examination.

13. Carry forward of marks

In case a student fails to secure the minimum 50% in any Theory or Practical course as specified in 12, then he/she shall reappear for the end semester examination of that course. However his/her marks of the Internal Assessments shall be carried over and he/she shall be entitled for grade obtained by him/her on passing.

14. Improvement of internal assessment

A student shall have the opportunity to improve his/her performance only once in the Sessional exam component of the internal assessment. The re-conduct of the Sessional exam shall be completed before the commencement of next end semester theory examinations.

Re-examination of end semester examinations

Reexamination of end semester examinations shall be conducted as per the schedule given in table XIII. The exact dates of examinations shall be notified from time to time.



Table-XIII: Tentative schedule of end semester examinations

Semester	For Regular Candidates	For Failed Candidates
I, III, V and VII	November / December	May / June
II, IV, VI and VIII	May / June	November / December

Question paper pattern for end semester theory examinations**For 75 marks paper****I. Multiple Choice Questions(MCQs)**

$$(Answer\ all\ the\ questions) = 20 \times 1 = 20$$

$$I. Long\ Answers\ (Answer\ 2\ out\ of\ 3) = 2 \times 10 = 20$$

$$II. Short\ Answers\ (Answer\ 7\ out\ of\ 9) = 7 \times 5 = 35$$

$$Total = 75\ marks$$

For 50 marks paper

$$I. Long\ Answers\ (Answer\ 2\ out\ of\ 3) = 2 \times 10 = 20$$

$$II. Short\ Answers\ (Answer\ 6\ out\ of\ 8) = 6 \times 5 = 30$$

$$Total = 50\ marks$$

For 35 marks paper

$$I. Long\ Answers\ (Answer\ 1\ out\ of\ 2) = 1 \times 10 = 10$$

$$II. Short\ Answers\ (Answer\ 5\ out\ of\ 7) = 5 \times 5 = 25$$

$$Total = 35\ marks$$

Question paper pattern for end semester practical examinations

$$I. Synopsis = 5$$

$$II. Experiments = 25$$

$$III. Viva\ voce = 5$$

$$Total = 35\ marks$$



15. Academic Progression:

No student shall be admitted to any examination unless he/she fulfills the norms given in 6. Academic progression rules are applicable as follows:

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

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

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

A student shall be eligible to get his/her CGPA upon successful completion of the courses of I to VIII semesters within the stipulated time period as per the norms specified in 26.

A lateral entry student shall be eligible to carry forward all the courses of III, IV and V semesters till the VI semester examinations. However, he/she shall not be eligible to attend the courses of VII semester until all the courses of III and IV semesters are successfully completed.

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

A lateral entry student shall be eligible to get his/her CGPA upon successful completion of the courses of III to VIII semesters within the stipulated time period as per the norms specified in 26.

Any student who has given more than 4 chances for successful completion of I / III semester courses and more than 3 chances for successful completion of II / IV semester courses shall be permitted to attend V / VII semester classes ONLY during the subsequent academic year as the case may be. In simpler terms there shall NOT be any ODD BATCH for any semester.



Note: Grade AB should be considered as failed and treated as one head for deciding academic progression. Such rules are also applicable for those students who fail to register for examination(s) of any course in any semester.

17. Grading of performances

Letter grades and grade points allocations:

Based on the performances, each student shall be awarded a final letter grade at the end of the semester for each course. The letter grades and their corresponding grade points are given in Table – XII.

Table – XII: Letter grades and grade points equivalent to Percentage of marks and performances

Percentage of Marks Obtained	Letter Grade	Grade Point	Performance
90.00 – 100	O	10	Outstanding
80.00 – 89.99	A	9	Excellent
70.00 – 79.99	B	8	Good
60.00 – 69.99	C	7	Fair
50.00 – 59.99	D	6	Average
Less than 50	F	0	Fail
Absent	AB	0	Fail

A learner who remains absent for any end semester examination shall be assigned a letter grade of AB and a corresponding grade point of zero. He/she should reappear for the said evaluation/examination in due course.

18. The Semester grade point average (SGPA)

The performance of a student in a semester is indicated by a number called ‘Semester Grade Point Average’ (SGPA). The SGPA is the weighted average of the grade points obtained in all the courses by the student during the semester. For example, if a student takes five courses (Theory/Practical) in a semester with credits C1, C2, C3, C4 and C5 and the student’s grade points in these courses are G1, G2, G3, G4 and G5, respectively, and then students’ SGPA is equal to:



$$\text{SGPA} = \frac{C_1G_1 + C_2G_2 + C_3G_3 + C_4G_4 + C_5G_5}{C_1 + C_2 + C_3 + C_4 + C_5}$$

The SGPA is calculated to two decimal points. It should be noted that, the SGPA for any semester shall take into consideration the F and ABS grade awarded in that semester. For example if a learner has a F or ABS grade in course 4, the SGPA shall then be computed as:

$$\text{SGPA} = \frac{C_1G_1 + C_2G_2 + C_3G_3 + C_4 * \text{ZERO} + C_5G_5}{C_1 + C_2 + C_3 + C_4 + C_5}$$

19. Cumulative Grade Point Average (CGPA)

The CGPA is calculated with the SGPA of all the VIII semesters to two decimal points and is indicated in final grade report card/final transcript showing the grades of all VIII semesters and their courses. The CGPA shall reflect the failed status in case of F grade(s), till the course(s) is/are passed. When the course(s) is/are passed by obtaining a pass grade on subsequent examination(s) the CGPA shall only reflect the new grade and not the fail grades earned earlier. The CGPA is calculated as:

$$\text{CGPA} = \frac{C_1S_1 + C_2S_2 + C_3S_3 + C_4S_4 + C_5S_5 + C_6S_6 + C_7S_7 + C_8S_8}{C_1 + C_2 + C_3 + C_4 + C_5 + C_6 + C_7 + C_8}$$

where C_1, C_2, C_3, \dots is the total number of credits for semester I, II, III, \dots and S_1, S_2, S_3, \dots is the SGPA of semester I, II, III, \dots .

20. Declaration of class

The class shall be awarded on the basis of CGPA as follows: First Class with Distinction = CGPA of 7.50 and above

First Class = CGPA of 6.00 to 7.49

Second Class = CGPA of 5.00 to 5.99



21. Project work

All the students shall undertake a project under the supervision of a teacher and submit a report. The area of the project shall directly relate any one of the elective subject opted by the student in semester VIII. The project shall be carried out in group not exceeding 5 in number. The project report shall be submitted in triplicate (typed & bound copy not less than 25 pages).

The internal and external examiner appointed by the University shall evaluate the project at the time of the Practical examinations of other semester(s). Students shall be evaluated in groups for four hours (i.e., about half an hour for a group of five students). The projects shall be evaluated as per the criteria given below.

Evaluation of Dissertation Book:

Objective(s) of the work done	15 Marks
Methodology adopted	20 Marks
Results and Discussions	20 Marks
Conclusions and Outcomes	20 Marks

Total	75 Marks

Evaluation of Presentation:

Presentation of work	25 Marks
Communication skills	20 Marks
Question and answer skills	30 Marks

Total	75 Marks

Explanation: The 75 marks assigned to the dissertation book shall be same for all the students in a group. However, the 75 marks assigned for presentation shall be awarded based on the performance of individual students in the given criteria.



22. Industrial training (Desirable)

Every candidate shall be required to work for at least 150 hours spread over four weeks in a Pharmaceutical Industry/Hospital. It includes Production unit, Quality Control department, Quality Assurance department, Analytical laboratory, Chemical manufacturing unit, Pharmaceutical R&D, Hospital (Clinical Pharmacy), Clinical Research Organization, Community Pharmacy, etc. After the Semester – VI and before the commencement of Semester – VII, and shall submit satisfactory report of such work and certificate duly signed by the authority of training organization to the head of the institute.

23. Practice School

In the VII semester, every candidate shall undergo practice school for a period of 150 hours evenly distributed throughout the semester. The student shall opt any one of the domains for practice school declared by the program committee from time to time.

At the end of the practice school, every student shall submit a printed report (in triplicate) on the practice school he/she attended (not more than 25 pages). Along with the exams of semester VII, the report submitted by the student, knowledge and skills acquired by the student through practice school shall be evaluated by the subject experts at college level and grade point shall be awarded.

24. Award of Ranks

Ranks and Medals shall be awarded on the basis of final CGPA. However, candidates who fail in one or more courses during the B.Pharm program shall not be eligible for award of ranks. Moreover, the candidates should have completed the B. Pharm program in minimum prescribed number of years, (four years) for the award of Ranks.

25. Award of degree

Candidates who fulfill the requirements mentioned above shall be eligible for award of degree during the ensuing convocation.

26. Duration for completion of the program of study

The duration for the completion of the program shall be fixed as double the actual duration of the program and the students have to pass within the said period, otherwise they have to get fresh Registration.

27. Re-admission after break of study

Candidate who seeks re-admission to the program after break of study has to get the approval from the university by paying a condonation fee.

No condonation is allowed for the candidate who has more than 2 years of break up period and he/she has to rejoin the program by paying the required fees.



CHAPTER - II: SYLLABUS
Semester I



BP101T. HUMAN ANATOMY AND PHYSIOLOGY-I (Theory)**45 Hours**

Scope: This subject is designed to impart fundamental knowledge on the structure and functions of the various systems of the human body. It also helps in understanding both homeostatic mechanisms. The subject provides the basic knowledge required to understand the various disciplines of pharmacy.

Objectives: Upon completion of this course the student should be able to

1. Explain the gross morphology, structure and functions of various organs of the human body.
2. Describe the various homeostatic mechanisms and their imbalances.
3. Identify the various tissues and organs of different systems of human body.
4. Perform the various experiments related to special senses and nervous system. 5. Appreciate coordinated working pattern of different organs of each system

Course Content:**Unit I****10 hours**

- **Introduction to human body**

Definition and scope of anatomy and physiology, levels of structural organization and body systems, basic life processes, homeostasis, basic anatomical terminology.

- **Cellular level of organization**

Structure and functions of cell, transport across cell membrane, cell division, cell junctions. General principles of cell communication, intracellular signaling pathway activation by extracellular signal molecule, Forms of intracellular signaling: a) Contact-dependent b) Paracrine c) Synaptic d) Endocrine

- **Tissue level of organization**

Classification of tissues, structure, location and functions of epithelial, muscular and nervous and connective tissues.



Unit II**10 hours**

- **Integumentary system**

Structure and functions of skin

- **Skeletal system**

Divisions of skeletal system, types of bone, salient features and functions of bones of axial and appendicular skeletal system

Organization of skeletal muscle, physiology of muscle contraction, neuromuscular junction

- **Joints**

- Structural and functional classification, types of joints movements and its articulation

Unit III**10 hours**

- **Nervous system**

Organization of nervous system, neuron, neuroglia, classification and properties of nerve fibre, electrophysiology, action potential, nerve impulse, receptors, synapse, neurotransmitters.

Central nervous system: Meninges, ventricles of brain and cerebrospinal fluid. structure and functions of brain (cerebrum, brain stem, cerebellum), spinal cord (gross structure, functions of afferent and efferent nerve tracts, reflex activity)

Unit IV**08 hours****Peripheral nervous system:**

Classification of peripheral nervous system: Structure and functions of sympathetic and parasympathetic nervous system.

Origin and functions of spinal and cranial nerves.

Special senses

Structure and functions of eye, ear, nose and tongue and their disorders.



Unit V**07 hours****Endocrine system**

Classification of hormones, mechanism of hormone action, structure and functions of pituitary gland, thyroid gland, parathyroid gland, adrenal gland, pancreas, pineal gland, thymus and their disorders.

BP107P. HUMAN ANATOMY AND PHYSIOLOGY (Practical)**4 Hours/week**

Practical physiology is complimentary to the theoretical discussions in physiology. Practicals allow the verification of physiological processes discussed in theory classes through experiments on living tissue, intact animals or normal human beings. This is helpful for developing an insight on the subject.

1. Study of compound microscope.
2. Microscopic study of epithelial and connective tissue
3. Microscopic study of muscular and nervous tissue
4. Identification of axial bones
5. Identification of appendicular bones
6. To study the integumentary and special senses using specimen, models, etc.,
7. To study the nervous system using specimen, models, etc.,
8. To study the endocrine system using specimen, models, etc
9. To demonstrate the general neurological examination
10. To demonstrate the function of olfactory nerve
11. To examine the different types of taste.
12. To demonstrate the visual acuity
13. To demonstrate the reflex activity
14. Recording of body temperature
15. To demonstrate positive and negative feedback mechanism.



Recommended Books (Latest Editions)

1. Essentials of Medical Physiology by K. Sembulingam and P. Sembulingam. Jaypee brothers medical publishers, New Delhi.
2. Anatomy and Physiology in Health and Illness by Kathleen J.W. Wilson, Churchill Livingstone, New York
3. Physiological basis of Medical Practice-Best and Tailor. Williams & Wilkins Co,Riverview,MI USA
4. Text book of Medical Physiology- Arthur C,Guyton andJohn.E. Hall. Miamisburg, OH, U.S.A.
5. Principles of Anatomy and Physiology by Tortora Grabowski. Palmetto, GA, U.S.A.
6. Textbook of Human Histology by Inderbir Singh, Jaypee brother's medical publishers, New Delhi.
7. Textbook of Practical Physiology by C.L. Ghai, Jaypee brother's medical publishers, New Delhi.
8. Practical workbook of Human Physiology by K. Srinageswari and Rajeev Sharma, Jaypee brother's medical publishers, New Delhi.

Reference Books (Latest Editions)

1. Physiological basis of Medical Practice-Best and Tailor. Williams & Wilkins Co, Riverview, MI USA
2. Text book of Medical Physiology- Arthur C, Guyton and John. E. Hall. Miamisburg, OH, U.S.A.
3. Human Physiology (vol 1 and 2) by Dr. C.C. Chatterrje ,Academic Publishers Kolkata



BP102T. PHARMACEUTICAL ANALYSIS (Theory)**45 Hours**

Scope: This course deals with the fundamentals of analytical chemistry and principles of electrochemical analysis of drugs

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

- understand the principles of volumetric and electro chemical analysis
- carryout various volumetric and electrochemical titrations develop analytical skills

Course Content:**UNIT-I****10Hours**

(a) **Pharmaceutical analysis-** Definition and scope

- Different techniques of analysis
- Methods of expressing concentration
- Primary and secondary standards.
- Preparation and standardization of various molar and normal solutions- Oxalic acid, sodium hydroxide, hydrochloric acid, sodium thiosulphate, sulphuric acid, potassium permanganate and ceric ammonium sulphate

(b) **Errors:** Sources of errors, types of errors, methods of minimizing errors, accuracy, precision and significant figures

UNIT-II**10 Hours**

- **Acid base titration:** Theories of acid base indicators, classification of acid base titrations and theory involved in titrations of strong, weak, and very weak acids and bases, neutralization curves
- **Non aqueous titration:** Solvents, acidimetry and alkalimetry titration and estimation of Sodium benzoate and Ephedrine HCl

UNIT-III**10 Hours**

Precipitation titrations: Mohr's method, Volhard's, Modified

Volhard's, Fajans method, estimation of sodium chloride.

- **Complexometric titration:** Classification, metal ion indicators, masking and demasking reagents, estimation of Magnesium sulphate, and calcium gluconate.



Gravimetry: Principle and steps involved in gravimetric analysis. Purity of the precipitate: co-precipitation and post precipitation, Estimation of barium sulphate.

UNIT-IV

Redox titrations

(a) Concepts of oxidation and reduction

(b) Types of redox titrations (Principles and applications)

Cerimetry, Iodimetry, Iodometry, Bromatometry, Dichrometry, Titration with potassium iodate

UNIT-V

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

BP108P. PHARMACEUTICAL ANALYSIS (Practical)

4 Hours / Week

I Preparation and standardization of

- (1) Sodium hydroxide
- (2) Sulphuric acid
- (3) Sodium thiosulfate
- (4) Potassium permanganate
- (5) Ceric ammonium sulphate

II Assay of the following compounds along with Standardization of Titrant

- (1) Ammonium chloride by acid base titration
- (2) Ferrous sulphate by Cerimetry
- (3) Copper sulphate by Iodometry
- (4) Calcium gluconate by complexometry



- (5) Hydrogen peroxide by Permanganometry
- (6) Sodium benzoate by non-aqueous titration
- (7) Sodium Chloride by precipitation titration

III Determination of Normality by electro-analytical methods

- (1) Conductometric titration of strong acid against strong base
- (2) Conductometric titration of strong acid and weak acid against strong base
- (3) Potentiometric titration of strong acid against strong base

Recommended Books: (Latest Editions)

A.H. Beckett & J.B. Stenlake's, Practical Pharmaceutical Chemistry Vol I & II, Stahlone Press of University of London

A.I. Vogel, Text Book of Quantitative Inorganic analysis

P. Gundu Rao, Inorganic Pharmaceutical Chemistry

Bentley and Driver's Textbook of Pharmaceutical Chemistry

John H. Kennedy, Analytical chemistry principles

Indian Pharmacopoeia.

BP103T. PHARMACEUTICS- I (Theory)

45 Hours

Scope: This course is designed to impart a fundamental knowledge on the preparatory pharmacy with arts and science of preparing the different conventional dosage forms.

Objectives: Upon completion of this course the student should be able to:

Know the history of profession of pharmacy

Understand the basics of different dosage forms, pharmaceutical incompatibilities and pharmaceutical calculations

Understand the professional way of handling the prescription

Preparation of various conventional dosage forms



Course Content:**UNIT – I****10 Hours**

Historical background and development of profession of pharmacy: History of profession of Pharmacy in India in relation to pharmacy education, industry and organization, Pharmacy as a career, Pharmacopoeias: Introduction to IP, BP, USP and Extra Pharmacopoeia.

Dosage forms: Introduction to dosage forms, classification and definitions

Prescription: Definition, Parts of prescription, handling of Prescription and Errors in prescription.

Posology: Definition, Factors affecting posology. Pediatric dose calculations based on age, body weight and body surface area.

UNIT – II**10 Hours**

Pharmaceutical calculations: Weights and measures – Imperial & Metric system, Calculations involving percentage solutions, alligation, proof spirit and isotonic solutions based on freezing point and molecular weight.

Powders: Definition, classification, advantages and disadvantages, Simple & compound powders – official preparations, dusting powders, effervescent, efflorescent and hygroscopic powders, eutectic mixtures. Geometric dilutions.

Liquid dosage forms: Advantages and disadvantages of liquid dosage forms. Excipients used in formulation of liquid dosage forms. Solubility enhancement techniques

UNIT – III**08 Hours**

Monophasic liquids: Definitions and preparations of Gargles, Mouthwashes, Throat Paint, Eardrops, Nasal drops, Enemas, Syrups, Elixirs, Liniments and Lotions. □ **Biphasic**

liquids:

Suspensions: Definition, advantages and disadvantages, classifications, Preparation of suspensions; Flocculated and Deflocculated suspension & stability problems and methods to overcome.

Emulsions: Definition, classification, emulsifying agent, test for the identification of type of Emulsion, Methods of preparation & stability problems and methods to overcome.

UNIT – IV**08 Hours**

Suppositories: Definition, types, advantages and disadvantages, types of bases, methods of preparations. Displacement value & its calculations, evaluation of suppositories.

Pharmaceutical incompatibilities: Definition, classification, physical, chemical and therapeutic incompatibilities with examples.

UNIV – V

07 Hours

Semisolid dosage forms: Definitions, classification, mechanisms and factors influencing dermal penetration of drugs. Preparation of ointments, pastes, creams and gels. Excipients used in semi solid dosage forms. Evaluation of semi solid dosages forms

BP109P. PHARMACEUTICSI (Practical)

3 Hours / week

- 1. Syrups**
 - a) Syrup IP
 - b) Paracetamol pediatric syrup
- 2. Elixirs**
 - a) Piperazine citrate elixir
 - b) Paracetamol pediatric elixir
- 3. Linctus**
 - a) Simple Linctus BPC
- 4. Solutions**
 - a) Strong solution of ammonium acetate
 - b) Cresol with soap solution
- 5. Suspensions**
 - a) Calamine lotion
 - b) Magnesium Hydroxide mixture
- 5. Emulsions**
 - a) Turpentine Liniment
 - b) Liquid paraffin emulsion
- 6. Powders and Granules**
 - a) ORS powder (WHO)
 - b) Effervescent granules
 - c) Dusting powder



7. Suppositories

- a) Glycero gelatin suppository
- b) Soap glycerin suppository

8. Semisolids

- a) Sulphur ointment
- b) Non staining iodine ointment with methyl salicylate
- c) Bentonite gel
- d)

9. Gargles and Mouthwashes

- a) Potassium chlorate gargle
- b) Chlorhexidinemouthwash

Recommended Books: (Latest Editions)

1. H.C. Ansel et al., Pharmaceutical Dosage Form and Drug Delivery System, Lippincott Williams and Walkins, New Delhi.
2. Carter S.J., Cooper and Gunn's-Dispensing for Pharmaceutical Students, CBS publishers, New Delhi.
3. M.E. Aulton, Pharmaceutics, The Science & Dosage Form Design, Churchill Livingstone, Edinburgh.
4. Indian pharmacopoeia.
5. British pharmacopoeia.
6. Lachmann. Theory and Practice of Industrial Pharmacy, Lea & Febiger Publisher, The University of Michigan.
7. Alfonso R. Gennaro Remington. The Science and Practice of Pharmacy, Lippincott Williams, New Delhi.
8. Carter S.J., Cooper and Gunn's. Tutorial Pharmacy, CBS Publications, New Delhi.
9. E.A. Rawlins, Bentley's Text Book of Pharmaceutics, English Language Book Society, Elsevier Health Sciences, USA.
10. Isaac Ghebre Sellassie: Pharmaceutical Pelletization Technology, Marcel Dekker, INC, New York.



11. Dilip M. Parikh: Handbook of Pharmaceutical Granulation Technology, Marcel Dekker, INC, New York. Françoise Nieloud and Gilberte Marti-Mestres: Pharmaceutical Emulsions and Suspensions, Marcel Dekker, INC, New York.

BP104T. PHARMACEUTICAL INORGANIC CHEMISTRY (Theory) 45 Hours

Scope: This subject deals with the monographs of inorganic drugs and pharmaceuticals.

Objectives: Upon completion of course student shall be able to

- know the sources of impurities and methods to determine the impurities in inorganic drugs and pharmaceuticals
- understand the medicinal and pharmaceutical importance of inorganic compounds

Course Content:

UNIT I

10 Hours

- **Impurities in pharmaceutical substances:** History of Pharmacopoeia, Sources and types of impurities, principle involved in the limit test for Chloride, Sulphate, Iron, Arsenic, Lead and Heavy metals, modified limit test for Chloride and Sulphate

General methods of preparation, assay for the compounds superscripted with **asterisk (*)**, properties and medicinal uses of inorganic compounds belonging to the following classes

UNIT II

10 Hours

- **Acids, Bases and Buffers:** Buffer equations and buffer capacity in general, buffers in pharmaceutical systems, preparation, stability, buffered isotonic solutions, measurements of tonicity, calculations and methods of adjusting isotonicity.
- **Major extra and intracellular electrolytes:** Functions of major physiological ions, Electrolytes used in the replacement therapy: Sodium chloride*, Potassium chloride, Calcium gluconate* and Oral Rehydration Salt (ORS), Physiological acid base balance.



- **Dental products:** Dentifrices, role of fluoride in the treatment of dental caries, Desensitizing agents, Calcium carbonate, Sodium fluoride, and Zinc eugenol cement.

UNIT III**10 Hours**

- **Gastrointestinal agents**

Acidifiers: Ammonium chloride* and Dil. HCl

Antacid: Ideal properties of antacids, combinations of antacids, Sodium

Bicarbonate*, Aluminum hydroxide gel, Magnesium hydroxide mixture

Cathartics: Magnesium sulphate, Sodium orthophosphate, Kaolin and Bentonite

Antimicrobials: Mechanism, classification, Potassium permanganate, Boric acid, Hydrogen peroxide*, Chlorinated lime*, Iodine and its preparations

UNIT IV**Miscellaneous compounds**

Expectorants: Potassium iodide, Ammonium chloride*.

Emetics: Copper sulphate*, Sodium potassium tartarate

Haematinics: Ferrous sulphate*, Ferrous gluconate

Poison and Antidote: Sodium thiosulphate*, Activated charcoal, Sodium nitrite³³³

Astringents: Zinc Sulphate, Potash Alum

UNIT V

Radiopharmaceuticals: Radio activity, Measurement of radioactivity, Properties of α , β , γ radiations, Half life, radio isotopes and study of radio isotopes - Sodium iodide I^{131} , Storage conditions, precautions & pharmaceutical application of radioactive substances.

BP110P. PHARMACEUTICAL INORGANIC CHEMISTRY (Practical)**4 Hours / Week****I Limit tests for following ions** Limit test for Chlorides and Sulphates

Modified limit test for Chlorides and Sulphates

Limit test for Iron



Limit test for Heavy metals

Limit test for Lead

Limit test for Arsenic

II **Identification test** Magnesium hydroxide

Ferrous sulphate

Sodium bicarbonate

Calcium gluconate

Copper sulphate

III **Test for purity**

Swelling power of Bentonite

Neutralizing capacity of aluminum hydroxide gel

Determination of potassium iodate and iodine in potassium Iodide

IV **Preparation of inorganic pharmaceuticals**

Boric acid

Potash alum

Ferrous sulphate

Recommended Books (Latest Editions)

1. A.H. Beckett & J.B. Stenlake's, Practical Pharmaceutical Chemistry Vol I & II, Stahlone Press of University of London, 4th edition.
2. A.I. Vogel, Text Book of Quantitative Inorganic analysis
3. P. Gundu Rao, Inorganic Pharmaceutical Chemistry, 3rd Edition
4. M.L Schroff, Inorganic Pharmaceutical Chemistry
5. Bentley and Driver's Textbook of Pharmaceutical Chemistry
6. Anand & Chatwal, Inorganic Pharmaceutical Chemistry
7. Indian Pharmacopoeia **BP105T.COMMUNICATION SKILLS (Theory)**

30 Hours

Scope: This course will prepare the young pharmacy student to interact effectively with doctors, nurses, dentists, physiotherapists and other health workers. At the end of this course



the student will get the soft skills set to work cohesively with the team as a team player and will add value to the pharmaceutical business.

Objectives:

Upon completion of the course the student shall be able to

1. Understand the behavioral needs for a Pharmacist to function effectively in the areas of pharmaceutical operation
2. Communicate effectively (Verbal and Non Verbal)
3. Effectively manage the team as a team player
4. Develop interview skills
5. Develop Leadership qualities and essentials

Course content:

UNIT – I

07

Hours

- **Communication Skills:** Introduction, Definition, The Importance of Communication, The Communication Process – Source, Message, Encoding, Channel, Decoding, Receiver, Feedback, Context
- **Barriers to communication:** Physiological Barriers, Physical Barriers, Cultural Barriers, Language Barriers, Gender Barriers, Interpersonal Barriers, Psychological Barriers, Emotional barriers
- **Perspectives in Communication:** Introduction, Visual Perception, Language, Other factors affecting our perspective - Past Experiences, Prejudices, Feelings, Environment

UNIT – II

07

Hours



- **Elements of Communication:** Introduction, Face to Face Communication - Tone of Voice, Body Language (Non-verbal communication), Verbal Communication, Physical Communication
- **Communication Styles:** Introduction, The Communication Styles Matrix with example for each -Direct Communication Style, Spirited Communication Style, Systematic Communication Style, Considerate Communication Style

UNIT – III**07****Hours**

- **Basic Listening Skills:** Introduction, Self-Awareness, Active Listening, Becoming an Active Listener, Listening in Difficult Situations
- **Effective Written Communication:** Introduction, When and When Not to Use Written Communication - Complexity of the Topic, Amount of Discussion' Required, Shades of Meaning, Formal Communication
- **Writing Effectively:** Subject Lines, Put the Main Point First, Know Your Audience, Organization of the Message

UNIT – IV**05****Hours**

- **Interview Skills:** Purpose of an interview, Do's and Dont's of an interview
- **Giving Presentations:** Dealing with Fears, Planning your Presentation, Structuring Your Presentation, Delivering Your Presentation, Techniques of Delivery

UNIT – V**04****Hours**

- **Group Discussion:** Introduction, Communication skills in group discussion, Do's and Dont's of group discussion



BP111P.COMMUNICATION SKILLS (Practical)

2 Hours / week

The following learning modules are to be conducted using wordsworth® English language lab software

Basic communication covering the following topics

Meeting People

Asking Questions

Making Friends

What did you do?

Do's and Dont's

Pronunciations covering the following topics

Pronunciation (Consonant Sounds)

Pronunciation and Nouns

Pronunciation (Vowel Sounds)

Advanced Learning

Listening Comprehension / Direct and Indirect Speech

Figures of Speech

Effective Communication

Writing Skills

Effective Writing

Interview Handling Skills

E-Mail etiquette



Presentation Skills

Recommended Books: (Latest Edition)

1. Basic communication skills for Technology, Andreja. J. Ruther Ford, 2nd Edition, Pearson Education, 2011
2. Communication skills, Sanjay Kumar, Pushpalata, 1stEdition, Oxford Press, 2011
3. Organizational Behaviour, Stephen .P. Robbins, 1stEdition, Pearson, 2013
4. Brilliant- Communication skills, Gill Hasson, 1stEdition, Pearson Life, 2011
5. The Ace of Soft Skills: Attitude, Communication and Etiquette for success, Gopala Swamy Ramesh, 5thEdition, Pearson, 2013
6. Developing your influencing skills, Deborah Dalley, Lois Burton, Margaret, Green hall, 1st Edition Universe of Learning LTD, 2010
7. Communication skills for professionals, Konar nira, 2ndEdition, New arrivals – PHI, 2011
8. Personality development and soft skills, Barun K Mitra, 1stEdition, Oxford Press, 2011
9. Soft skill for everyone, Butter Field, 1st Edition, Cengage Learning india pvt.ltd, 2011
10. Soft skills and professional communication, Francis Peters SJ, 1stEdition, Mc Graw Hill Education, 2011
11. Effective communication, John Adair, 4thEdition, Pan Mac Millan,2009
12. Bringing out the best in people, Aubrey Daniels, 2ndEdition, Mc Graw Hill, 1999

BP 106RBT.REMEDIAL BIOLOGY (Theory)**30 Hours**

Scope: To learn and understand the components of living world, structure and functional system of plant and animal kingdom.

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

- know the classification and salient features of five kingdoms of life
- understand the basic components of anatomy & physiology of plant
- know understand the basic components of anatomy & physiology animal with special reference to human



UNIT I**07 Hours****Living world:**

- Definition and characters of living organisms
- Diversity in the living world
- Binomial nomenclature
- Five kingdoms of life and basis of classification. Salient features of Monera, Protista, Fungi, Animalia and Plantae, Virus,

Morphology of Flowering plants

- Morphology of different parts of flowering plants – Root, stem, inflorescence, flower, leaf, fruit, seed.
- General Anatomy of Root, stem, leaf of monocotyledons & Dicotyledons.

UNIT II**07 Hours****Body fluids and circulation**

- Composition of blood, blood groups, coagulation of blood
- Composition and functions of lymph
- Human circulatory system
- Structure of human heart and blood vessels
- Cardiac cycle, cardiac output and ECG

Digestion and Absorption

- Human alimentary canal and digestive glands
- Role of digestive enzymes
- Digestion, absorption and assimilation of digested food

Breathing and respiration

- Human respiratory system
- Mechanism of breathing and its regulation
- Exchange of gases, transport of gases and regulation of respiration
- Respiratory volumes



UNIT III**07 Hours****Excretory products and their elimination**

- Modes of excretion
- Human excretory system- structure and function
- Urine formation
- Rennin angiotensin system

Neural control and coordination

- Definition and classification of nervous system
- Structure of a neuron
- Generation and conduction of nerve impulse
- Structure of brain and spinal cord
- Functions of cerebrum, cerebellum, hypothalamus and medulla oblongata

Chemical coordination and regulation

- Endocrine glands and their secretions
- Functions of hormones secreted by endocrine glands

Human reproduction

- Parts of female reproductive system
- Parts of male reproductive system
- Spermatogenesis and Oogenesis
- Menstrual cycle

UNIT IV**05 Hours****Plants and mineral nutrition:**

- Essential mineral, macro and micronutrients
- Nitrogen metabolism, Nitrogen cycle, biological nitrogen fixation

Photosynthesis

- Autotrophic nutrition, photosynthesis, Photosynthetic pigments, Factors affecting photosynthesis.



UNIT V**04 Hours**

Plant respiration:Respiration, glycolysis, fermentation (anaerobic).

Plant growth and development

- Phases and rate of plant growth, Condition of growth,Introduction to plant growth regulators

Cell - The unit of life

- Structure and functions of cell and cell organelles.Cell division

Tissues

- Definition, types of tissues, location and functions.

Text Books

- a. Text book of Biology by S. B. Gokhale
- b. A Text book of Biology by Dr. Thulajappa and Dr. Seetaram.

Reference Books

- a. A Text book of Biology by B.V. Sreenivasa Naidu
- b. A Text book of Biology by Naidu and Murthy
- c. Botany for Degree students By A.C.Dutta.
- d.Outlines of Zoology by M. Ekambaranatha ayyer and T. N. Ananthakrishnan.
- e. A manual for pharmaceutical biology practical by S.B. Gokhale and C. K. Kokate



BP112RBP.REMEDIAL BIOLOGY (Practical)**30 Hours**

1. Introduction to experiments in biology
 - a) Study of Microscope
 - b) Section cutting techniques
 - c) Mounting and staining
 - d) Permanent slide preparation
2. Study of cell and its inclusions
3. Study of Stem, Root, Leaf and its modifications
4. Detailed study of frog by using computer models
5. Microscopic study and identification of tissues
6. Identification of bones
7. Determination of blood group
8. Determination of blood pressure
9. Determination of tidal volume

Reference Books

1. Practical human anatomy and physiology. by S.R.Kale and R.R.Kale.
2. A Manual of pharmaceutical biology practical by S.B.Gokhale, C.K.Kokate and S.P.Shriwastava.
3. Biology practical manual according to National core curriculum .Biology forum of Karnataka.
Prof .M.J.H.Shafi



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06 UNIT –II**Hours****□ Matrices and Determinant:**

Introduction matrices, Types of matrices, Operation on matrices, Transpose of a matrix, Matrix Multiplication, Determinants, Properties of determinants , Product of determinants, Minors and co-Factors, Adjoint or adjugate of a square matrix , Singular and non-singular matrices, Inverse of a matrix, Solution of system of linear of equations using matrix method, Cramer's rule, Characteristic equation and roots of a square matrix, Cayley–Hamilton theorem, Application of Matrices in solving Pharmacokinetic equations

UNIT – III**06 Hours****□ Calculus**

Differentiation : Introductions, Derivative of a function, Derivative of a constant Derivative of a product of a constant and a function , Derivative of the sum or difference of two functions, Derivative of the product of two functions (product formula), Derivative of the quotient of two functions *n.w.r.t.x*, where *n* is any (Quotient formula) – **Without Proof**, Derivative of *x* rational number Derivative of e^x , Derivative of $\log_e x$, Derivative of a^x , Derivative of trigonometric functions from first principles (**without Proof**), Successive Differentiation Conditions for a function to be a maximum or a minimum at a point. Application

UNIT – IV**06 Hours****□ Analytical Geometry**

Introduction: Signs of the Coordinates, Distance formula,
Straight Line : Slope or gradient of a straight line, Conditions for parallelism and perpendicularity of two lines, Slope of a line joining two points, Slope – intercept form of a straight line **Integration:**



Introduction, Definition, Standard formulae, Rules of integration , Method of substitution, Method of Partial fractions, Integration by parts, definite integrals, application

UNIT-V**06 Hours**

Differential Equations : Some basic definitions, Order and degree,

Equations in separable form , Homogeneous equations, Linear Differential equations,

Exact equations, **Application in solving Pharmacokinetic equations**

Laplace Transform : Introduction, Definition, Properties of Laplace transform, Laplace

Transforms of elementary functions, Inverse

Laplace transforms, Laplace transform of derivatives, Application to solve Linear

differential equations, **Application in solving Chemical kinetics and Pharmacokinetics equations**

Recommended Books (Latest Edition)

1. Differential Calculus by Shanthinarayan
2. Pharmaceutical Mathematics with application to Pharmacy by Panchaksharappa Gowda D.H.
3. Integral Calculus by Shanthinarayan
Higher Engineering Mathematics by Dr.B.S.Grewal



Semester II**BP 201T. HUMAN ANATOMY AND PHYSIOLOGY-II (Theory)****45 Hours**

Scope: This subject is designed to impart fundamental knowledge on the structure and functions of the various systems of the human body. It also helps in understanding both homeostatic mechanisms. The subject provides the basic knowledge required to understand the various disciplines of pharmacy.

Objectives: Upon completion of this course the student should be able to:

1. Explain the gross morphology, structure and functions of various organs of the human body.
2. Describe the various homeostatic mechanisms and their imbalances.
3. Identify the various tissues and organs of different systems of human body.
4. Perform the hematological tests like blood cell counts, haemoglobin estimation, bleeding/clotting time etc and also record blood pressure, heart rate, pulse and respiratory volume.
5. Appreciate coordinated working pattern of different organs of each system
6. Appreciate the interlinked mechanisms in the maintenance of normal functioning (homeostasis) of human body.

Course Content:**Unit I****10 hours**

- **Body fluids and blood**
- Body fluids, composition and functions of blood, hemopoiesis, formation of hemoglobin, anemia, mechanisms of coagulation, blood grouping, Rh factors, transfusion, its significance and disorders of blood, Reticulo endothelial system.

- **Lymphatic system**

Lymphatic organs and tissues, lymphatic vessels, lymph circulation and functions of lymphatic system



Unit II**10 hours****• Cardiovascular system**

Heart – anatomy of heart, blood circulation, blood vessels, structure and functions of artery, vein and capillaries, elements of conduction system of heart and heart beat, its regulation by autonomic nervous system, cardiac output, cardiac cycle. Regulation of blood pressure, pulse, electrocardiogram and disorders of heart.

Unit III**06 hours****• Digestive system**

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

• Respiratory system

Anatomy of respiratory system with special reference to anatomy of lungs, mechanism of respiration, regulation of respiration

Unit IV**• Respiratory system****10 hours**

Lung Volumes and capacities transport of respiratory gases, artificial respiration, and resuscitation methods.

• Urinary system

Anatomy of urinary tract with special reference to anatomy of kidney and nephrons, functions of kidney and urinary tract, physiology of urine formation, micturition reflex and role of kidneys in acid base balance, role of RAS in kidney and disorders of kidney.

Unit V**09 hours****• Reproductive system**

Anatomy of male and female reproductive system, Functions of male and female reproductive system, sex hormones, physiology of menstruation, fertilization, spermatogenesis, oogenesis, pregnancy and parturition



- **Introduction to genetics**

Chromosomes, genes and DNA, protein synthesis, genetic pattern of inheritance

BP 207 P. HUMAN ANATOMY AND PHYSIOLOGY (Practical)**4 Hours/week**

Practical physiology is complimentary to the theoretical discussions in physiology. Practicals allow the verification of physiological processes discussed in theory classes through experiments on living tissue, intact animals or normal human beings. This is helpful for developing an insight on the subject.

1. Introduction to hemocytometry.
2. Enumeration of white blood cell (WBC) count
3. Enumeration of total red blood corpuscles (RBC) count
4. Determination of bleeding time
5. Determination of clotting time
6. Estimation of hemoglobin content
7. Determination of blood group.
8. Determination of erythrocyte sedimentation rate (ESR).
9. Determination of heart rate and pulse rate.
10. Recording of blood pressure.
11. Determination of tidal volume and vital capacity.
12. Study of digestive, respiratory, cardiovascular systems, urinary and reproductive systems with the help of models, charts and specimens.
13. Recording of basal mass index .
14. Study of family planning devices and pregnancy diagnosis test.
15. Demonstration of total blood count by cell analyser
16. Permanent slides of vital organs and gonads.

Recommended Books (Latest Editions)

1. Essentials of Medical Physiology by K. Sembulingam and P. Sembulingam. Jaypee brothers medical publishers, New Delhi.
2. Anatomy and Physiology in Health and Illness by Kathleen J.W. Wilson, Churchill Livingstone, New York
3. Physiological basis of Medical Practice-Best and Tailor. Williams & Wilkins Co,Riverview,MI USA
4. Text book of Medical Physiology- Arthur C,Guyton andJohn.E. Hall. Miamisburg, OH, U.S.A.
5. Principles of Anatomy and Physiology by Tortora Grabowski. Palmetto, GA, U.S.A.
6. Textbook of Human Histology by Inderbir Singh, Jaypee brothers medical publishers, New Delhi.
7. Textbook of Practical Physiology by C.L. Ghai, Jaypee brothers medical publishers, New Delhi.
8. Practical workbook of Human Physiology by K. Srinageswari and Rajeev Sharma, Jaypee brother's medical publishers, New Delhi.

Reference Books:

1. Physiological basis of Medical Practice-Best and Tailor. Williams & Wilkins Co, Riverview, MI USA
2. Text book of Medical Physiology- Arthur C, Guyton and John. E. Hall. Miamisburg, OH, U.S.A.
3. Human Physiology (vol 1 and 2) by Dr. C.C. Chatterrje ,Academic Publishers Kolkata



BP202T. PHARMACEUTICAL ORGANIC CHEMISTRY –I (Theory)**45 Hours**

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

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

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

Course Content:

General methods of preparation and reactions of compounds superscripted with asterisk (*) to be explained

To emphasize on definition, types, classification, principles/mechanisms, applications, examples and differences

UNIT-I**07****Hours**

- **Classification, nomenclature and isomerism**

Classification of Organic Compounds

Common and IUPAC systems of nomenclature of organic compounds

(up to 10 Carbons open chain and carbocyclic compounds)

Structural isomerisms in organic compounds

UNIT-II 10 Hours

- **Alkanes*, Alkenes* and Conjugated dienes***

SP³ hybridization in alkanes, Halogenation of alkanes, uses of paraffins.

Stabilities of alkenes, SP² hybridization in alkenes



E_1 and E_2 reactions – kinetics, order of reactivity of alkyl halides, rearrangement of carbocations, Saytzeffs orientation and evidences. E_1 versus E_2 reactions, Factors affecting E_1 and E_2 reactions. Ozonolysis, electrophilic addition reactions of alkenes, Markownikoff's orientation, free radical addition reactions of alkenes, Anti Markownikoff's orientation. Stability of conjugated dienes, Diel-Alder, electrophilic addition, free radical addition reactions of conjugated dienes, allylic rearrangement

UNIT-III 10 Hours

- **Alkyl halides***

SN_1 and SN_2 reactions - kinetics, order of reactivity of alkyl halides, stereochemistry and rearrangement of carbocations.

SN_1 versus SN_2 reactions, Factors affecting SN_1 and SN_2 reactions

Structure and uses of ethylchloride, Chloroform, trichloroethylene, tetrachloroethylene, dichloromethane, tetrachloromethane and iodoform.

- **Alcohols***- Qualitative tests, Structure and uses of Ethyl alcohol, chlorobutanol, Cetosteryl alcohol, Benzyl alcohol, Glycerol, Propylene glycol

UNIT-IV 10 Hours

- **Carbonyl compounds* (Aldehydes and ketones)**

Nucleophilic addition, Electromeric effect, aldol condensation, Crossed Aldol condensation, Cannizzaro reaction, Crossed Cannizzaro reaction, Benzoin condensation, Perkin condensation, qualitative tests, Structure and uses of Formaldehyde, Paraldehyde, Acetone, Chloral hydrate, Hexamine, Benzaldehyde, Vanilin, Cinnamaldehyde.

UNIT-V

08 Hours

- **Carboxylic acids***

Acidity of carboxylic acids, effect of substituents on acidity, inductive effect and qualitative tests for carboxylic acids, amide and ester

Structure and Uses of Acetic acid, Lactic acid, Tartaric acid, Citric acid, Succinic acid. Oxalic acid, Salicylic acid, Benzoic acid, Benzyl benzoate, Dimethyl phthalate, Methyl salicylate and Acetyl salicylic acid



- **Aliphatic amines*** - Basicity, effect of substituent on Basicity. Qualitative test, Structure and uses of Ethanolamine, Ethylenediamine, Amphetamine

BP208P. PHARMACEUTICAL ORGANIC CHEMISTRY -I (Practical)**4 Hours / week**

1. Systematic qualitative analysis of unknown organic compounds like
 1. Preliminary test: Color, odour, aliphatic/aromatic compounds, saturation and unsaturation, etc.
 2. Detection of elements like Nitrogen, Sulphur and Halogen by Lassaigne's test
 3. Solubility test
 4. Functional group test like Phenols, Amides/ Urea, Carbohydrates, Amines, Carboxylic acids, Aldehydes and Ketones, Alcohols, Esters, Aromatic and Halogenated Hydrocarbons, Nitro compounds and Anilides.
 5. Melting point/Boiling point of organic compounds
 6. Identification of the unknown compound from the literature using melting point/boiling point.
 7. Preparation of the derivatives and confirmation of the unknown compound by melting point/ boiling point.
 8. Minimum 5 unknown organic compounds to be analysed systematically.
 9. Preparation of suitable solid derivatives from organic compounds
 10. Construction of molecular models

Recommended Books (Latest Editions)

1. Organic Chemistry by Morrison and Boyd
2. Organic Chemistry by I.L. Finar , Volume-I



3. Textbook of Organic Chemistry by B.S. Bahl & Arun Bahl.
4. Organic Chemistry by P.L.Soni
5. Practical Organic Chemistry by Mann and Saunders.
6. Vogel's text book of Practical Organic Chemistry
7. Advanced Practical organic chemistry by N.K.Vishnoi.
8. Introduction to Organic Laboratory techniques by Pavia, Lampman and Kriz.
9. Reaction and reaction mechanism by Ahluwalia/Chatwal.

BP203 T. BIOCHEMISTRY (Theory)

45 Hours

Scope: Biochemistry deals with complete understanding of the molecular levels of the chemical process associated with living cells. The scope of the subject is providing biochemical facts and the principles to understand metabolism of nutrient molecules in physiological and pathological conditions. It is also emphasizing on genetic organization of mammalian genome and hetero & autocatalytic functions of DNA. **Objectives:** Upon completion of course student shell able to

1. Understand the catalytic role of enzymes, importance of enzyme inhibitors in design of new drugs, therapeutic and diagnostic applications of enzymes.
2. Understand the metabolism of nutrient molecules in physiological and pathological conditions.
3. Understand the genetic organization of mammalian genome and functions of DNA in the synthesis of RNAs and proteins.

Course Content:

UNIT I

10 Hours

- **Carbohydrate metabolism**

Glycolysis – Pathway, energetics and significance



Citric acid cycle- Pathway, energetics and significance

HMP shunt and its significance; Glucose-6-Phosphate dehydrogenase (G6PD) deficiency

Glycogen metabolism Pathways and glycogen storage diseases (GSD)

Gluconeogenesis- Pathway and its significance

Hormonal regulation of blood glucose level and Diabetes mellitus

- **Biological oxidation**

Electron transport chain (ETC) and its mechanism.

Oxidative phosphorylation & its mechanism and substrate level phosphorylation

Inhibitors ETC and oxidative phosphorylation/Uncouplers

UNIT II

10 Hours

- **Lipid metabolism**

β -Oxidation of saturated fatty acid (Palmitic acid)

Formation and utilization of ketone bodies; ketoacidosis

De novo synthesis of fatty acids (Palmitic acid)

Biological significance of cholesterol and conversion of cholesterol into bile acids, steroid hormone and vitamin D

Disorders of lipid metabolism: Hypercholesterolemia, atherosclerosis, fatty liver and obesity.

- **Amino acid metabolism**

General reactions of amino acid metabolism: Transamination, deamination & decarboxylation, urea cycle and its disorders

Catabolism of phenylalanine and tyrosine and their metabolic disorders (Phenyketonuria, Albinism, alkeptonuria, tyrosinemia)

Synthesis and significance of biological substances; 5-HT, melatonin, dopamine, noradrenaline, adrenaline



Catabolism of heme; hyperbilirubinemia and jaundice

UNIT III

- **Nucleic acid metabolism and genetic information transfer**

Biosynthesis of purine and pyrimidine nucleotides

Catabolism of purine nucleotides and Hyperuricemia and Gout disease

Organization of mammalian genome

Structure of DNA and RNA and their functions

DNA replication (semi conservative model)

Transcription or RNA synthesis

Genetic code, Translation or Protein synthesis and inhibitors

UNIT IV

- **Biomolecules**

Introduction, classification, chemical nature and biological role of carbohydrate, lipids, nucleic acids, amino acids and proteins.

- **Bioenergetics**

Concept of free energy, endergonic and exergonic reaction, Relationship between free energy, enthalpy and entropy; Redox potential.

Energy rich compounds; classification; biological significances of ATP

UNIT V

07 Hours

Enzymes

Introduction, properties, nomenclature and IUB classification of enzymes

Enzyme kinetics (Michaelis plot, Line Weaver Burke plot)

Enzyme inhibitors with examples

Regulation of enzymes: enzyme induction and repression, allosteric enzymes regulation



Therapeutic and diagnostic applications of enzymes and isoenzymes Coenzymes –Structure and biochemical functions

BP 209 P. BIOCHEMISTRY (Practical) 4 Hours / Week

1. Qualitative analysis of carbohydrates (Glucose, Fructose, Lactose, Maltose, Sucrose and starch)
2. Identification tests for Proteins (albumin and Casein)
3. Quantitative analysis of reducing sugars (DNSA method) and Proteins (Biuret method)
4. Qualitative analysis of urine for abnormal constituents
5. Determination of blood creatinine
6. Determination of blood sugar
7. Determination of serum total cholesterol
8. Preparation of buffer solution and measurement of pH
9. Study of enzymatic hydrolysis of starch
10. Determination of Salivary amylase activity
11. Study the effect of Temperature on Salivary amylase activity.
12. Study the effect of substrate concentration on salivary amylase activity.

Recommended Books (Latest Editions)

1. Principles of Biochemistry by Lehninger.
2. Harper's Biochemistry by Robert K. Murry, Daryl K. Granner and Victor W. Rodwell.
3. Biochemistry by Stryer.
4. Biochemistry by D. Satyanarayan and U.Chakrapani



5. Textbook of Biochemistry by Rama Rao.
6. Textbook of Biochemistry by Deb.
7. Outlines of Biochemistry by Conn and Stumpf
8. Practical Biochemistry by R.C. Gupta and S. Bhargavan.
9. Introduction of Practical Biochemistry by David T. Plummer. (3rd Edition)
10. Practical Biochemistry for Medical students by Rajagopal and Ramakrishna.
11. Practical Biochemistry by Harold Varley.

BP 204T.PATHOPHYSIOLOGY (THEORY)

45Hours

Scope: Pathophysiology is the study of causes of diseases and reactions of the body to such disease producing causes. This course is designed to impart a thorough knowledge of the relevant aspects of pathology of various conditions with reference to its pharmacological applications, and understanding of basic pathophysiological mechanisms. Hence it will not only help to study the syllabus of pathology, but also to get baseline knowledge required to practice medicine safely, confidently, rationally and effectively.

Objectives: Upon completion of the subject student shall be able to –

1. Describe the etiology and pathogenesis of the selected disease states; 2. Name the signs and symptoms of the diseases; and
3. Mention the complications of the diseases.

Course content:

Unit I

10Hours

- **Basic principles of Cell injury and Adaptation:**

Introduction, definitions, Homeostasis, Components and Types of Feedback systems, Causes of cellular injury, Pathogenesis (Cell membrane damage, Mitochondrial damage, Ribosome damage, Nuclear damage), Morphology of cell injury – Adaptive changes (Atrophy, Hypertrophy, hyperplasia, Metaplasia, Dysplasia), Cell swelling, Intra cellular accumulation, Calcification, Enzyme leakage and Cell Death Acidosis & Alkalosis, Electrolyte imbalance



- **Basic mechanism involved in the process of inflammation and repair:**

Introduction, Clinical signs of inflammation, Different types of Inflammation, Mechanism of Inflammation – Alteration in vascular permeability and blood flow, migration of WBC's, Mediators of inflammation, Basic principles of wound healing in the skin, Pathophysiology of Atherosclerosis

Unit II**10Hours**

- **Cardiovascular System:**

Hypertension, congestive heart failure, ischemic heart disease (angina, myocardial infarction, atherosclerosis and arteriosclerosis)

- **Respiratory system:** Asthma, Chronic obstructive airways diseases.
- **Renal system:** Acute and chronic renal failure

Unit II**10Hours**

- **Haematological Diseases:**

Iron deficiency, megaloblastic anemia (Vit B12 and folic acid), sickle cell anemia, thalasemia, hereditary acquired anemia, hemophilia

- **Endocrine system:** Diabetes, thyroid diseases, disorders of sex hormones
- **Nervous system:** Epilepsy, Parkinson's disease, stroke, psychiatric disorders: depression, schizophrenia and Alzheimer's disease.
- **Gastrointestinal system:** Peptic Ulcer

Unit IV**8 Hours**

- Inflammatory bowel diseases, jaundice, hepatitis (A,B,C,D,E,F) alcoholic liver disease.
- **Disease of bones and joints:** Rheumatoid arthritis, osteoporosis and gout
- **Principles of cancer:** classification, etiology and pathogenesis of cancer
- **Diseases of bones and joints:** Rheumatoid Arthritis, Osteoporosis, Gout
- **Principles of Cancer:** Classification, etiology and pathogenesis of Cancer



Unit V**7 Hours**

• **Infectious diseases:** Meningitis, Typhoid, Leprosy, Tuberculosis Urinary tract infections

Sexually transmitted diseases: AIDS, Syphilis, Gonorrhoea

Recommended Books (Latest Editions)

1. Vinay Kumar, Abul K. Abas, Jon C. Aster; Robbins & Cotran Pathologic Basis of Disease; South Asia edition; India; Elsevier; 2014.
2. Harsh Mohan; Text book of Pathology; 6th edition; India; Jaypee Publications; 2010.
3. Laurence B, Bruce C, Bjorn K. ; Goodman Gilman's The Pharmacological Basis of Therapeutics; 12th edition; New York; McGraw-Hill; 2011.
4. Best, Charles Herbert 1899-1978; Taylor, Norman Burke 1885-1972; West, John B (John Burnard); Best and Taylor's Physiological basis of medical practice; 12th ed; united states;
5. William and Wilkins, Baltimore; 1991 [1990 printing].
6. Nicki R. Colledge, Brian R. Walker, Stuart H. Ralston; Davidson's Principles and Practice of Medicine; 21st edition; London; ELBS/Churchill Livingstone; 2010.
7. Guyton A, John .E Hall; Textbook of Medical Physiology; 12th edition; WB Saunders Company; 2010.
8. Joseph DiPiro, Robert L. Talbert, Gary Yee, Barbara Wells, L. Michael Posey; Pharmacotherapy: A Pathophysiological Approach; 9th edition; London; McGraw-Hill Medical; 2014.
9. V. Kumar, R. S. Cotran and S. L. Robbins; Basic Pathology; 6th edition; Philadelphia; WB Saunders Company; 1997.
10. Roger Walker, Clive Edwards; Clinical Pharmacy and Therapeutics; 3rd edition; London; Churchill Livingstone publication; 2003.

Recommended Journals

1. The Journal of Pathology. ISSN: 1096-9896 (Online)
2. The American Journal of Pathology. ISSN: 0002-9440
3. Pathology. 1465-3931 (Online)
4. International Journal of Physiology, Pathophysiology and Pharmacology. ISSN: 1944-8171 (Online)



5. Indian Journal of Pathology and Microbiology. ISSN-0377-4929.

BP205 T. COMPUTER APPLICATIONS IN PHARMACY (Theory)

30 Hrs (2 Hrs/Week)

Scope: This subject deals with the introduction Database, Database Management system, computer application in clinical studies and use of databases.

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

1. know the various types of application of computers in pharmacy
2. know the various types of databases
3. know the various applications of databases in pharmacy

Course content:

UNIT – I

06 hours

Number system: Binary number system, Decimal number system, Octal number system, Hexadecimal number systems, conversion decimal to

binary, binary to decimal, octal to binary etc, binary addition, binary subtraction – One's complement, Two's complement method, binary multiplication, binary division

Concept of Information Systems and Software : Information gathering, requirement and feasibility analysis, data flow diagrams, process specifications, input/output design, process life cycle, planning and managing the project

UNIT –II

06 hours

Web technologies: Introduction to HTML, XML, CSS and Programming languages, introduction to web servers and



Server Products

Introduction to databases, MYSQL, MS ACCESS, Pharmacy Drug database

UNIT – III

**06
hours**

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

UNIT – IV

Bioinformatics: Introduction, Objective of Bioinformatics, Bioinformatics Databases, Concept of Bioinformatics, Impact of Bioinformatics in Vaccine Discovery

UNIT-V

Computers as data analysis in Preclinical development:

Chromatographic data analysis(CDS), Laboratory Information management System (LIMS) and Text Information Management System(TIMMS)

BP210P. COMPUTER APPLICATIONS IN PHARMACY (Practical)

1. Design a questionnaire using a word processing package to gather information about a particular disease.
2. Create a HTML web page to show personal information.
3. Retrieve the information of a drug and its adverse effects using online tools
4. Creating mailing labels Using Label Wizard , generating label in MS WORD



5. Create a database in MS Access to store the patient information with the required fields Using access
6. Design a form in MS Access to view, add, delete and modify the patient record in the database
7. Generating report and printing the report from patient database
8. Creating invoice table using – MS Access
9. Drug information storage and retrieval using MS Access
10. Creating and working with queries in MS Access
11. Exporting Tables, Queries, Forms and Reports to web pages
12. Exporting Tables, Queries, Forms and Reports to XML pages

Recommended books (Latest edition):

1. Computer Application in Pharmacy – William E.Fassett –Lea and Febiger, 600 South Washington Square, USA, (215) 922-1330.
2. Computer Application in Pharmaceutical Research and Development –Sean Ekins – Wiley-Interscience, A John Willey and Sons, INC., Publication, USA
3. Bioinformatics (Concept, Skills and Applications) – S.C.Rastogi-CBS Publishers and Distributors, 4596/1- A, 11 Darya Gani, New Delhi – 110 002(INDIA)
4. Microsoft office Access - 2003, Application Development Using VBA, SQL Server, DAP and Infopath – Cary N.Prague – Wiley Dreamtech India (P) Ltd., 4435/7, Ansari Road, Daryagani, New Delhi - 110002

BP 206 T. ENVIRONMENTAL SCIENCES (Theory)

30 hours

Scope:Environmental Sciences is the scientific study of the environmental system and the status of its inherent or induced changes on organisms. It includes not only the study of physical and biological characters of the environment but also the social and cultural factors and the impact of man on environment.

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

1. Create the awareness about environmental problems among learners.



2. Impart basic knowledge about the environment and its allied problems.
3. Develop an attitude of concern for the environment.
4. Motivate learner to participate in environment protection and environment improvement.
5. Acquire skills to help the concerned individuals in identifying and solving environmental problems.
6. Strive to attain harmony with Nature.

Course content:**Unit-I****10hours**

The Multidisciplinary nature of environmental studies

Natural Resources

Renewable and non-renewable resources:

Natural resources and associated problems

a) Forest resources; b) Water resources; c) Mineral resources; d) Food resources; e) Energy resources; f) Land resources: Role of an individual in conservation of natural resources.

Unit-II**10hours**

Ecosystems

- Concept of an ecosystem.
- Structure and function of an ecosystem.
- Introduction, types, characteristic features, structure and function of the ecosystems: Forest ecosystem; Grassland ecosystem; Desert ecosystem; Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

Unit- III**10hours**

Environmental Pollution: Air pollution; Water pollution; Soil pollution

Recommended Books (Latest edition):

1. Y.K. Sing, Environmental Science, New Age International Pvt, Publishers, Bangalore
2. Agarwal, K.C. 2001 Environmental Biology, Nidi Publ. Ltd. Bikaner.
3. Bharucha Erach, The Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad – 380 013, India,



4. Brunner R.C., 1989, Hazardous Waste Incineration, McGraw Hill Inc. 480p
5. Clark R.S., Marine Pollution, Clarendon Press Oxford
6. Cunningham, W.P. Cooper, T.H. Gorhani, E & Hepworth, M.T. 2001, Environmental Encyclopedia, Jaico Publ. House, Mumbai, 1196p
7. De A.K., Environmental Chemistry, Wiley Eastern Ltd.

Down of Earth, Centre for Science and Environment



SEMESTER III



BP301T. PHARMACEUTICAL ORGANIC CHEMISTRY –II (Theory)**45 Hours**

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

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

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

Course Content:

General methods of preparation and reactions of compounds superscripted with asterisk (*) to be explained

To emphasize on definition, types, classification, principles/mechanisms, applications, examples and differences

UNIT I**10 Hours**

- **Benzene and its derivatives**
 - A. Analytical, synthetic and other evidences in the derivation of structure of benzene, Orbital picture, resonance in benzene, aromatic characters, Huckel's rule
 - B. Reactions of benzene - nitration, sulphonation, halogenation- reactivity, Friedelcrafts alkylation- reactivity, limitations, Friedelcrafts acylation.
 - C. Substituents, effect of substituents on reactivity and orientation of mono substituted benzene compounds towards electrophilic substitution reaction
 - D. Structure and uses of DDT, Saccharin, BHC and Chloramine

UNIT II**10 Hours**

- **Phenols*** - Acidity of phenols, effect of substituents on acidity, qualitative tests, Structure and uses of phenol, cresols, resorcinol, naphthols



- **Aromatic Amines*** - Basicity of amines, effect of substituents on basicity, and synthetic uses of aryl diazonium salts

UNIT III**10 Hours**

- **Fats and Oils** a. Fatty acids – reactions.
- b. Hydrolysis, Hydrogenation, Saponification and Rancidity of oils, Drying oils.
- c. Analytical constants – Acid value, Saponification value, Ester value, Iodine value, Acetyl value, Reichert Meissl (RM) value – significance and principle involved in their determination.

UNIT IV**Polynuclear hydrocarbons:**

- Synthesis, reactions
- Structure and medicinal uses of Naphthalene, Phenanthrene, Anthracene, Diphenylmethane, Triphenylmethane and their derivatives

UNIT V**Cyclo alkanes***

Stabilities – Baeyer's strain theory, limitation of Baeyer's strain theory, Coulson and Moffitt's modification, Sachse Mohr's theory (Theory of strainless rings), reactions of cyclopropane and cyclobutane only

BP305P. PHARMACEUTICAL ORGANIC CHEMISTRY -II (Practical)**4 Hrs/week****I Experiments involving laboratory techniques**

- Recrystallization
- Steam distillation

II Determination of following oil values (including standardization of reagents)

- Acid value
- Saponification value
- Iodine value

III Preparation of compounds

- Benzanilide/Phenyl benzoate/Acetanilide from Aniline/ Phenol /Aniline by acylation reaction.
- 2,4,6-Tribromo aniline/Para bromo acetanilide from Aniline/ □Acetanilide by halogenation (Bromination) reaction.
- 5-Nitro salicylic acid/Meta di nitro benzene from Salicylic acid / Nitro benzene by nitration reaction.
- Benzoic acid from Benzyl chloride by oxidation reaction.
- Benzoic acid/ Salicylic acid from alkyl benzoate/ alkyl salicylate by hydrolysis reaction.
- 1-Phenyl azo-2-naphthol from Aniline by diazotization and coupling reactions.
- Benzil from Benzoin by oxidation reaction.
- Dibenzal acetone from Benzaldehyde by Claisen Schmidt reaction
- Cinnamic acid from Benzaldehyde by Perkin reaction
- *P*-Iodo benzoic acid from *P*-amino benzoic acid

Recommended Books (Latest Editions)

1. Organic Chemistry by Morrison and Boyd
2. Organic Chemistry by I.L. Finar , Volume-I
3. Textbook of Organic Chemistry by B.S. Bahl & Arun Bahl.
4. Organic Chemistry by P.L.Soni
5. Practical Organic Chemistry by Mann and Saunders.
6. Vogel's text book of Practical Organic Chemistry
7. Advanced Practical organic chemistry by N.K.Vishnoi.
8. Introduction to Organic Laboratory techniques by Pavia, Lampman and Kriz.

BP302T. PHYSICAL PHARMACEUTICS-I (Theory)

45Hours

Scope: The course deals with the various physical, physicochemical properties and principle involved in dosage forms, formulations. Theory and practical components of the subject help



the student to get a better insight in to various areas of formulation research and development and stability studies of pharmaceuticals.

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

1. Understand various physicochemical properties of drug molecules in the designing the dosage form
2. Know the principles of chemical kinetics & to use them in assigning expiry date for formulation
3. Demonstrate use of physicochemical properties in evaluation of dosage forms.
4. Appreciate physicochemical properties of drug molecules in formulation research and development

Course Content:

UNIT-I

10 Hours

Solubility of drugs: Solubility expressions, mechanisms of solute solvent interactions, ideal solubility parameters, solvation & association, quantitative approach to the factors influencing solubility of drugs, Dissolution & drug release, diffusion principles in biological systems. Solubility of gas in liquids, solubility of liquids in liquids, (Binary solutions, ideal solutions) Raoult's law, real solutions, azeotropic mixtures, fractional distillation. Partially miscible liquids, Critical solution temperature and applications. Distribution law, its limitations and applications

UNIT-II

10Hours

States of Matter and properties of matter: State of matter, changes in the state of matter, latent heats, vapour pressure, sublimation critical point, eutectic mixtures, gases, aerosols – inhalers, relative humidity, liquid complexes, liquid crystals, glassy states, solidcrystalline, amorphous & polymorphism.

Physicochemical properties of drug molecules: Refractive index, optical rotation, dielectric constant, dipole moment, dissociation constant, determinations and applications

UNIT-III

10Hours



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

UNIT-IV**08Hours**

Complexation and protein binding: Introduction, Classification of Complexation, Applications, methods of analysis, protein binding, Complexation and drug action, crystalline structures of complexes and thermodynamic treatment of stability constants.

UNIT-V**07 Hours**

pH, buffers and Isotonic solutions: Sorensen's pH scale, pH determination (electrometric and calorimetric), applications of buffers, buffer equation, buffer capacity, buffers in pharmaceutical and biological systems, buffered isotonic solutions.

BP306P. PHYSICAL PHARMACEUTICS – I (Practical)**4 Hrs/week**

1. Determination the solubility of drug at room temperature
2. Determination of pKa value by Half Neutralization/ Henderson Hassel Balch equation.
3. Determination of Partition co- efficient of benzoic acid in benzene and water
4. Determination of Partition co- efficient of Iodine in CCl₄ and water
5. Determination of % composition of NaCl in a solution using phenol-water system by CST method
6. Determination of particle size, particle size distribution using sieving method
7. Determination of particle size, particle size distribution using Microscopic method
8. Determination of bulk density, true density and porosity
9. Determine the angle of repose and influence of lubricant on angle of repose
10. Determination of stability constant and donor acceptor ratio of PABA-Caffeine complex by solubility method



11. Determination of stability constant and donor acceptor ratio of Cupric-Glycine complex by pH titration method

Recommended Books: (Latest Editions)

1. Physical pharmacy by Alfred Martin
2. Experimental pharmaceuticals by Eugene, Parott.
3. Tutorial pharmacy by Cooper and Gunn.
4. Stocklosam J. Pharmaceutical calculations, Lea &Febiger, Philadelphia.
5. Liberman H.A, Lachman C., Pharmaceutical Dosage forms, Tablets, Volume-1 to 3, MarcelDekkar Inc.
6. Liberman H.A, Lachman C, Pharmaceutical dosage forms. Disperse systems, volume 1, 2, 3. Marcel Dekkar Inc.
7. Physical pharmaceuticals by Ramasamy C and ManavalanR.
8. Laboratory manual of physical pharmaceuticals, C.V.S. Subramanyam, J. Thimma settee

BP 303 T. PHARMACEUTICAL MICROBIOLOGY (Theory)

45Hours Scope:

- In the broadest sense, scope of microbiology is the study of all organisms that are invisible to the naked eye- that is the study of microorganisms.
- Microorganisms are necessary for the production of bread, cheese, beer, antibiotics, vaccines, vitamins, enzymes etc.
- Microbiology has an impact on medicine, agriculture, food science, ecology, genetics, biochemistry, immunology etc.

Objectives: Upon completion of the subject student shall be able to;

1. Understand methods of identification, cultivation and preservation of various microorganisms
2. Importance of sterilization in microbiology. and pharmaceutical industry



3. Learn sterility testing of pharmaceutical products.
4. Microbiological standardization of Pharmaceuticals.
5. Understand the cell culture technology and its applications in pharmaceutical industries.

Course content:

Unit I

10 Hours

Introduction, history of microbiology, its branches, scope and its importance.

Introduction to Prokaryotes and Eukaryotes

Study of ultra-structure and morphological classification of bacteria, nutritional requirements, raw materials used for culture media and physical parameters for growth, growth curve, isolation and preservation methods for pure cultures, cultivation of anaerobes, quantitative measurement of bacterial growth (total & viable count).

Study of different types of phase contrast microscopy, dark field microscopy and electron microscopy.

Unit II

10 Hours

Identification of bacteria using staining techniques (simple, Gram's & Acid fast staining) and biochemical tests (IMViC).

Study of principle, procedure, merits, demerits and applications of Physical, chemical and mechanical method of sterilization.

Evaluation of the efficiency of sterilization methods.

Equipments employed in large scale sterilization.

Sterility indicators.

Unit III

Study of morphology, classification, reproduction/replication and cultivation of Fungi and Virus.



Classification and mode of action of disinfectants

Factors influencing disinfection, antiseptics and their evaluation. For bacteriostatic and bactericidal actions

Evaluation of bactericidal & Bacteriostatic.

Sterility testing of products (solids, liquids, ophthalmic and other sterile products) according to IP, BP and USP.

Unit IV

Designing of aseptic area, laminar flow equipments; study of different sources of contamination in an aseptic area and methods of prevention, clean area classification. Principles and methods of different microbiological assay. Methods for standardization of antibiotics, vitamins and amino acids. Assessment of a new antibiotic and testing of antimicrobial activity of a new substance.

General aspects-environmental cleanliness.

Unit V

Types of spoilage, factors affecting the microbial spoilage of pharmaceutical products, sources and types of microbial contaminants, assessment of microbial contamination and spoilage.

Preservation of pharmaceutical products using antimicrobial agents, evaluation of microbial stability of formulations.

Growth of animal cells in culture, general procedure for cell culture, Primary, established and transformed cell cultures.

Application of cell cultures in pharmaceutical industry and research.

BP 307P.PHARMACEUTICAL MICROBIOLOGY (Practical)

4 Hrs/week



1. Introduction and study of different equipments and processing, e.g., B.O.D. incubator, laminar flow, aseptic hood, autoclave, hot air sterilizer, deep freezer, refrigerator, microscopes used in experimental microbiology.
2. Sterilization of glassware, preparation and sterilization of media.
3. Sub culturing of bacteria and fungus. Nutrient stabs and slants preparations.
4. Staining methods- Simple, Grams staining and acid fast staining (Demonstration with practical).
5. Isolation of pure culture of micro-organisms by multiple streak plate technique and other techniques.
6. Microbiological assay of antibiotics by cup plate method and other methods
7. Motility determination by Hanging drop method.
8. Sterility testing of pharmaceuticals.
9. Bacteriological analysis of water
10. Biochemical test (IMViC reactions)
11. Revision Practical Class

Recommended Books (Latest edition)

1. W.B. Hugo and A.D. Russel: Pharmaceutical Microbiology, Blackwell Scientific publications, Oxford London.
2. Prescott and Dunn., Industrial Microbiology, 4th edition, CBS Publishers & Distributors, Delhi.
3. Pelczar, Chan Kreig, Microbiology, Tata McGraw Hill edn.
4. Malcolm Harris, Balliere Tindall and Cox: Pharmaceutical Microbiology.
5. Rose: Industrial Microbiology.
6. Probisher, Hinsdill et al: Fundamentals of Microbiology, 9th ed. Japan
7. Cooper and Gunn's: Tutorial Pharmacy, CBS Publisher and Distribution.
8. Pepler: Microbial Technology.
9. I.P., B.P., U.S.P.- latest editions.



10. Ananthnarayan : Text Book of Microbiology, Orient-Longman, Chennai
11. Edward: Fundamentals of Microbiology.
12. N.K.Jain: Pharmaceutical Microbiology, Vallabh Prakashan, Delhi
13. Bergeys manual of systematic bacteriology, Williams and Wilkins- A Waverly company
- BP 304 T. PHARMACEUTICAL ENGINEERING (Theory)**

45 Hours

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

Objectives: Upon completion of the course student shall be able:

1. To know various unit operations used in Pharmaceutical industries.
2. To understand the material handling techniques.
3. To perform various processes involved in pharmaceutical manufacturing process.
4. To carry out various test to prevent environmental pollution.
5. To appreciate and comprehend significance of plant lay out design for optimum use of resources.
6. To appreciate the various preventive methods used for corrosion control in Pharmaceutical industries.

Course content:

UNIT-I

10 Hours

- **Flow of fluids:** Types of manometers, Reynolds number and its significance, Bernoulli's theorem and its applications, Energy losses, Orifice meter, Venturimeter, Pitot tube and Rotometer.
- **Size Reduction:** Objectives, Mechanisms & Laws governing size reduction, factors affecting size reduction, principles, construction, working, uses, merits and demerits of Hammer mill, ball mill, fluid energy mill, Edge runner mill & end runner mill.



- **Size Separation:** Objectives, applications & mechanism of size separation, official standards of powders, sieves, size separation Principles, construction, working, uses, merits and demerits of Sieve shaker, cyclone separator, Air separator, Bag filter & elutriation tank.
- **Mixing:** Objectives, applications & factors affecting mixing, Difference between solid and liquid mixing, mechanism of solid mixing, liquids mixing and semisolids mixing. Principles, Construction, Working, uses, Merits and Demerits of Double cone blender, twin shell blender, ribbon blender, Sigma blade mixer, planetary mixers, Propellers, Turbines, Paddles & Silverson Emulsifier,

UNIT-II**10 Hours**

- **Crystallization:** Objectives, applications, & theory of crystallization. Solubility curves, principles, construction, working, uses, merits and demerits of Agitated batch crystallizer, Swenson Walker Crystallizer, Krystal crystallizer, Vacuum crystallizer. Caking of crystals, factors affecting caking & prevention of caking.
- **Evaporation:** Objectives, applications and factors influencing evaporation, differences between evaporation and other heat process. principles, construction, working, uses, merits and demerits of Steam jacketed kettle, horizontal tube evaporator, climbing film evaporator, forced circulation evaporator, multiple effect evaporator & Economy of multiple effect evaporator.
- **Heat Transfer:** Objectives, applications & Heat transfer mechanisms. Fourier's law, Heat transfer by conduction, convection & radiation. Heat interchangers & heat exchangers.

UNIT- III**10 Hours**

- **Drying:** Objectives, applications & mechanism of drying process, measurements & applications of Equilibrium Moisture content, rate of drying curve. principles, construction, working, uses, merits and demerits of Tray dryer, drum dryer spray dryer, fluidized bed dryer, vacuum dryer, freeze dryer.
- **Distillation:** Objectives, applications & types of distillation. principles, construction, working, uses, merits and demerits of (lab scale and industrial scale) Simple distillation, preparation of purified water and water for injection BP by distillation, flash distillation, fractional distillation, distillation under reduced pressure, steam distillation & molecular distillation



UNIT-IV**08 Hours**

- **Filtration:** Objectives, applications, Theories & Factors influencing filtration, filter aids, filter medias. Principle, Construction, Working, Uses, Merits and demerits of plate & frame filter, filter leaf, rotary drum filter, Meta filter & Cartridge filter, membrane filters and Seidtz filter.
- **Centrifugation:** Objectives, principle & applications of Centrifugation, principles, construction, working, uses, merits and demerits of Perforated basket centrifuge, Non- perforated basket centrifuge, semi continuous centrifuge & super centrifuge.

UNIT- V**07 Hours**

- **Plant location, industrial hazards and plant safety:** Plant Layout, utilities and services, Mechanical hazards, Chemical hazards, Fire hazards, explosive hazards and their safety.
- **Materials of pharmaceutical plant construction, Corrosion and its prevention:** Factors affecting during materials selected for Pharmaceutical plant construction, Theories of corrosion, types of corrosion and there prevention. Ferrous and nonferrous metals, inorganic and organic non metals.
- **Material handling systems:** Objectives & applications of Material handling systems, different types of conveyors such as belt, screw and pneumatic conveyors.

Recommended Books: (Latest Editions)

1. Introduction to chemical engineering – Walter L Badger & Julius Banchemo, Latest edition.
2. Solid phase extraction, Principles, techniques and applications by Nigel J.K. Simpson- Latest edition.
3. Unit operation of chemical engineering – McCabe Smith, Latest edition.
4. Pharmaceutical engineering principles and practices – C.V.S Subrahmanyam et al., Latest edition.
5. Remington practice of pharmacy- Martin, Latest edition.
6. Theory and practice of industrial pharmacy by Lachmann., Latest edition.
7. Physical pharmaceutics- C.V.S Subrahmanyam et al., Latest edition.



8. Cooper and Gunn's Tutorial pharmacy, S.J. Carter, Latest edition.

BP308P - PHARMACEUTICAL ENGINEERING (Practical)

4 Hours/week

- I. Determination of radiation constant of brass, iron, unpainted and painted glass. II. Steam distillation – To calculate the efficiency of steam distillation.
- III. To determine the overall heat transfer coefficient by heat exchanger.
- IV. Construction of drying curves (for calcium carbonate and starch). V. Determination of moisture content and loss on drying.
- VI. Determination of humidity of air – i) From wet and dry bulb temperatures –use of Dew point method.
- VII. Description of Construction working and application of Pharmaceutical Machinery such as rotary tablet machine, fluidized bed coater, fluid energy mill, de humidifier.
- VIII. Size analysis by sieving – To evaluate size distribution of tablet granulations – Construction of various size frequency curves including arithmetic and logarithmic probability plots.
- IX. Size reduction: To verify the laws of size reduction using ball mill and determining Kicks, Rittinger's, Bond's coefficients, power requirement and critical speed of Ball Mill.
- X. Demonstration of colloid mill, planetary mixer, fluidized bed dryer, freeze dryer and such other major equipment.
- XI. Factors affecting Rate of Filtration and Evaporation (Surface area, Concentration and Thickness/ viscosity
- XII. To study the effect of time on the Rate of Crystallization.
- XIII. To calculate the uniformity Index for given sample by using Double Cone Blender.



SEMESTER IV



BP401T. PHARMACEUTICAL ORGANIC CHEMISTRY –III (Theory)**45 Hours**

Scope: This subject imparts knowledge on stereo-chemical aspects of organic compounds and organic reactions, important named reactions, chemistry of important hetero cyclic compounds. It also emphasizes on medicinal and other uses of organic compounds.

Objectives: At the end of the course, the student shall be able to

1. understand the methods of preparation and properties of organic compounds
2. explain the stereo chemical aspects of organic compounds and stereo chemical reactions
3. know the medicinal uses and other applications of organic compounds

Course Content:

Note: To emphasize on definition, types, mechanisms, examples, uses/applications

UNIT-I**10 Hours****Stereo isomerism**

Optical isomerism –

Optical activity, enantiomerism, diastereoisomerism, meso compounds

Elements of symmetry, chiral and achiral molecules

DL system of nomenclature of optical isomers, sequence rules, RS system of nomenclature of optical isomers

Reactions of chiral molecules

Racemic modification and resolution of racemic mixture.

Asymmetric synthesis: partial and absolute

UNIT-II**10 Hours**

Geometrical isomerism

220



Nomenclature of geometrical isomers (Cis Trans, EZ, Syn Anti systems)

Methods of determination of configuration of geometrical isomers.

Conformational isomerism in Ethane, n-Butane and Cyclohexane.

Stereo isomerism in biphenyl compounds (Atropisomerism) and conditions for optical activity.

Stereospecific and stereoselective reactions

UNIT-III

10 Hours

Heterocyclic compounds:

Nomenclature and classification

Synthesis, reactions and medicinal uses of following compounds/derivatives

Pyrrrole, Furan, and Thiophene - Relative aromaticity, reactivity and Basicity of pyrrole

UNIT-IV

8 Hours

Synthesis, reactions and medicinal uses of following compounds/derivatives Pyrazole, Imidazole, Oxazole and Thiazole. Pyridine, Quinoline, Isoquinoline, Acridine and Indole. Basicity of pyridine

Synthesis and medicinal uses of Pyrimidine, Purine, azepines and their derivatives

UNIT-V

07 Hours

Reactions of synthetic importance

Metal hydride reduction (NaBH_4 and LiAlH_4), Clemmensen reduction, Birch reduction, Wolff Kishner reduction.

Oppenauer-oxidation and Dakin reaction.

Beckmanns rearrangement and Schmidt rearrangement. Claisen-Schmidt condensation

Recommended Books (Latest Editions)

1. Organic chemistry by I.L. Finar, Volume-I & II.
2. A text book of organic chemistry – Arun Bahl, B.S. Bahl.
3. Heterocyclic Chemistry by Raj K. Bansal



4. Organic Chemistry by Morrison and Boyd
5. Heterocyclic Chemistry by T.L. Gilchrist

BP402T. MEDICINAL CHEMISTRY – I (Theory)

45 Hours

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

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

1. understand the chemistry of drugs with respect to their pharmacological activity
2. understand the drug metabolic pathways, adverse effect and therapeutic value of drugs
3. know the Structural Activity Relationship (SAR) of different class of drugs
4. write the chemical synthesis of some drugs

Course Content:

Study of the development of the following classes of drugs, Classification, mechanism of action, uses of drugs mentioned in the course, Structure activity relationship of selective class of drugs as specified in the course and synthesis of drugs superscripted (*)

UNIT- I

10 Hours

Introduction to Medicinal Chemistry

History and development of medicinal chemistry

Physicochemical properties in relation to biological action

Ionization, Solubility, Partition Coefficient, Hydrogen bonding, Protein binding, Chelation, Bioisosterism, Optical and Geometrical isomerism.

Drug metabolism

Drug metabolism principles- Phase I and Phase II.

Factors affecting drug metabolism including stereo chemical aspects.



UNIT- II**10 Hours****Drugs acting on Autonomic Nervous System****Adrenergic Neurotransmitters:**

Biosynthesis and catabolism of catecholamine.

Adrenergic receptors (Alpha & Beta) and their distribution.

Sympathomimetic agents: SAR of Sympathomimetic agents

Direct acting: Nor-epinephrine, Epinephrine, Phenylephrine*, Dopamine

Methyldopa, Clonidine, Dobutamine, Isoproterenol, Terbutaline, Salbutamol*, Bitolterol, Naphazoline, Oxymetazoline and Xylometazoline.

- Indirect acting agents: Hydroxyamphetamine, Pseudoephedrine, Propylhexedrine.
- Agents with mixed mechanism: Ephedrine, Metaraminol.

Adrenergic Antagonists:

Alpha adrenergic blockers: Tolazoline*, Phentolamine, Phenoxybenzamine, Prazosin, Dihydroergotamine, Methysergide.

Beta adrenergic blockers: SAR of beta blockers, Propranolol*, Metibranolol, Atenolol, Betazolol, Bisoprolol, Esmolol, Metoprolol, Labetolol, Carvedilol.

UNIT-III

Cholinergic neurotransmitters: Biosynthesis and catabolism of acetylcholine.

Cholinergic receptors (Muscarinic & Nicotinic) and their distribution.

Parasympathomimetic agents: SAR of Parasympathomimetic agents

Direct acting agents: Acetylcholine, Carbachol*, Bethanechol, Methacholine, Pilocarpine.

Indirect acting/ Cholinesterase inhibitors (Reversible & Irreversible): Physostigmine, Neostigmine*, Pyridostigmine, Edrophonium chloride, Tacrine hydrochloride, Ambenonium chloride, Isoflurophate, Echothiophate iodide, Parathione, Malathion.

Cholinesterase reactivator: Pralidoxime chloride.



Cholinergic Blocking agents: SAR of cholinolytic agents

Solanaceous alkaloids and analogues: Atropine sulphate, Hyoscyamine sulphate, Scopolamine hydrobromide, Homatropine hydrobromide, Ipratropium bromide*.

Synthetic cholinergic blocking agents: Tropicamide, Cyclopentolate hydrochloride, Clidinium bromide, Dicyclomine hydrochloride*, Glycopyrrolate, Methantheline bromide, Propantheline bromide, Benztropine mesylate, Orphenadrine citrate, Biperidine hydrochloride, Procyclidine hydrochloride*, Tridihexethyl chloride, Isopropamide iodide, Ethopropazine hydrochloride.

UNIT- IV**Drugs acting on Central Nervous System****General anesthetics:**

Inhalation anesthetics: Halothane*, Methoxyflurane, Enflurane, Sevoflurane, Isoflurane, Desflurane.

Ultra short acting barbiturates: Methohexital sodium*, Thiamylal sodium, Thiopental sodium.

Dissociative anesthetics: Ketamine hydrochloride.*

Narcotic and non-narcotic analgesics

Morphine and related drugs: SAR of Morphine analogues, Morphine sulphate, Codeine, Meperidine hydrochloride, Anilerdine hydrochloride, Diphenoxylate hydrochloride, Loperamide hydrochloride, Fentanyl citrate*, Methadone hydrochloride*, Propoxyphene hydrochloride, Pentazocine, Levorphanol tartarate.

Narcotic antagonists: Nalorphine hydrochloride, Levallorphan tartarate, Naloxone hydrochloride.

Anti-inflammatory agents: Sodium salicylate, Aspirin, Mefenamic acid*, Meclofenamate, Indomethacin, Sulindac, Tolmetin, Zomepirac, Diclofenac, Ketorolac, Ibuprofen*, Naproxen, Piroxicam, Phenacetin, Acetaminophen, Antipyrine, Phenylbutazone.



BP406P. MEDICINAL CHEMISTRY – I (Practical)**4 Hours/Week****I Preparation of drugs/ intermediates**

- 1 1,3-pyrazole
- 2 1,3-oxazole
- 3 Benzimidazole
- 4 Benztriazole
- 5 2,3- diphenyl quinoxaline
- 6 Benzocaine
- 7 Phenytoin
- 8 Phenothiazine
- 9 Barbiturate

II Assay of drugs

- 1 Chlorpromazine
- 2 Phenobarbitone
- 3 Atropine
- 4 Ibuprofen
- 5 Aspirin
- 6 Furosemide

III Determination of Partition coefficient for any two drugs**Recommended Books (Latest Editions)**

1. Wilson and Giswold's Organic medicinal and Pharmaceutical Chemistry.
2. Foye's Principles of Medicinal Chemistry.
3. Burger's Medicinal Chemistry, Vol I to IV.
4. Introduction to principles of drug design- Smith and Williams.
5. Remington's Pharmaceutical Sciences.
6. Martindale's extra pharmacopoeia.
7. Organic Chemistry by I.L. Finar, Vol. II.
8. The Organic Chemistry of Drug Synthesis by Lednicer, Vol. 1-5.
9. Indian Pharmacopoeia.

Text book of practical organic chemistry- A.I.Vogel.



BP 403 T. PHYSICAL PHARMACEUTICS-II (Theory)**45Hours**

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

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

1. Understand various physicochemical properties of drug molecules in the designing the dosage form
2. Know the principles of chemical kinetics & to use them in assigning expiry date for Formulation
3. Demonstrate use of physicochemical properties in evaluation of dosage forms.
4. Appreciate physicochemical properties of drug molecules in formulation research and Development

Course Content:**UNIT-I****10 Hours**

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

UNIT-II**10 Hours**

Rheology: Newtonian systems, law of flow, kinematic viscosity, effect of temperature, non-Newtonian systems, pseudoplastic, dilatants, plastic, thixotropy, thixotropy in formulation, determination of viscosity, capillary, falling Sphere, rotational viscometers

Deformation of solids: Plastic and elastic deformation, Heckel equation, Stress, Strain, Elastic Modulus

UNIT-III**10 Hours**

Coarse dispersion: Suspension, interfacial properties of suspended particles, settling in suspensions, formulation of suspensions. Emulsions and theories of emulsification,



microemulsion and multiple emulsions; Physical stability of emulsions, preservation of emulsions, rheological properties of emulsions, phase equilibria and emulsion formulation.

UNIT-IV**08 Hours**

Surface and interfacial phenomenon: Liquid interface, surface & interfacial tensions, surface free energy, measurement of surface & interfacial tensions, spreading coefficient, adsorption at liquid interfaces, surface active agents, HLB Scale, solubilisation, detergency, adsorption at solid interface.

UNIT-V**07 Hours**

Colloidal dispersions: Classification of dispersed systems & their general characteristics, size & shapes of colloidal particles, classification of colloids & comparative account of their general properties. Optical, kinetic & electrical properties. Effect of electrolytes, coacervation, peptization & protective action.

BP 407P. PHYSICAL PHARMACEUTICS- II (Practical)**3 Hrs/week**

1. Determination of surface tension of given liquids by drop count and drop weight method
2. Determination of HLB number of a surfactant by saponification method
3. Determination of Freundlich and Langmuir constants using activated char coal
4. Determination of critical micellar concentration of surfactants
5. Determination of viscosity of liquid using Ostwald's viscometer
6. Determination sedimentation volume with effect of different suspending agent
7. Determination sedimentation volume with effect of different concentration of single suspending agent
8. Determination of viscosity of semisolid by using Brookfield viscometer
9. Determination of reaction rate constant first order.
10. Determination of reaction rate constant second order
11. Accelerated stability studies

Recommended Books: (Latest Editions)

1. Physical Pharmacy by Alfred Martin, Sixth edition
2. Experimental pharmaceuticals by Eugene, Parott.



3. Tutorial pharmacy by Cooper and Gunn.
4. Stocklosam J. Pharmaceutical calculations, Lea & Febiger, Philadelphia.
5. Liberman H.A, Lachman C., Pharmaceutical Dosage forms, Tablets, Volume-1 to 3, Marcel Dekkar Inc.
6. Liberman H.A, Lachman C, Pharmaceutical dosage forms. Disperse systems, volume 1, 2, 3. Marcel Dekkar Inc.
7. Physical Pharmaceutics by Ramasamy C, and Manavalan R.

BP 404 T. PHARMACOLOGY-I (Theory)

45 Hrs

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

Objectives: Upon completion of this course the student should be able to

1. Understand the pharmacological actions of different categories of drugs
 2. Explain the mechanism of drug action at organ system/sub cellular/ macromolecular levels.
 3. Apply the basic pharmacological knowledge in the prevention and treatment of various diseases.
 4. Observe the effect of drugs on animals by simulated experiments
 5. Appreciate correlation of pharmacology with other bio medical sciences
- Course Content:**

UNIT-I

08 hours

1. General Pharmacology

a. Introduction to Pharmacology- Definition, historical landmarks and scope of pharmacology, nature and source of drugs, essential drugs concept and routes of drug administration, Agonists, antagonists(competitive and non competitive), spare receptors, addiction, tolerance, dependence, tachyphylaxis, idiosyncrasy, allergy.

b. Pharmacokinetics- Membrane transport, absorption, distribution, metabolism and excretion of drugs .Enzyme induction, enzyme inhibition, kinetics of elimination

UNIT-II

12 Hours



General Pharmacology

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

UNIT-III**10 Hours****2. Pharmacology of peripheral nervous system**

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

UNIT-IV**08 Hours****3. Pharmacology of central nervous system**

- a. Neurohumoral transmission in the C.N.S. special emphasis on importance of various neurotransmitters like with GABA, Glutamate, Glycine, serotonin, dopamine.
- b. General anesthetics and pre-anesthetics.
- c. Sedatives, hypnotics and centrally acting muscle relaxants.
- d. Anti-epileptics
- e. Alcohols and disulfiram

UNIT-V**07 Hours**

3. Pharmacology of central nervous system

- a. Psychopharmacological agents: Antipsychotics, antidepressants, anti-anxiety agents, anti-manics and hallucinogens.
- b. Drugs used in Parkinsons disease and Alzheimer's disease.
- c. CNS stimulants and nootropics.
- d. Opioid analgesics and antagonists
- e. Drug addiction, drug abuse, tolerance and dependence.

BP 408 P.PHARMACOLOGY-I (Practical)**4Hrs/Week**

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

Note: All laboratory techniques and animal experiments are demonstrated by simulated experiments by softwares and videos

Recommended Books (Latest Editions)

1. Rang H. P., Dale M. M., Ritter J. M., Flower R. J., Rang and Dale's Pharmacology, Churchill Livingstone Elsevier



2. Katzung B. G., Masters S. B., Trevor A. J., Basic and clinical pharmacology, Tata Mc Graw-Hill
3. Goodman and Gilman's, The Pharmacological Basis of Therapeutics
4. Marry Anne K. K., Lloyd Yee Y., Brian K. A., Robbin L.C., Joseph G. B., Wayne A. K., Bradley R.W., Applied Therapeutics, The Clinical use of Drugs, The Point Lippincott Williams & Wilkins
5. Mycek M.J, Gelnet S.B and Perper M.M. Lippincott's Illustrated Reviews- Pharmacology
6. K.D.Tripathi. Essentials of Medical Pharmacology, JAYPEE Brothers Medical Publishers (P) Ltd, New Delhi.
7. Sharma H. L., Sharma K. K., Principles of Pharmacology, Paras medical publisher
8. Modern Pharmacology with clinical Applications, by Charles R.Craig & Robert,
9. Ghosh MN. Fundamentals of Experimental Pharmacology. Hilton & Company, Kolkata.
10. Kulkarni SK. Handbook of experimental pharmacology. VallabhPrakashan,

BP 405 T.PHARMACOGNOSY AND PHYTOCHEMISTRY I (Theory)

45 Hours

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

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

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

Course Content:

UNIT-I

10 Hours

Introduction to Pharmacognosy:

- (a) Definition, history, scope and development of Pharmacognosy
- (b) Sources of Drugs – Plants, Animals, Marine & Tissue culture



(c) Organized drugs, unorganized drugs (dried latex, dried juices, dried extracts, gums and mucilages, oleoresins and oleo- gum -resins).

Classification of drugs:

Alphabetical, morphological, taxonomical, chemical, pharmacological, chemo and sero taxonomical classification of drugs

Quality control of Drugs of Natural Origin:

Adulteration of drugs of natural origin. Evaluation by organoleptic, microscopic, physical, chemical and biological methods and properties.

Quantitative microscopy of crude drugs including lycopodium spore method, leaf constants, camera lucida and diagrams of microscopic objects to scale with camera lucida.

UNIT-II

10 Hours

Cultivation, Collection, Processing and storage of drugs of natural origin: Cultivation and Collection of drugs of natural origin Factors influencing cultivation of medicinal plants. Plant hormones and their applications.

Polyploidy, mutation and hybridization with reference to medicinal plants

Conservation of medicinal plants

UNIT-III

07 Hours

Plant tissue culture:

Historical development of plant tissue culture, types of cultures, Nutritional requirements, growth and their maintenance.

Applications of plant tissue culture in pharmacognosy.

Edible vaccines

UNIT IV

10 Hours

Pharmacognosy in various systems of medicine:

Role of Pharmacognosy in allopathy and traditional systems of medicine namely, Ayurveda, Unani, Siddha, Homeopathy and Chinese systems of medicine.

Introduction to secondary metabolites:

Definition, classification, properties and test for identification of Alkaloids, Glycosides, Flavonoids, Tannins, Volatile oil and Resins

UNIT V

08 Hours



Study of biological source, chemical nature and uses of drugs of natural origin containing following drugs

Plant Products:

Fibers - Cotton, Jute, Hemp

Hallucinogens, Teratogens, Natural allergens

Primary metabolites:

General introduction, detailed study with respect to chemistry, sources, preparation, evaluation, preservation, storage, therapeutic used and commercial utility as Pharmaceutical Aids and/or Medicines for the following Primary metabolites:

Carbohydrates: Acacia, Agar, Tragacanth, Honey

Proteins and Enzymes : Gelatin, casein, proteolytic enzymes (Papain, bromelain, serratiopeptidase, urokinase, streptokinase, pepsin).

Lipids(Waxes, fats, fixed oils) : Castor oil, Chaulmoogra oil, Wool Fat, Bees Wax **Marine**

Drugs:

Novel medicinal agents from marine sources

BP408 P. PHARMACOGNOSY AND PHYTOCHEMISTRY I (Practical)

4 Hours/Week

1. Analysis of crude drugs by chemical tests: (i)Tragaccanth (ii) Acacia (iii)Agar (iv) Gelatin (v) starch (vi) Honey (vii) Castor oil
2. Determination of stomatal number and index
3. Determination of vein islet number, vein islet termination and palisade ratio.
4. Determination of size of starch grains, calcium oxalate crystals by eye piece micrometer
5. Determination of Fiber length and width
6. Determination of number of starch grains by Lycopodium spore method
7. Determination of Ash value
8. Determination of Extractive values of crude drugs
9. Determination of moisture content of crude drugs
10. Determination of swelling index and foaming

Recommended Books: (Latest Editions)



1. W.C.Evans, Trease and Evans Pharmacognosy, 16th edition, W.B. Saunders & Co., London, 2009.
2. Tyler, V.E., Brady, L.R. and Robbers, J.E., Pharmacognosy, 9th Edn., Lea and Febiger, Philadelphia, 1988.
3. Text Book of Pharmacognosy by T.E. Wallis
4. Mohammad Ali. Pharmacognosy and Phytochemistry, CBS Publishers & Distribution, New Delhi.
5. Text book of Pharmacognosy by C.K. Kokate, Purohit, Gokhlae (2007), 37th Edition, Nirali Prakashan, New Delhi.
6. Herbal drug industry by R.D. Choudhary (1996), 1stEdn, Eastern Publisher, New Delhi.
7. Essentials of Pharmacognosy, Dr.SH.Ansari, IInd edition, Birla publications, New Delhi, 2007
8. Practical Pharmacognosy: C.K. Kokate, Purohit, Gokhlae
9. Anatomy of Crude Drugs by M.A. Iyengar



SEMESTER V



BP501T. MEDICINAL CHEMISTRY – II (Theory)**45 Hours**

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

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

1. Understand the chemistry of drugs with respect to their pharmacological activity
2. Understand the drug metabolic pathways, adverse effect and therapeutic value of drugs
3. Know the Structural Activity Relationship of different class of drugs
4. Study the chemical synthesis of selected drugs

Course Content:

Study of the development of the following classes of drugs, Classification, mechanism of action, uses of drugs mentioned in the course, Structure activity relationship of selective class of drugs as specified in the course and synthesis of drugs superscripted (*)

UNIT- I**10 Hours**

Antihistaminic agents: Histamine, receptors and their distribution in the humanbody

H₁-antagonists: Diphenhydramine hydrochloride*, Dimenhydrinate, Doxylamines succinate, Clemastine fumarate, Diphenylpyraline hydrochloride, Tripelenamine hydrochloride, Chlorcyclizine hydrochloride, Meclizine hydrochloride, Buclizine hydrochloride, Chlorpheniramine maleate, Triprolidinehydrochloride*, Phenidamine tartarate, Promethazine hydrochloride*, Trimeprazine tartrate, Cyproheptadine hydrochloride, Azatidine maleate, Astemizole, Loratadine, Cetirizine, Levocetrazine Cromolyn sodium

H₂-antagonists: Cimetidine*, Famotidine, Ranitidin.

Gastric Proton pump inhibitors: Omeprazole, Lansoprazole, Rabeprazole, Pantoprazole



Anti-neoplastic agents:

Alkylating agents: Mecllorethamine*, Cyclophosphamide, Melphalan, Chlorambucil, Busulfan, Thiotepa

Antimetabolites: Mercaptopurine*, Thioguanine, Fluorouracil, Floxuridine, Cytarabine, Methotrexate*, Azathioprine

Antibiotics: Dactinomycin, Daunorubicin, Doxorubicin, Bleomycin

Plant products: Etoposide, Vinblastin sulphate, Vincristin sulphate

Miscellaneous: Cisplatin, Mitotane.

UNIT – II**10 Hours****Anti-anginal:**

Vasodilators: Amyl nitrite, Nitroglycerin*, Pentaerythritol tetranitrate, Isosorbide dinitrite*, Dipyridamole.

Calcium channel blockers: Verapamil, Bepridil hydrochloride, Diltiazem hydrochloride, Nifedipine, Amlodipine, Felodipine, Nicardipine, Nimodipine.

Diuretics: Carbonic anhydrase inhibitors: Acetazolamide*, Methazolamide, Dichlorphenamide. Thiazides: Chlorthiazide*, Hydrochlorothiazide, Hydroflumethiazide, Cyclothiazide, Loop diuretics: Furosemide*, Bumetanide, Ethacrynic acid. Potassium sparing Diuretics: Spironolactone, Triamterene, Amiloride. Osmotic Diuretics: Mannitol

Anti-hypertensive Agents: Timolol, Captopril, Lisinopril, Enalapril, Benazepril hydrochloride, Quinapril hydrochloride, Methyldopate hydrochloride,* Clonidine hydrochloride, Guanethidine monosulphate, Guanabenz acetate, Sodium nitroprusside, Diazoxide, Minoxidil, Reserpine, Hydralazine hydrochloride.

UNIT- III**10 Hours**

Anti-arrhythmic Drugs: Quinidine sulphate, Procainamide hydrochloride, Disopyramidephosphate*, Phenytoin sodium, Lidocaine hydrochloride, Tocainide hydrochloride, Mexiletine hydrochloride, Lorcaïnide hydrochloride, Amiodarone, Sotalol.

Anti-hyperlipidemic agents: Clofibrate, Lovastatin, Cholesteramine and Cholestipol



Coagulant & Anticoagulants: Menadione, Acetomenadione, Warfarin*, Anisindione, clopidogrel

Drugs used in Congestive Heart Failure: Digoxin, Digitoxin, Nesiritide, Bosentan, Tezosentan.

UNIT- IV

08 Hours

Drugs acting on Endocrine system

Nomenclature, Stereochemistry and metabolism of steroids

Sex hormones: Testosterone, Nandrolone, Progestrones, Oestriol, Oestradiol, Oestrione, Diethyl stilbestrol.

Drugs for erectile dysfunction: Sildenafil, Tadalafil.

Oral contraceptives: Mifepristone, Norgestril, Levonorgestrol

Corticosteroids: Cortisone, Hydrocortisone, Prednisolone, Betamethasone, Dexamethasone

Thyroid and antithyroid drugs: L-Thyroxine, L-Thyronine, Propylthiouracil, Methimazole.

UNIT – V

07 Hours

Antidiabetic agents:

Insulin and its preparations

Sulfonyl ureas: Tolbutamide*, Chlorpropamide, Glipizide, Glimepiride.

Biguanides: Metformin.

Thiazolidinediones: Pioglitazone, Rosiglitazone.

Meglitinides: Repaglinide, Nateglinide.

Glucosidase inhibitors: Acarbose, Voglibose.

Local Anesthetics: SAR of Local anesthetics

Benzoic Acid derivatives; Cocaine, Hexylcaine, Meprylcaine, Cyclomethycaine, Piperocaine.



Amino Benzoic acid derivatives: Benzocaine*, Butamben, Procaine*, Butacaine, Propoxycaine, Tetracaine, Benoxinate.

Lidocaine/Anilide derivatives: Lignocaine, Mepivacaine, Prilocaine, Etidocaine.
Miscellaneous: Phenacaine, Dipiperodon, Dibucaine.*

Recommended Books (Latest Editions) 1. Wilson and Giswold's Organic medicinal and Pharmaceutical Chemistry.

2. Foye's Principles of Medicinal Chemistry.
3. Burger's Medicinal Chemistry, Vol I to IV.
4. Introduction to principles of drug design- Smith and Williams.
5. Remington's Pharmaceutical Sciences.
6. Martindale's extra pharmacopoeia.
7. Organic Chemistry by I.L. Finar, Vol. II.
8. The Organic Chemistry of Drug Synthesis by Lednicer, Vol. 1 to 5.
9. Indian Pharmacopoeia.
10. Text book of practical organic chemistry- A.I.Vogel.



BP 502 T. FORMULATIVE PHARMACY (Theory)**45 Hours**

Scope: Course enables the student to understand and appreciate the influence of pharmaceutical additives and various pharmaceutical dosage forms on the performance of the drug product.

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

1. Know the various pharmaceutical dosage forms and their manufacturing techniques.
2. Know various considerations in development of pharmaceutical dosage forms
3. Formulate solid, liquid and semisolid dosage forms and evaluate them for their quality

Course content:**3 hours/ week****UNIT-I****07 Hours**

Preformulation Studies: Introduction to preformulation, goals and objectives, study of physicochemical characteristics of drug substances.

a. Physical properties: Physical form (crystal & amorphous), particle size, shape, flow properties, solubility profile (pKa, pH, partition coefficient), polymorphism

b. Chemical Properties: Hydrolysis, oxidation, reduction, racemisation, polymerization
BCS classification of drugs

Application of preformulation considerations in the development of solid, liquid oral and parenteral dosage forms and its impact on stability of dosage forms.

UNIT-II**10 Hours****Tablets:**

a. Introduction, ideal characteristics of tablets, classification of tablets. Excipients, Formulation of tablets, granulation methods, compression and processing problems. Equipments and tablet tooling.



- b. Tablet coating: Types of coating, coating materials, formulation of coating composition, methods of coating, equipment employed and defects in coating.
- c. Quality control tests: In process and finished product tests

Liquid orals: Formulation and manufacturing consideration of solutions, suspensions and emulsions; Filling and packaging; evaluation of liquid orals official in pharmacopoeia

UNIT-III

08 Hours

Capsules:

- a. **Hard gelatin capsules:** Introduction, Extraction of gelatin and production of hard gelatin capsule shells. size of capsules, Filling, finishing and special techniques of formulation of hard gelatin capsules. In process and final product quality control tests for capsules.
- b. **Soft gelatin capsules:** Nature of shell and capsule content, size of capsules, importance of base adsorption and minimum/gram factors, production, in process and final product quality control tests. Packing, storage and stability testing of soft gelatin capsules

Pellets: Introduction, formulation requirements, pelletization process, equipments for manufacture of pellets

UNIT-IV

10 Hours

Parenteral Products:

- a. Definition, types, advantages and limitations. Preformulation factors and essential requirements, vehicles, additives, importance of isotonicity
- b. Production procedure, production facilities and controls.
- c. Formulation of injections, sterile powders, emulsions, suspensions, large volume parenterals and lyophilized products, Sterilization.
- d. Containers and closures selection, filling and sealing of ampoules, vials and infusion fluids. Quality control tests.



Ophthalmic Preparations: Introduction, formulation considerations; formulation of eye drops, eye ointments and eye lotions; methods of preparation; labeling, containers; evaluation of ophthalmic preparations

UNIT-V**10 Hours**

Cosmetics: Formulation and preparation of the following cosmetic preparations: lipsticks, shampoos, cold cream and vanishing cream, tooth pastes, hair dyes and sunscreens.

Pharmaceutical Aerosols: Definition, propellants, containers, valves, types of aerosol systems; formulation and manufacture of aerosols; Evaluation of aerosols; Quality control and stability studies.

Packaging Materials Science: Materials used for packaging of pharmaceutical products, factors influencing choice of containers, legal and official requirements for containers, stability aspects of packaging materials, quality control tests.

BP 506 P. FORMULATIVE PHARMACY (Practical)**4 Hours/week**

1. Preformulation study for prepared granules
2. Preparation and evaluation of Paracetamol tablets
3. Preparation and evaluation of Aspirin tablets
4. Coating of tablets
5. Preparation and evaluation of Tetracycline capsules
6. Preparation of Calcium Gluconate injection
7. Preparation of Ascorbic Acid injection
8. Preparation of Paracetamol Syrup
9. Preparation of Eye drops
10. Preparation of Pellets by extrusion spheronization technique
11. Preparation of Creams (cold / vanishing cream)
12. Evaluation of Glass containers



Recommended Books: (Latest Editions)

1. Pharmaceutical dosage forms - Tablets, volume 1 -3 by H.A. Liberman, Leon Lachman & J.B. Schwartz
2. Pharmaceutical dosage form - Parenteral medication vol- 1&2 by Liberman & Lachman
3. Pharmaceutical dosage form disperse system VOL-1 by Liberman & Lachman
4. Modern Pharmaceutics by Gilbert S. Banker & C.T. Rhodes, 3rd Edition
5. Remington: The Science and Practice of Pharmacy, 20th edition Pharmaceutical Science (RPS)
6. Theory and Practice of Industrial Pharmacy by Liberman & Lachman
7. Pharmaceutics- The science of dosage form design by M.E. Aulton, Churchill Livingstone, Latest edition
8. Introduction to Pharmaceutical Dosage Forms by H. C. Ansel, Lea & Febiger, Philadelphia, 5th edition, 2005
9. Drug stability - Principles and practice by Cartensen & C.J. Rhodes, 3rd Edition, Marcel Dekker Series, Vol 107.

BP503.T. PHARMACOLOGY-II (Theory)**45 Hours**

Scope: This subject is intended to impart the fundamental knowledge on various aspects (classification, mechanism of action, therapeutic effects, clinical uses, side effects and contraindications) of drugs acting on different systems of body and in addition, emphasis on the basic concepts of bioassay.

Objectives: Upon completion of this course the student should be able to

1. Understand the mechanism of drug action and its relevance in the treatment of different diseases
2. Demonstrate isolation of different organs/tissues from the laboratory animals by simulated experiments



3. Demonstrate the various receptor actions using isolated tissue preparation
4. Appreciate correlation of pharmacology with related medical sciences

Course Content:

UNIT-I **10hours**

1. Pharmacology of drugs acting on cardio vascular system

- a. Introduction to hemodynamic and electrophysiology of heart.
- b. Drugs used in congestive heart failure
- c. Anti-hypertensive drugs.
- d. Anti-anginal drugs.
- e. Anti-arrhythmic drugs.
- f. Anti-hyperlipidemic drugs.

UNIT-II **10hours**

1. Pharmacology of drugs acting on cardio vascular system

- a. Drug used in the therapy of shock.
- b. Hematinics, coagulants and anticoagulants.
- c. Fibrinolytics and anti-platelet drugs
- d. Plasma volume expanders

2. Pharmacology of drugs acting on urinary system

- a. Diuretics
- b. Anti-diuretics.

UNIT-III **10hours**

3. Autocoids and related drugs

- a. Introduction to autocoids and classification
- b. Histamine, 5-HT and their antagonists.
- c. Prostaglandins, Thromboxanes and Leukotrienes.
- d. Angiotensin, Bradykinin and Substance P.
- e. Non-steroidal anti-inflammatory agents
- f. Anti-gout drugs
- g. Antirheumatic drugs

UNIT-IV **08hours**

5. Pharmacology of drugs acting on endocrine system



- a. Basic concepts in endocrine pharmacology.
- b. Anterior Pituitary hormones- analogues and their inhibitors.
- c. Thyroid hormones- analogues and their inhibitors.
- d. Hormones regulating plasma calcium level- Parathormone, Calcitonin and Vitamin-D.
- d. Insulin, Oral Hypoglycemic agents and glucagon.
- e. ACTH and corticosteroids.

UNIT-V**07hours****5. Pharmacology of drugs acting on endocrine system**

- a. Androgens and Anabolic steroids.
- b. Estrogens, progesterone and oral contraceptives.
- c. Drugs acting on the uterus.

6. Bioassay

- a. Principles and applications of bioassay.
- b. Types of bioassay
- c. Bioassay of insulin, oxytocin, vasopressin, ACTH, d-tubocurarine, digitalis, histamine and 5-HT

BP 507 P. PHARMACOLOGY-II (Practical)**4Hrs/Week**

1. Introduction to *in-vitro* pharmacology and physiological salt solutions.
2. Effect of drugs on isolated frog heart.
3. Effect of drugs on blood pressure and heart rate of dog.
4. Study of diuretic activity of drugs using rats/mice.
5. DRC of acetylcholine using frog rectus abdominis muscle.
6. Effect of physostigmine and atropine on DRC of acetylcholine using frog rectus abdominis muscle and rat ileum respectively.
7. Bioassay of histamine using guinea pig ileum by matching method.
8. Bioassay of oxytocin using rat uterine horn by interpolation method.
9. Bioassay of serotonin using rat fundus strip by three point bioassay.
10. Bioassay of acetylcholine using rat ileum/colon by four point bioassay.
11. Determination of PA_2 value of prazosin using rat anococcygeus muscle (by Schilds plot method).



12. Determination of PD₂ value using guinea pig ileum.
13. Effect of spasmogens and spasmolytics using rabbit jejunum.
14. Anti-inflammatory activity of drugs using carrageenan induced paw-edema model.
15. Analgesic activity of drug using central and peripheral methods

Note: All laboratory techniques and animal experiments are demonstrated by simulated experiments by softwares and videos

Recommended Books (Latest Editions)

1. Rang H. P., Dale M. M., Ritter J. M., Flower R. J., Rang and Dale's Pharmacology, Churchill Livingstone Elsevier
2. Katzung B. G., Masters S. B., Trevor A. J., Basic and clinical pharmacology, Tata Mc Graw-Hill.
3. Goodman and Gilman's, The Pharmacological Basis of Therapeutics
4. Marry Anne K. K., Lloyd Yee Y., Brian K. A., Robbin L.C., Joseph G. B., Wayne A. K., Bradley R.W., Applied Therapeutics, The Clinical use of Drugs, The Point Lippincott Williams & Wilkins.
5. Mycek M.J, Gelnet S.B and Perper M.M. Lippincott's Illustrated Reviews- Pharmacology.
6. K.D.Tripathi. Essentials of Medical Pharmacology, JAYPEE Brothers Medical Publishers (P) Ltd, New Delhi.
7. Sharma H. L., Sharma K. K., Principles of Pharmacology, Paras medical publisher
8. Modern Pharmacology with clinical Applications, by Charles R.Craig & Robert.
9. Ghosh MN. Fundamentals of Experimental Pharmacology. Hilton & Company, Kolkata.
10. Kulkarni SK. Handbook of experimental pharmacology. Vallabh Prakashan.

BP504 T. PHARMACOGNOSY AND PHYTOCHEMISTRY II (Theory)

45Hours

Scope: The main purpose of subject is to impart the students the knowledge of how the secondary metabolites are produced in the crude drugs, how to isolate and identify and produce them industrially. Also this subject involves the study of producing the plants and phytochemicals through plant tissue culture, drug interactions and basic principles of traditional system of medicine

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



1. to know the modern extraction techniques, characterization and identification of the herbal drugs and phytoconstituents
2. to understand the preparation and development of herbal formulation.
3. to understand the herbal drug interactions
4. to carryout isolation and identification of phytoconstituents

Course Content:**UNIT-I****7 Hours****Metabolic pathways in higher plants and their determination**

- a) Brief study of basic metabolic pathways and formation of different secondary metabolites through these pathways- Shikimic acid pathway, Acetate pathways and Amino acid pathway.
- b) Study of utilization of radioactive isotopes in the investigation of Biogenetic studies.

UNIT-II**20 Hours**

General introduction, composition, chemistry & chemical classes, general methods of extraction & analysis, biosources, therapeutic uses and commercial applications of following secondary metabolites:

Alkaloids: Vinca, Rauwolfia, Belladonna, Opium,

Phenylpropanoids and Flavonoids: Lignans, Tea, Ruta

Steroids, Cardiac Glycosides & Triterpenoids: Liquorice, Dioscorea, Digitalis

Volatile oils: Mentha, Clove, Cinnamon, Fennel, Coriander,

Tannins: Catechu, Pterocarpus

Resins: Benzoin, Guggul, Ginger, Asafoetida, Myrrh, Colophony

Glycosides: Senna, Aloes, Bitter Almond

Iridoids, Other terpenoids & Naphthaquinones: Gentian, Artemisia, taxus, carotenoids

UNIT-III**10 Hours**

Industrial production, estimation and utilization of the following phytoconstituents:

Forskolin, Sennoside, Artemisinin, Diosgenin, Digoxin, Atropine, Podophyllotoxin, Caffeine, Taxol, Vincristine and Vinblastine

UNIT IV**8 Hours****Basics of Phytochemistry**

Modern methods of extraction, application of latest techniques like Spectroscopy, chromatography and electrophoresis in the isolation, purification and identification of crude drugs.



BP 508 P. PHARMACOGNOSY AND PHYTOCHEMISTRY II (Practical)**4 Hours/Week**

1. Morphology, histology and powder characteristics & extraction & detection of: Cinchona, Cinnamon, Senna, Clove, Ephedra, Fennel and Coriander
2. Exercise involving isolation & detection of active principles
 - a. Caffeine - from tea dust.
 - b. Diosgenin from Dioscorea
 - c. Atropine from Belladonna
 - d. Sennosides from Senna
3. Separation of sugars by Paper chromatography
4. TLC of herbal extract
5. Distillation of volatile oils and detection of phytoconstituents by TLC
6. Analysis of crude drugs by chemical tests: (i) Asafoetida (ii) Benzoin (iii) Colophony (iv) Aloes (v) Myrrh

Recommended Books: (Latest Editions)

1. W.C.Evans, Trease and Evans Pharmacognosy, 16th edition, W.B. Saunders & Co., London, 2009.
2. Mohammad Ali. Pharmacognosy and Phytochemistry, CBS Publishers & Distribution, New Delhi.
3. Text book of Pharmacognosy by C.K. Kokate, Purohit, Gokhlae (2007), 37th Edition, Nirali Prakashan, New Delhi.
4. Herbal drug industry by R.D. Choudhary (1996), 1stEdn, Eastern Publisher, New Delhi.
5. Essentials of Pharmacognosy, Dr.SH.Ansari, IInd edition, Birla publications, New Delhi, 2007
6. Herbal Cosmetics by H.Pande, Asia Pacific Business press, Inc, New Delhi.
7. A.N. Kalia, Textbook of Industrial Pharmacognosy, CBS Publishers, New Delhi, 2005.
8. R Endress, Plant cell Biotechnology, Springer-Verlag, Berlin, 1994.
9. Pharmacognosy & Pharmacobiotechnology. James Bobbers, Marilyn KS, VE Tylor.
10. The formulation and preparation of cosmetic, fragrances and flavours.
11. Remington's Pharmaceutical sciences.



12. Text Book of Biotechnology by Vyas and Dixit.
13. Text Book of Biotechnology by R.C. Dubey.

BP 505 T. PHARMACEUTICAL JURISPRUDENCE (Theory)

45 Hours

Scope: This course is designed to impart basic knowledge on several important legislations related to the profession of pharmacy in India.

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

1. The Pharmaceutical legislations and their implications in the development and marketing
2. Various Indian pharmaceutical Acts and Laws
3. The regulatory authorities and agencies governing the manufacture and sale of pharmaceuticals
4. The code of ethics during the pharmaceutical practice

Course Content:

UNIT-I

10 Hours

Drugs and Cosmetics Act, 1940 and its rules 1945:

Objectives, Definitions, Legal definitions of schedules to the act and rules

Import of drugs – Classes of drugs and cosmetics prohibited from import, Import under license or permit offences and penalties.

Manufacture of drugs – Prohibition of manufacture and sale of certain drugs,

Conditions for grant of license and conditions of license for manufacture of drugs, Manufacture of drugs for test, examination and analysis, manufacture of new drug, loan license and repacking license.

UNIT-II

10 Hours

Drugs and Cosmetics Act, 1940 and its rules 1945.

Detailed study of Schedule G, H, M, N, P, T, U, V, X, Y, Part XII B, Sch F & DMR (OA)

Sale of Drugs – Wholesale, Retail sale and Restricted license. Offences and penalties

Labeling & Packing of drugs- General labeling requirements and specimen labels for drugs and cosmetics, List of permitted colors. Offences and penalties.



Administration of the act and rules – Drugs Technical Advisory Board, Central drugs Laboratory, Drugs Consultative Committee, Government drug analysts, Licensing authorities, controlling authorities, Drugs Inspectors

UNIT-III

10 Hours

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

UNIT-IV

08 Hours

- **Study of Salient Features of Drugs and magic remedies Act and its rules:** Objectives, Definitions, Prohibition of certain advertisements, Classes of Exempted advertisements, Offences and Penalties
- **Prevention of Cruelty to animals Act-1960:** Objectives, Definitions, Institutional Animal Ethics Committee, Breeding and Stocking of Animals, Performance of Experiments, Transfer and acquisition of animals for experiment, Records, Power to suspend or revoke registration, Offences and Penalties
- **National Pharmaceutical Pricing Authority:** Drugs Price Control Order (DPCO)2013. Objectives, Definitions, Sale prices of bulk drugs, Retail price of formulations, Retail



price and ceiling price of scheduled formulations, National List of Essential Medicines (NLEM)

UNIT-V**07 Hours**

- **Pharmaceutical Legislations** – A brief review, Introduction, Study of drugs enquiry committee, Health survey and development committee, Hathi committee and Mudaliar committee
- **Code of Pharmaceutical ethics** Definition, Pharmacist in relation to his job, trade, medical profession and his profession, Pharmacist's oath
- **Medical Termination of pregnancy act**
- **Right to information Act**
- **Introduction to Intellectual Property Rights (IPR)**

Recommended books: (Latest Edition)

1. Forensic Pharmacy by B. Suresh
2. Text book of Forensic Pharmacy by B.M. Mithal
3. Hand book of drug law-by M.L. Mehra
4. A text book of Forensic Pharmacy by N.K. Jain
5. Drugs and Cosmetics Act/Rules by Govt. of India publications.
6. Medicinal and Toilet preparations act 1955 by Govt. of India publications.
7. Narcotic drugs and psychotropic substances act by Govt. of India publications
8. Drugs and Magic Remedies act by Govt. of India publication
9. Bare Acts of the said laws published by Government. Reference books (Theory)



SEMESTER VI



BP601T. MEDICINAL CHEMISTRY – III (Theory)**45 Hours**

Scope: This subject is designed to impart fundamental knowledge on the structure, chemistry and therapeutic value of drugs. The subject emphasis on modern techniques of rational drug design like quantitative structure activity relationship (QSAR), Prodrug concept, combinatorial chemistry and Computer aided drug design (CADD). The subject also emphasizes on the chemistry, mechanism of action, metabolism, adverse effects, Structure Activity Relationships (SAR), therapeutic uses and synthesis of important drugs.

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

1. Understand the importance of drug design and different techniques of drug design.
2. Understand the chemistry of drugs with respect to their biological activity.
3. Know the metabolism, adverse effects and therapeutic value of drugs.
4. Know the importance of SAR of drugs.

Course Content:

Study of the development of the following classes of drugs, Classification, mechanism of action, uses of drugs mentioned in the course, Structure activity relationship of selective class of drugs as specified in the course and synthesis of drugs superscripted by (*)

UNIT – I 10 Hours**Antibiotics**

Historical background, Nomenclature, Stereochemistry, Structure activity relationship, Chemical degradation classification and important products of the following classes.

β-Lactam antibiotics: Penicillin, Cephalosporins, β- Lactamase inhibitors, Monobactams

Aminoglycosides: Streptomycin, Neomycin, Kanamycin

Tetracyclines: Tetracycline, Oxytetracycline, Chlortetracycline, Minocycline, Doxycycline

UNIT – II 10 Hours**Antibiotics**

Historical background, Nomenclature, Stereochemistry, Structure activity relationship, Chemical degradation classification and important products of the following classes.

Macrolide: Erythromycin Clarithromycin, Azithromycin.

Miscellaneous: Chloramphenicol*, Clindamycin.

Prodrugs: Basic concepts and application of prodrugs design.

Antimalarials: Etiology of malaria.



Quinolines: SAR, Quinine sulphate, Chloroquine*, Amodiaquine, Primaquine phosphate, Pamaquine*, Quinacrine hydrochloride, Mefloquine.

Biguanides and dihydro triazines: Cycloguanil pamoate, Proguanil.

Miscellaneous: Pyrimethamine, Artesunate, Artemether, Atovaquone.

UNIT – III

10 Hours

Anti-tubercular Agents

Synthetic anti tubercular agents: Isoniazid*, Ethionamide, Ethambutol, Pyrazinamide, Para amino salicylic acid.*

Anti tubercular antibiotics: Rifampicin, Rifabutin, Cycloserine Streptomycin, Capreomycin sulphate.

Urinary tract anti-infective agents

Quinolones: SAR of quinolones, Nalidixic Acid, Norfloxacin, Enoxacin, Ciprofloxacin*, Ofloxacin, Lomefloxacin, Sparfloxacin, Gatifloxacin, Moxifloxacin

Miscellaneous: Furazolidine, Nitrofurantoin*, Methanamine.

Antiviral agents:

Amantadine hydrochloride, Rimantadine hydrochloride, Idoxuridine trifluoride, Acyclovir*, Gancyclovir, Zidovudine, Didanosine, Zalcitabine, Lamivudine, Loviride, Delavirding, Ribavirin, Saquinavir, Indinavir, Ritonavir.

UNIT – IV

08 Hours

Antifungal agents:

Antifungal antibiotics: Amphotericin-B, Nystatin, Natamycin, Griseofulvin.

Synthetic Antifungal agents: Clotrimazole, Econazole, Butoconazole, Oxiconazole Tioconazole, Miconazole*, Ketoconazole, Terconazole, Itraconazole, Fluconazole, Naftifine hydrochloride, Tolnaftate*.

Anti-protozoal Agents: Metronidazole*, Tinidazole, Ornidazole, Diloxanide, Iodoquinol, Pentamidine Isethionate, Atovaquone, Eflornithine.

Anthelmintics: Diethylcarbamazine citrate*, Thiabendazole, Mebendazole*, Albendazole, Niclosamide, Oxamniquine, Praziquantal, Ivermectin.

Sulphonamides and Sulfones

Historical development, chemistry, classification and SAR of Sulfonamides: Sulphamethizole, Sulfoxazole, Sulphamethazine, Sulfacetamide*, Sulphapyridine, Sulfamethoxazole*, Sulphadiazine, Mefenide acetate, Sulfasalazine.

Folate reductase inhibitors: Trimethoprim*, Cotrimoxazole.



Sulfones: Dapsone*.

UNIT – V

07 hours

Introduction to Drug Design

Various approaches used in drug design.

Physicochemical parameters used in quantitative structure activity relationship (QSAR) such as partition coefficient, Hammett's electronic parameter, Taft's steric parameter and Hansch analysis. Pharmacophore modeling and docking techniques.

Combinatorial Chemistry: Concept and applications of combinatorial chemistry: solid phase and solution phase synthesis.

BP607P. MEDICINAL CHEMISTRY- III (Practical)

4 Hours / week

I Preparation of drugs and intermediates

- 1 Sulphanilamide
- 2 7-Hydroxy, 4-methyl coumarin
- 3 Chlorobutanol
- 4 Triphenyl imidazole
- 5 Tolbutamide
- 6 Hexamine

II Assay of drugs

- 1 Isonicotinic acid hydrazide
- 2 Chloroquine
- 3 Metronidazole
- 4 Dapsone
- 5 Chlorpheniramine maleate
- 6 Benzyl penicillin

III Preparation of medicinally important compounds or intermediates by Microwave irradiation technique

IV Drawing structures and reactions using chem draw®

V Determination of physicochemical properties such as logP, clogP, MR, Molecular weight, Hydrogen bond donors and acceptors for class of drugs course content using drug design software Drug likeliness screening (Lipinskies RO5)



Recommended Books (Latest Editions)

1. Wilson and Giswold's Organic medicinal and Pharmaceutical Chemistry.
2. Foye's Principles of Medicinal Chemistry.
3. Burger's Medicinal Chemistry, Vol I to IV.
4. Introduction to principles of drug design- Smith and Williams.
5. Remington's Pharmaceutical Sciences.
6. Martindale's extra pharmacopoeia.
7. Organic Chemistry by I.L. Finar, Vol. II.
8. The Organic Chemistry of Drug Synthesis by Lednicer, Vol. 1-5.
9. Indian Pharmacopoeia.
10. Text book of practical organic chemistry- A.I.Vogel



BP602 T. PHARMACOLOGY-III (Theory)**45 Hours**

Scope: This subject is intended to impart the fundamental knowledge on various aspects (classification, mechanism of action, therapeutic effects, clinical uses, side effects and contraindications) of drugs acting on respiratory and gastrointestinal system, infectious diseases, immuno-pharmacology and in addition, emphasis on the principles of toxicology and chronopharmacology.

Objectives: Upon completion of this course the student should be able to:

1. understand the mechanism of drug action and its relevance in the treatment of different infectious diseases
2. comprehend the principles of toxicology and treatment of various poisonings and
3. appreciate correlation of pharmacology with related medical sciences.

Course Content:**UNIT-I****10hours****1. Pharmacology of drugs acting on Respiratory system**

- a. Anti -asthmatic drugs
- b. Drugs used in the management of COPD
- c. Expectorants and antitussives
- d. Nasal decongestants
- e. Respiratory stimulants

2. Pharmacology of drugs acting on the Gastrointestinal Tract

- a. Antiulcer agents.
- b. Drugs for constipation and diarrhoea.
- c. Appetite stimulants and suppressants.
- d. Digestants and carminatives.
- e. Emetics and anti-emetics.

UNIT-II**10hours****3. Chemotherapy**

- a. General principles of chemotherapy.
- b. Sulfonamides and cotrimoxazole.
- c. Antibiotics- Penicillins, cephalosporins, chloramphenicol, macrolides, quinolones and



fluoroquinolons, tetracycline and aminoglycosides

UNIT-III

10hours

3. Chemotherapy

- a. Antitubercular agents
- b. Antileprotic agents
- c. Antifungal agents
- d. Antiviral drugs
- e. Anthelmintics
- f. Antimalarial drugs
- g. Antiamoebic agents

UNIT-IV

08hours

3. Chemotherapy

- l. Urinary tract infections and sexually transmitted diseases.
- m. Chemotherapy of malignancy.

4. Immunopharmacology

- a. Immunostimulants
- b. Immunosuppressant

Protein drugs, monoclonal antibodies, target drugs to antigen, biosimilars

UNIT-V

07hours

5. Principles of toxicology

- a. Definition and basic knowledge of acute, subacute and chronic toxicity.
- b. Definition and basic knowledge of genotoxicity, carcinogenicity, teratogenicity and mutagenicity
- c. General principles of treatment of poisoning
- d. Clinical symptoms and management of barbiturates, morphine, organophosphorus compound and lead, mercury and arsenic poisoning.

6. Chronopharmacology

- a. Definition of rhythm and cycles.
- b. Biological clock and their significance leading to chronotherapy.



BP 608 P. PHARMACOLOGY-III (Practical)**4Hrs/Week**

1. Dose calculation in pharmacological experiments
2. Antiallergic activity by mast cell stabilization assay
3. Study of anti-ulcer activity of a drug using pylorus ligand (SHAY) rat model and NSAIDS induced ulcer model.
4. Study of effect of drugs on gastrointestinal motility
5. Effect of agonist and antagonists on guinea pig ileum
6. Estimation of serum biochemical parameters by using semi- autoanalyser
7. Effect of saline purgative on frog intestine
8. Insulin hypoglycemic effect in rabbit
9. Test for pyrogens (rabbit method)
10. Determination of acute oral toxicity (LD50) of a drug from a given data
11. Determination of acute skin irritation / corrosion of a test substance
12. Determination of acute eye irritation / corrosion of a test substance
13. Calculation of pharmacokinetic parameters from a given data
14. Biostatistics methods in experimental pharmacology(student's t test, ANOVA)
15. Biostatistics methods in experimental pharmacology (Chi square test, Wilcoxon Signed Rank test)

**Experiments are demonstrated by simulated experiments/videos*

Recommended Books (Latest Editions)

1. Rang H. P., Dale M. M., Ritter J. M., Flower R. J., Rang and Dale's Pharmacology, Churchill Livingstone Elsevier
2. Katzung B. G., Masters S. B., Trevor A. J., Basic and clinical pharmacology, Tata Mc Graw-Hill
3. Goodman and Gilman's, The Pharmacological Basis of Therapeutics



4. Marry Anne K. K., Lloyd Yee Y., Brian K. A., Robbin L.C., Joseph G. B., Wayne A. K., Bradley R.W., Applied Therapeutics, The Clinical use of Drugs. The Point Lippincott Williams & Wilkins
5. Mycek M.J, Gelnet S.B and Perper M.M. Lippincott's Illustrated Reviews- Pharmacology
6. K.D.Tripathi. Essentials of Medical Pharmacology, , JAYPEE Brothers Medical Publishers (P) Ltd, New Delhi.
7. Sharma H. L., Sharma K. K., Principles of Pharmacology, Paras medical publisher Modern Pharmacology with clinical Applications, by Charles R.Craig & Robert,
8. Ghosh MN. Fundamentals of Experimental Pharmacology. Hilton & Company, Kolkata,
9. Kulkarni SK. Handbook of experimental pharmacology. VallabhPrakashan
- 10.N.Udupa and P.D. Gupta, Concepts in Chronopharmacology.

BP 603 T. HERBAL DRUG TECHNOLOGY (Theory)

45 hours

Scope: This subject gives the student the knowledge of basic understanding of herbal drug industry, the quality of raw material, guidelines for quality of herbal drugs, herbal cosmetics, natural sweeteners, nutraceutical etc. The subject also emphasizes on Good Manufacturing Practices (GMP), patenting and regulatory issues of herbal drugs

Objectives: Upon completion of this course the student should be able to:

- 1 understand raw material as source of herbal drugs from cultivation to herbal drug product
2. know the WHO and ICH guidelines for evaluation of herbal drugs
- 3.know the herbal cosmetics, natural sweeteners, nutraceuticals
- 4.appreciate patenting of herbal drugs, GMP .

Course content:

UNIT-I

6 Hours

Herbs as raw materials

Definition of herb, herbal medicine, herbal medicinal product, herbal drug preparation Source of Herbs

Selection, identification and authentication of herbal materials

Processing of herbal raw material



Biodynamic Agriculture

Good agricultural practices in cultivation of medicinal plants including Organic farming. Pest and Pest management in medicinal plants: Biopesticides/Bioinsecticides.

UNIT-II**05 Hours**

- a) Basic principles involved in Ayurveda, Siddha, Unani and Homeopathy
- b) Preparation and standardization of Ayurvedic formulations viz Aristas and Asawas, Ghutika, Churna, Lehya and Bhasma.

UNIT-III**7 Hours****Nutraceuticals**

General aspects, Market, growth, scope and types of products available in the market. Health benefits and role of Nutraceuticals in ailments like Diabetes, CVS diseases, Cancer, Irritable bowel syndrome and various Gastro intestinal diseases.

Study of following herbs as health food: Alfaalfa, Chicory, Ginger, Fenugreek, Garlic, Honey, Amla, Ginseng, Ashwagandha, Spirulina

Herbal-Drug and Herb-Food Interactions: General introduction to interaction and classification. Study of following drugs and their possible side effects and interactions: Hypercium, kava-kava, Ginkobiloba, Ginseng, Garlic, Pepper & Ephedra.

UNIT-IV**10 Hours****Herbal Cosmetics**

Sources and description of raw materials of herbal origin used via, fixed oils, waxes, gums colours, perfumes, protective agents, bleaching agents, antioxidants in products such as skin care, hair care and oral hygiene products.

Herbal excipients:

Herbal Excipients – Significance of substances of natural origin as excipients – colorants, sweeteners, binders, diluents, viscosity builders, disintegrants, flavors & perfumes.

Herbal formulations :

Conventional herbal formulations like syrups, mixtures and tablets and Novel dosage forms like phytosomes

UNIT- V**10 Hours**

Evaluation of Drugs WHO & ICH guidelines for the assessment of herbal drugs Stability testing of herbal drugs.

Patenting and Regulatory requirements of natural products:

- a) Definition of the terms: Patent, IPR, Farmers right, Breeder's right, Bioprospecting and Biopiracy
- b) Patenting aspects of Traditional Knowledge and Natural Products. Case study of Curcuma & Neem.

Regulatory Issues - Regulations in India (ASU DTAB, ASU DCC), Regulation of manufacture of ASU drugs - Schedule Z of Drugs & Cosmetics Act for ASU drugs.

UNIT-VI

07

Hours

General Introduction to Herbal Industry

Herbal drugs industry: Present scope and future prospects.

A brief account of plant based industries and institutions involved in work on medicinal and aromatic plants in India.

Schedule T – Good Manufacturing Practice of Indian systems of medicine

Components of GMP (Schedule – T) and its objectives

Infrastructural requirements, working space, storage area, machinery and equipments, standard operating procedures, health and hygiene, documentation and records.

BP 609 P. HERBAL DRUG TECHNOLOGY (Practical)

4 hours/ week

1. To perform preliminary phytochemical screening of crude drugs.
2. Determination of Ash value
3. Determination of moisture content of crude drugs
4. Determination of Extractive values of crude drugs
5. Determination of the alcohol content of Asava and Arista
6. Preparation of herbal cosmetics



7. Preparation and standardization of herbal formulation
8. Determination of swelling index and foaming index
9. Monograph analysis of herbal drugs from recent Pharmacopoeias
10. Analysis of fixed oils

Recommended Books: (Latest Editions)

1. Textbook of Pharmacognosy by Trease & Evans.
2. Textbook of Pharmacognosy by Tyler, Brady & Robber.
3. Pharmacognosy by Kokate, Purohit and Gokhale
4. Essential of Pharmacognosy by Dr.S.H.Ansari
5. Pharmacognosy & Phytochemistry by V.D.Rangari
6. Pharmacopoeal standards for Ayurvedic Formulation (Council of Research in Indian Medicine & Homeopathy)
7. Mukherjee, P.W. Quality Control of Herbal Drugs: An Approach to Evaluation of Botanicals. Business Horizons Publishers, New Delhi, India, 2002.

BP 604 T. BIOPHARMACEUTICS AND PHARMACOKINETICS (Theory)

45 Hours

Scope: This subject is designed to impart knowledge and skills necessary for dose calculations, dose adjustments and to apply Biopharmaceutics theories in practical problem solving. Basic theoretical discussions of the principles of Biopharmaceutics and pharmacokinetics are provided to help the students' to clarify the concepts.

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

1. Understand the basic concepts in biopharmaceutics and pharmacokinetics.
2. Use plasma data and derive the pharmacokinetic parameters to describe the process of drug absorption, distribution, metabolism and elimination.
3. Critically evaluate biopharmaceutic studies involving drug product equivalency



4. Design and evaluate dosage regimens of the drugs using pharmacokinetic and biopharmaceutic parameters.
5. detect potential clinical pharmacokinetic problems and apply basic pharmacokinetic principles to solve them

Course Content:

UNIT-I

10 Hours

Introduction to Biopharmaceutics

Absorption; Mechanisms of drug absorption through GIT, factors influencing drug absorption through GIT, absorption of drug from Non per oral extra-vascular routes, Distribution of drugs Tissue permeability of drugs, binding of drugs, apparent, volume of drug distribution, protein binding of drugs, factors affecting protein-drug binding.

Kinetics of protein binding, Clinical significance of protein binding of drugs

UNIT- II

10 Hours

Drug Elimination renal excretion of drugs, factors affecting renal excretion of drugs, renal clearance, Non renal routes of drug excretion of drugs

Bioavailability and Bioequivalence: Objectives of bioavailability studies, absolute and relative bioavailability, measurement of bioavailability, in-vitro drug dissolution models, in- vitro, in-vivo correlations, bioequivalence studies, methods to enhance the bioavailability.

UNIT- III

10 Hours

Pharmacokinetics: Introduction to Pharmacokinetics models, Compartment models, Non compartment models, physiological models, One compartment open model. a. Intravenous Injection (Bolus) b. Intravenous infusion, extra vascular administrations, calculations of K_a , K_E . From plasma and urinary excretion data

UNIT- IV

08 Hours *Multicompartment*

models: Two compartment open model. IV bolus *Multiple – Dosage Regimens:* a).

Repetitive Intravenous injections – One Compartment Open Model

b). Repetitive Extravascular dosing – One Compartment Open model

UNIT- V

07 Hours

Nonlinear Pharmacokinetics: a. Introduction, b. Factors causing Non-linearity.

c. Michaelis-menton method of estimating parameters, Biotransformation of drugs



Recommended Books: (Latest Editions)

1. Biopharmaceutics and Clinical Pharmacokinetics by, Milo Gibaldi.
2. Biopharmaceutics and Pharmacokinetics; By Robert F Notari
3. Applied biopharmaceutics and pharmacokinetics, Leon Shargel and Andrew B.C.YU 4th edition, Prentice-Hall International edition. USA
4. Bio pharmaceuticals and Pharmacokinetics-A Treatise, By D. M. Brahmkar and Sunil B. Jaiswal, Vallabh Prakashan Pitampura, Delhi
5. Pharmacokinetics: By Milo Gibaldi Donald, R. Marcel Dekker Inc.
6. Hand Book of Clinical Pharmacokinetics, By Milo Gibaldi and Laurie Prescott by ADIS Health Science Press.
7. Biopharmaceutics; By Swarbrick
8. Clinical Pharmacokinetics, Concepts and Applications: By Malcolm Rowland and Thomas, N. Tozen, Lea and Febrger, Philadelphia, 1995.
10. Dissolution, Bioavailability and Bioequivalence, By Abdou H.M, Mack, Publishing Company, Pennsylvania 1989.
11. Biopharmaceutics and Clinical Pharmacokinetics-An introduction 4th edition Revised and expanded by Robert F Notari Marcel Dekker Inc, New York and Basel, 1987.
12. Remington's Pharmaceutical Sciences, By Mack Publishing Company, Pennsylvania

BP 605 T. PHARMACEUTICAL BIOTECHNOLOGY (Theory)**45 Hours****Scope:**

- Biotechnology has a long promise to revolutionize the biological sciences and technology.
- Scientific application of biotechnology in the field of genetic engineering, medicine and fermentation technology makes the subject interesting.
- Biotechnology is leading to new biological revolutions in diagnosis, prevention and cure of diseases, new and cheaper pharmaceutical drugs.
- Biotechnology has already produced transgenic crops and animals and the future promises lot more.
- It is basically a research-based subject.

Objectives: Upon completion of the subject student shall be able to;

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

Unit I**10 Hours**

- a) Brief introduction to Biotechnology with reference to Pharmaceutical Sciences.
- b) Enzyme Biotechnology- Methods of enzyme immobilization and applications.
- c) Biosensors- Working and applications of biosensors in Pharmaceutical Industries.
- d) Brief introduction to Protein Engineering.
- e) Use of microbes in industry. Production of Enzymes- General consideration - Amylase, Catalase, Peroxidase, Lipase, Protease, Penicillinase.
- f) Basic principles of genetic engineering.

Unit II**10 Hours**

- a) Study of cloning vectors, restriction endonucleases and DNA ligase.
- b) Recombinant DNA technology. Application of genetic engineering in medicine.
- c) Application of r DNA technology and genetic engineering in the products:
- d) Interferon b) Vaccines- hepatitis- B c) Hormones- Insulin.
- e) Brief introduction to PCR

Types of immunity- humoral immunity, cellular immunity

Unit III**10 Hours**

- a) Structure of Immunoglobulins
- b) Structure and Function of MHC
- c) Hypersensitivity reactions, Immune stimulation and Immune suppressions.
- d) General method of the preparation of bacterial vaccines, toxoids, viral vaccine, antitoxins, serum-immune blood derivatives and other products relative to immunity.
- e) Storage conditions and stability of official vaccines
- f) Hybridoma technology- Production, Purification and Applications

Unit IV**08Hours**

- a) Immuno blotting techniques- ELISA, Western blotting, Southern blotting.
- b) Genetic organization of Eukaryotes and Prokaryotes
- c) Microbial genetics including transformation, transduction, conjugation, plasmids and transposons.



- d) Introduction to Microbial biotransformation and applications.
e) Mutation.

Unit V**07 Hours**

- a. Types of mutation/mutants
b) Fermentation methods and general requirements, study of media, equipments, sterilization methods, aeration process, stirring.
c) Large scale production fermenter design and its various controls.
d) Study of the production of - penicillins, citric acid, Vitamin B12, Glutamic acid, Griseofulvin,

Recommended Books (Latest edition):

1. B.R. Glick and J.J. Pasternak: Molecular Biotechnology: Principles and Applications of Recombinant DNA: ASM Press Washington D.C.
2. RA Goldshy et. al., : Kuby Immunology.
3. J.W. Goding: Monoclonal Antibodies.
4. J.M. Walker and E.B. Gingold: Molecular Biology and Biotechnology by Royal Society of Chemistry.
5. Zaborsky: Immobilized Enzymes, CRC Press, Degraland, Ohio.
6. S.B. Primrose: Molecular Biotechnology (Second Edition) Blackwell Scientific Publication.
7. Stanbury F., P., Whitakar A., and Hall J., S., Principles of fermentation technology, 2nd edition, Aditya books Ltd., New Delhi

BP606 PHARMACEUTICAL QUALITY ASSURANCE (Theory)**45 Hours**

Scope: This course deals with the various aspects of quality control and quality assurance aspects of pharmaceutical industries. It covers the important aspects like cGMP, QC tests, documentation, quality certifications and regulatory affairs.

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

- understand the cGMP aspects in a pharmaceutical industry
- appreciate the importance of documentation
- understand the scope of quality certifications applicable to pharmaceutical industries



- understand the responsibilities of QA & QC departments

Course content:

UNIT – I

10 Hours

Quality Assurance and Quality Management concepts: Definition and concept of Quality control, Quality assurance and GMP

Total Quality Management (TQM): Definition, elements, philosophies

ICH Guidelines: purpose, participants, process of harmonization, Brief overview of QSEM, with special emphasis on Q-series guidelines, ICH stability testing guidelines **Quality by**

design (QbD): Definition, overview, elements of QbD program, tools

ISO 9000 & ISO14000: Overview, Benefits, Elements, steps for registration **NABL accreditation** : Principles and procedure

UNIT - II

10 Hours

Organization and personnel: Personnel responsibilities, training, hygiene and personal records.

Premises: Design, construction and plant layout, maintenance, sanitation, environmental control, utilities and maintenance of sterile areas, control of contamination.

Equipments and raw materials: Equipments selection, purchase specifications, maintenance, purchase specifications and maintenance of stores for raw materials.

UNIT – III

10 Hours

Quality Control: Quality control test for containers, rubber closures and secondary packing materials.

Good Laboratory Practices: General Provisions, Organization and Personnel, Facilities, Equipment, Testing Facilities Operation, Test and Control Articles, Protocol for Conduct of a Nonclinical Laboratory Study, Records and Reports, Disqualification of Testing Facilities

UNIT – IV

08 Hours

Complaints: Complaints and evaluation of complaints, Handling of return good, recalling and waste disposal.

Document maintenance in pharmaceutical industry: Batch Formula Record, Master Formula Record, SOP, Quality audit, Quality Review and Quality documentation, Reports and documents, distribution records.

UNIT – V

07 Hours

Calibration and Validation: Introduction, definition and general principles of calibration, qualification and validation, importance and scope of validation, types of validation.



validation master plan. Calibration of pH meter, Qualification of UV-Visible spectrophotometer, General principles of Analytical method Validation.

Warehousing: Good warehousing practice, materials management

Recommended Books: (Latest Edition)

1. Quality Assurance Guide by organization of Pharmaceutical Products of India.
2. Good Laboratory Practice Regulations, 2nd Edition, Sandy Weinberg Vol. 69.
3. Quality Assurance of Pharmaceuticals- A compendium of Guide lines and Related materials Vol I WHO Publications.
4. A guide to Total Quality Management- Kushik Maitra and Sedhan K Ghosh
5. How to Practice GMP's – P P Sharma.
6. ISO 9000 and Total Quality Management – Sadhank G Ghosh
7. The International Pharmacopoeia – Vol I, II, III, IV- General Methods of Analysis and Quality specification for Pharmaceutical Substances, Excipients and Dosage forms
8. Good laboratory Practices – Marcel Dekker Series
9. ICH guidelines, ISO 9000 and 14000 guidelines



SEMESTER VII



BP701T. INSTRUMENTAL METHODS OF ANALYSIS (Theory)**45 Hours**

Scope: This subject deals with the application of instrumental methods in qualitative and quantitative analysis of drugs. This subject is designed to impart a fundamental knowledge on the principles and instrumentation of spectroscopic and chromatographic technique. This also emphasizes on theoretical and practical knowledge on modern analytical instruments that are used for drug testing.

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

1. Understand the interaction of matter with electromagnetic radiations and its applications in drug analysis
2. Understand the chromatographic separation and analysis of drugs.
3. Perform quantitative & qualitative analysis of drugs using various analytical instruments.

Course Content:**UNIT –I****10 Hours****UV Visible spectroscopy**

Electronic transitions, chromophores, auxochromes, spectral shifts, solvent effect on absorption spectra, Beer and Lambert's law, Derivation and deviations.

Instrumentation - Sources of radiation, wavelength selectors, sample cells, detectors- Photo tube, Photomultiplier tube, Photo voltaic cell, Silicon Photodiode.

Applications - Spectrophotometric titrations, Single component and multi component analysis

Fluorimetry

Theory, Concepts of singlet, doublet and triplet electronic states, internal and external conversions, factors affecting fluorescence, quenching, instrumentation and applications

UNIT –II**10 Hours****IR spectroscopy**

Introduction, fundamental modes of vibrations in poly atomic molecules, sample handling, factors affecting vibrations

Instrumentation - Sources of radiation, wavelength selectors, detectors - Golay cell,

Bolometer, Thermocouple, Thermister, Pyroelectric detector and applications

Flame Photometry-Principle, interferences, instrumentation and applications

Atomic absorption spectroscopy- Principle, interferences, instrumentation and applications

Nepheloturbidometry- Principle, instrumentation and applications



UNIT –III**10 Hours****Introduction to chromatography**

Adsorption and partition column chromatography-Methodology, advantages, disadvantages and applications.

Thin layer chromatography- Introduction, Principle, Methodology, Rf values, advantages, disadvantages and applications.

Paper chromatography-Introduction, methodology, development techniques, advantages, disadvantages and applications

Electrophoresis– Introduction, factors affecting electrophoretic mobility, Techniques of paper, gel, capillary electrophoresis, applications

UNIT –IV**10 Hours**

Gas chromatography - Introduction, theory, instrumentation, derivatization, temperature programming, advantages, disadvantages and applications

High performance liquid chromatography (HPLC)-Introduction, theory, instrumentation, advantages and applications.

UNIT –V**10 Hours**

Ion exchange chromatography- Introduction, classification, ion exchange resins, properties, mechanism of ion exchange process, factors affecting ion exchange, methodology and applications

Gel chromatography- Introduction, theory, instrumentation and applications

Affinity chromatography- Introduction, theory, instrumentation and applications



BP705P. INSTRUMENTAL METHODS OF ANALYSIS (Practical)**4 Hours/Week**

- 1 Determination of absorption maxima and effect of solvents on absorption maxima of organic compounds
- 2 Estimation of dextrose by colorimetry
- 3 Estimation of sulfanilamide by colorimetry
- 4 Simultaneous estimation of ibuprofen and paracetamol by UV spectroscopy
- 5 Assay of paracetamol by UV- Spectrophotometry
- 6 Estimation of quinine sulfate by fluorimetry
- 7 Study of quenching of fluorescence
- 8 Determination of sodium by flame photometry
- 9 Determination of potassium by flame photometry
- 10 Determination of chlorides and sulphates by nephelo turbidometry
- 11 Separation of amino acids by paper chromatography
- 12 Separation of sugars by thin layer chromatography
- 13 Separation of plant pigments by column chromatography
- 14 Demonstration experiment on HPLC
- 15 Demonstration experiment on Gas Chromatography

Recommended Books (Latest Editions)

1. Instrumental Methods of Chemical Analysis by B.K Sharma
2. Organic spectroscopy by Y.R Sharma
3. Text book of Pharmaceutical Analysis by Kenneth A. Connors
4. Vogel's Text book of Quantitative Chemical Analysis by A.I. Vogel
5. Practical Pharmaceutical Chemistry by A.H. Beckett and J.B. Stenlake
6. Organic Chemistry by I. L. Finar
7. Organic spectroscopy by William Kemp
8. Quantitative Analysis of Drugs by D. C. Garrett
9. Quantitative Analysis of Drugs in Pharmaceutical Formulations by P. D. Sethi
10. Spectrophotometric identification of Organic Compounds by Silverstein



BP 702 T. INDUSTRIAL PHARMACY (Theory)**45 Hours**

Scope: This course is designed to impart fundamental knowledge on pharmaceutical product commercialization from laboratory to market

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

1. Know the process of pilot plant and scale up of pharmaceutical dosage forms
2. Understand the process of technology transfer from lab scale to commercial batch
3. Know different laws and acts that regulate pharmaceutical industry in India and US
4. Understand the approval process and regulatory requirements for drug products

Course Content:**UNIT-I****10 Hours**

Pilot plant scale up techniques: General considerations - including significance of personnel requirements, space requirements, raw materials, Pilot plant scale up considerations for solids, liquid orals, semi solids and relevant documentation, SUPAC guidelines, Introduction to Platform technology

UNIT-II**10 Hours**

Technology development and transfer: WHO guidelines for Technology Transfer: Terminologies, Technology transfer protocol, Quality risk management, Transfer from R & D to production (Process, packaging and cleaning), Granularity of TT Process (API, excipients, finished products, packing materials) Documentation, Premises and equipments, qualification and validation, quality control, analytical method transfer, Approved regulatory bodies and agencies, Commercialization - practical aspects and problems (case studies), TOT agencies in India - APCTD, NRDC, TIFAC, BCIL, TBSE / SIDBI; Technology of Transfer (TOT) related documentation - confidentiality agreements, licensing, MoUs, legal issues

UNIT-III**10 Hours**

Regulatory affairs: Introduction, Historical overview of Regulatory Affairs, Regulatory authorities, Role of Regulatory affairs department, Responsibility of Regulatory Affairs Professionals

Regulatory requirements for drug approval: Drug Development Teams, Non-Clinical Drug Development, Pharmacology, Drug Metabolism and Toxicology, General considerations of Investigational New Drug (IND) Application, Investigator's Brochure (IB) and New Drug Application (NDA), Clinical research / BE studies, Clinical Research



Protocols, Biostatistics in Pharmaceutical Product Development, Data Presentation for FDA Submissions, Management of Clinical Studies.

UNIT-IV**08 Hours**

Quality management systems: Quality management & Certifications: Concept of Quality, Total Quality Management, Quality by design, Six Sigma concept, Out of Specifications (OOS), Change control, Introduction to ISO 9000 series of quality systems standards, ISO 14000, NABL, GLP

UNIT-V**07 Hours**

Indian Regulatory Requirements: Central Drug Standard Control Organization (CDSCO) and State Licensing Authority: Organization, Responsibilities, Common Technical Document (CTD), Certificate of Pharmaceutical Product (COPP), Regulatory requirements and approval procedures for New Drugs.

Recommended Books: (Latest Editions)

1. Regulatory Affairs from Wikipedia, the free encyclopedia modified on 7th April available at http://en.wikipedia.org/wiki/Regulatory_Affairs.
2. International Regulatory Affairs Updates, 2005. available at <http://www.iraup.com/about.php>
3. Douglas J Pisano and David S. Mantus. Text book of FDA Regulatory Affairs A Guide for Prescription Drugs, Medical Devices, and Biologics' Second Edition.
4. Regulatory Affairs brought by learning plus, inc. available at <http://www.cgmp.com/ra.htm>.

BP 703T. PHARMACY PRACTICE (Theory)**45 Hours**

Scope: In the changing scenario of pharmacy practice in India, for successful practice of Hospital Pharmacy, the students are required to learn various skills like drug distribution, drug information, and therapeutic drug monitoring for improved patient care. In community pharmacy, students will be learning various skills such as dispensing of drugs, responding to minor ailments by providing suitable safe medication, patient counselling for improved patient care in the community set up.

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

1. know various drug distribution methods in a hospital
2. appreciate the pharmacy stores management and inventory control



3. monitor drug therapy of patient through medication chart review and clinical review
4. obtain medication history interview and counsel the patients
5. identify drug related problems
6. detect and assess adverse drug reactions
7. interpret selected laboratory results (as monitoring parameters in therapeutics) of specific disease states
8. know pharmaceutical care services
9. do patient counseling in community pharmacy;
10. appreciate the concept of Rational drug therapy.

Unit I:**10 Hours****a) Hospital and it's organization**

Definition, Classification of hospital- Primary, Secondary and Tertiary hospitals, Classification based on clinical and non- clinical basis, Organization Structure of a Hospital, and Medical staffs involved in the hospital and their functions.

b) Hospital pharmacy and its organization

Definition, functions of hospital pharmacy, Organization structure, Location, Layout and staff requirements, and Responsibilities and functions of hospital pharmacists.

c) Adverse drug reaction

Classifications - Excessive pharmacological effects, secondary pharmacological effects, idiosyncrasy, allergic drug reactions, genetically determined toxicity, toxicity following sudden withdrawal of drugs, Drug interaction- beneficial interactions, adverse interactions, and pharmacokinetic drug interactions, Methods for detecting drug interactions, spontaneous case reports and record linkage studies, and Adverse drug reaction reporting and management.

d) Community Pharmacy

Organization and structure of retail and wholesale drug store, types and design, Legal requirements for establishment and maintenance of a drug store, Dispensing of proprietary products, maintenance of records of retail and wholesale drug store.

Unit II:**10 Hours****a) Drug distribution system in a hospital**

Dispensing of drugs to inpatients, types of drug distribution systems, charging policy and labelling, Dispensing of drugs to ambulatory patients, and Dispensing of controlled drugs.



b) Hospital formulary

Definition, contents of hospital formulary, Differentiation of hospital formulary and Drug list, preparation and revision, and addition and deletion of drug from hospital formulary.

c) Therapeutic drug monitoring

Need for Therapeutic Drug Monitoring, Factors to be considered during the Therapeutic Drug Monitoring, and Indian scenario for Therapeutic Drug Monitoring.

d) Medication adherence

Causes of medication non-adherence, pharmacist role in the medication adherence, and monitoring of patient medication adherence.

e) Patient medication history interview

Need for the patient medication history interview, medication interview forms.

f) Community pharmacy management Financial, materials, staff, and infrastructure requirements.

Unit III:**10 Hours****a) Pharmacy and therapeutic committee**

Organization, functions, Policies of the pharmacy and therapeutic committee in including drugs into formulary, inpatient and outpatient prescription, automatic stop order, and emergency drug list preparation.

b) Drug information services

Drug and Poison information centre, Sources of drug information, Computerised services, and storage and retrieval of information.

c) Patient counseling

Definition of patient counseling; steps involved in patient counseling, and Special cases that require the pharmacist

d) Education and training program in the hospital

Role of pharmacist in the education and training program, Internal and external training program, Services to the nursing homes/clinics, Code of ethics for community pharmacy, and Role of pharmacist in the interdepartmental communication and community health education.

e) Prescribed medication order and communication skills

Prescribed medication order- interpretation and legal requirements, and Communication skills- communication with prescribers and patients.

Unit IV**8 Hours**

a) Budget preparation and implementation

Budget preparation and implementation

b) Clinical Pharmacy

Introduction to Clinical Pharmacy, Concept of clinical pharmacy, functions and responsibilities of clinical pharmacist, Drug therapy monitoring - medication chart review, clinical review, pharmacist intervention, Ward round participation, Medication history and Pharmaceutical care.

c) Over the counter (OTC) sales

Introduction and sale of over the counter, and Rational use of common over the counter medications.

Unit V**7 Hours****a) Drug store management and inventory control**

Organisation of drug store, types of materials stocked and storage conditions, Purchase and inventory control: principles, purchase procedure, purchase order, procurement and stocking, Economic order quantity, Reorder quantity level, and Methods used for the analysis of the drug expenditure

b) Investigational use of drugs

Description, principles involved, classification, control, identification, role of hospital pharmacist, advisory committee.

c) Interpretation of Clinical Laboratory Tests

Blood chemistry, hematology, and urinalysis

Recommended Books (Latest Edition):

1. Merchant S.H. and Dr. J.S.Quadry. *A textbook of hospital pharmacy*, 4th ed. Ahmadabad: B.S. Shah Prakakshan; 2001.
2. Parthasarathi G, Karin Nyfort-Hansen, Milap C Nahata. *A textbook of Clinical Pharmacy Practice- essential concepts and skills*, 1st ed. Chennai: Orient Longman Private Limited; 2004.
3. William E. Hassan. *Hospital pharmacy*, 5th ed. Philadelphia: Lea & Febiger; 1986.
4. Tipnis Bajaj. *Hospital Pharmacy*, 1st ed. Maharashtra: Career Publications; 2008.
5. Scott LT. *Basic skills in interpreting laboratory data*, 4th ed. American Society of Health System Pharmacists Inc; 2009.
6. Parmar N.S. *Health Education and Community Pharmacy*, 18th ed. India: CBS Publishers & Distributers; 2008.



Journals:

1. Therapeutic drug monitoring. ISSN: 0163-4356
 2. Journal of pharmacy practice. ISSN : 0974-8326
- American journal of health system pharmacy. ISSN: 1535-2900 (online) 4. Pharmacy times (Monthly magazine)

BP 704T: NOVEL DRUG DELIVERY SYSTEMS (Theory)**45 Hours**

Scope: This subject is designed to impart basic knowledge on the area of novel drug delivery systems.

Objectives: Upon completion of the course student shall be able

1. To understand various approaches for development of novel drug delivery systems.
2. To understand the criteria for selection of drugs and polymers for the development of Novel drug delivery systems, their formulation and evaluation

Course content:**Unit-I****10 Hours**

Controlled drug delivery systems: Introduction, terminology/definitions and rationale, advantages, disadvantages, selection of drug candidates. Approaches to design controlled release formulations based on diffusion, dissolution and ion exchange principles. Physicochemical and biological properties of drugs relevant to controlled release formulations **Polymers:** Introduction, classification, properties, advantages and application of polymers in formulation of controlled release drug delivery systems.

Unit-II**10 Hours**

Microencapsulation: Definition, advantages and disadvantages, microspheres /microcapsules, microparticles, methods of microencapsulation, applications

Mucosal Drug Delivery system: Introduction, Principles of bioadhesion / mucoadhesion, concepts, advantages and disadvantages, transmucosal permeability and formulation considerations of buccal delivery systems

Implantable Drug Delivery Systems: Introduction, advantages and disadvantages, concept of implants and osmotic pump

Unit-III**10 Hours**

Transdermal Drug Delivery Systems: Introduction, Permeation through skin, factors affecting permeation, permeation enhancers, basic components of TDDS, formulation approaches



Gastroretentive drug delivery systems: Introduction, advantages, disadvantages, approaches for GRDDS – Floating, high density systems, inflatable and gastroadhesive systems and their applications

Nasopulmonary drug delivery system: Introduction to Nasal and Pulmonary routes of drug delivery, Formulation of Inhalers (dry powder and metered dose), nasal sprays, nebulizers

Unit-IV **08 Hours**

Nanotechnology and its Concepts: Concepts and approaches for targeted drug delivery systems, advantages and disadvantages, introduction to liposomes, niosomes, nanoparticles, monoclonal antibodies and their applications

Unit-V **07 Hours**

Ocular Drug Delivery Systems: Introduction, intra ocular barriers and methods to overcome –Preliminary study, ocular formulations and ocuserts

Intrauterine Drug Delivery Systems: Introduction, advantages and disadvantages, development of intra uterine devices (IUDs) and applications

Recommended Books: (Latest Editions)

1. Y W. Chien, Novel Drug Delivery Systems, 2nd edition, revised and expanded, Marcel Dekker, Inc., New York, 1992.
2. Robinson, J. R., Lee V. H. L, Controlled Drug Delivery Systems, Marcel Dekker, Inc., New York, 1992.
3. Encyclopedia of Controlled Delivery. Edith Mathiowitz, Published by Wiley Interscience Publication, John Wiley and Sons, Inc, New York. Chichester/Weinheim
4. N.K. Jain, Controlled and Novel Drug Delivery, CBS Publishers & Distributors, New Delhi, First edition 1997 (reprint in 2001).
5. S.P. Vyas and R.K. Khar, Controlled Drug Delivery -concepts and advances, Vallabh Prakashan, New Delhi, First edition 2002.

Journals

1. Indian Journal of Pharmaceutical Sciences (IPA)
2. Indian Drugs (IDMA)
3. Journal of Controlled Release (Elsevier Sciences)
4. Drug Development and Industrial Pharmacy (Marcel & Decker)
5. International Journal of Pharmaceutics (Elsevier Sciences)



SEMESTER VIII



BP801T. BIOSTATISTICS AND RESEARCH METHODOLOGY (Theory)**45 Hours**

Scope: To understand the applications of Biostatistics in Pharmacy. This subject deals with descriptive statistics, Graphics, Correlation, Regression, logistic regression Probability theory, Sampling technique, Parametric tests, Non Parametric tests, ANOVA, Introduction to Design of Experiments, Phases of Clinical trials and Observational and Experimental studies, SPSS, R and MINITAB statistical software's, analyzing the statistical data using Excel.

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

- Know the operation of M.S. Excel, SPSS, R and MINITAB®, DoE (Design of Experiment)
- Know the various statistical techniques to solve statistical problems
- Appreciate statistical techniques in solving the problems.

Course content:**Unit-I****10 Hours**

Introduction: Statistics, Biostatistics, Frequency distribution

Measures of central tendency: Mean, Median, Mode- Pharmaceutical examples

Measures of dispersion: Dispersion, Range, standard deviation, Pharmaceutical problems

Correlation: Definition, Karl Pearson's coefficient of correlation, Multiple correlation - Pharmaceuticals examples

Unit-II**10 Hours**

Regression: Curve fitting by the method of least squares, fitting the lines $y = a + bx$ and $x = a + by$, Multiple regression, standard error of regression- Pharmaceutical Examples

Probability: Definition of probability, Binomial distribution, Normal distribution, Poisson's distribution, properties - problems

Sample, Population, large sample, small sample, Null hypothesis, alternative hypothesis, sampling, essence of sampling, types of sampling, Error-I type, Error-II type, Standard error of mean (SEM) - Pharmaceutical examples

Parametric test: t-test(Sample, Pooled or Unpaired and Paired), ANOVA, (One way and Two way), Least Significance difference



Unit-III**10 Hours**

Non Parametric tests: Wilcoxon Rank Sum Test, Mann-Whitney U test, Kruskal-Wallis test, Friedman Test

Introduction to Research: Need for research, Need for design of Experiments, Experiential Design Technique, plagiarism

Graphs: Histogram, Pie Chart, Cubic Graph, response surface plot, Counter Plot graph

Designing the methodology: Sample size determination and Power of a study, Report writing and presentation of data, Protocol, Cohorts studies, Observational studies, Experimental studies, Designing clinical trial, various phases.

Unit-IV**8 Hours**

Blocking and confounding system for Two-level factorials

Regression modeling: Hypothesis testing in Simple and Multiple regression models

Introduction to Practical components of Industrial and Clinical Trials Problems:

Statistical Analysis Using Excel, SPSS, MINITAB®, DESIGN OF EXPERIMENTS, R - Online Statistical Software's to Industrial and Clinical trial approach

Unit-V**7Hours**

Design and Analysis of experiments:

Factorial Design: Definition, 2^2 , 2^3 design. Advantage of factorial design

Response Surface methodology: Central composite design, Historical design, Optimization Techniques

Recommended Books (Latest edition):

1. Pharmaceutical statistics- Practical and clinical applications, Sanford Bolton, publisher Marcel Dekker Inc. NewYork.
2. Fundamental of Statistics – Himalaya Publishing House- S.C.Guptha
3. Design and Analysis of Experiments –PHI Learning Private Limited, R. Pannerselvam,
4. Design and Analysis of Experiments – Wiley Students Edition, Douglas and C. Montgomery



BP 802T SOCIAL AND PREVENTIVE PHARMACY**Hours: 45**

Scope: The purpose of this course is to introduce to students a number of health issues and their challenges. This course also introduced a number of national health programmes. The roles of the pharmacist in these contexts are also discussed.

Objectives:

After the successful completion of this course, the student shall be able to:

- Acquire high consciousness/realization of current issues related to health and pharmaceutical problems within the country and worldwide.
- Have a critical way of thinking based on current healthcare development.
- Evaluate alternative ways of solving problems related to health and pharmaceutical issues

Course content:**Unit I:****10 Hours**

Concept of health and disease: Definition, concepts and evaluation of public health. Understanding the concept of prevention and control of disease, social causes of diseases and social problems of the sick.

Social and health education: Food in relation to nutrition and health, Balanced diet, Nutritional deficiencies, Vitamin deficiencies, Malnutrition and its prevention.

Sociology and health: Socio cultural factors related to health and disease, Impact of urbanization on health and disease, Poverty and health

Hygiene and health: personal hygiene and health care; avoidable habits

Unit II:**10 Hours**

Preventive medicine: General principles of prevention and control of diseases such as cholera, SARS, Ebola virus, influenza, acute respiratory infections, malaria, chicken guinea, dengue, lymphatic filariasis, pneumonia, hypertension, diabetes mellitus, cancer, drug addiction-drug substance abuse

Unit III:**10 Hours**

National health programs, its objectives, functioning and outcome of the following: HIV AND AIDS control programme, TB, Integrated disease surveillance program (IDSP), National leprosy control programme, National mental health program, National programme for prevention and control of deafness, Universal immunization programme, National programme for control of blindness, Pulse polio programme.



Unit IV:**08 Hours**

National health intervention programme for mother and child, National family welfare programme, National tobacco control programme, National Malaria Prevention Program, National programme for the health care for the elderly, Social health programme; role of WHO in Indian national program

Unit V:**07 Hours**

Community services in rural, urban and school health: Functions of PHC, Improvement in rural sanitation, national urban health mission, Health promotion and education in school.

Recommended Books (Latest edition):

1. Short Textbook of Preventive and Social Medicine, Prabhakara GN, 2nd Edition, 2010, ISBN: 9789380704104, JAYPEE Publications
2. Textbook of Preventive and Social Medicine (Mahajan and Gupta), Edited by Roy Rabindra Nath, Saha Indranil, 4th Edition, 2013, ISBN: 9789350901878, JAYPEE Publications
3. Review of Preventive and Social Medicine (Including Biostatistics), Jain Vivek, 6th Edition, 2014, ISBN: 9789351522331, JAYPEE Publications
4. Essentials of Community Medicine—A Practical Approach, Hiremath Lalita D, Hiremath Dhananjaya A, 2nd Edition, 2012, ISBN: 9789350250440, JAYPEE Publications
5. Park Textbook of Preventive and Social Medicine, K Park, 21st Edition, 2011, ISBN-14: 9788190128285, BANARSIDAS BHANOT PUBLISHERS.
6. Community Pharmacy Practice, Ramesh Adepu, BSP publishers, Hyderabad

Recommended Journals:

1. Research in Social and Administrative Pharmacy, Elsevier, Ireland

BP803ET. PHARMACEUTICAL MARKETING (Theory)**45 Hours**

Scope: The pharmaceutical industry not only needs highly qualified researchers, chemist, technical people but also requires skilled managers who can take the industry forward by managing and taking the complex decisions which are imperative for the growth of the industry. Sales & Marketing which grooms the people for taking a challenging role in Sales and Product management. The career in product management starts from having hands on experience in sales and marketing only.



Course Objective: The course aim is to provide an understanding of marketing concepts and techniques and the application of the same in the pharmaceutical industry.

Unit I

10 Hours

Marketing:

Definition, general concepts, and scope of marketing; Distinction between marketing & selling; Marketing environment; Industry and competitive analysis; Analyzing consumer buying behavior; industrial buying behavior.

Pharmaceutical market:

Quantitative and qualitative aspects; size and composition of the market; demographic descriptions and socio-psychological characteristics of the consumer; market segmentation & targeting. Consumer profile; Motivation and prescribing habits of the physician; patients' choice of physician and retail pharmacist. Analyzing the Market; Role of market research.

Unit II

10 Hours

Product decision:

Meaning, Classification, product line and product mix decisions, product life cycle, product portfolio analysis; product positioning; New product decisions; Product branding, packaging and labeling decisions, Product management in pharmaceutical industry.

Unit III

10 Hours

Promotion:

Meaning and methods, determinants of promotional mix, promotional budget; An overview of personal selling, advertising, direct mail, journals, sampling, retailing, medical exhibition, public relations, online promotional techniques for OTC Products.

Unit IV

10 Hours

Pharmaceutical marketing channels:

Designing channel, channel members, selecting the appropriate channel, conflict in channels, physical distribution management: Strategic importance, tasks in physical distribution management.

Professional sales representative (PSR):

Duties of PSR, purpose of detailing, selection and training, supervising, norms for customer calls, motivating, evaluating, compensation and future prospects of the PSR.



Unit V**10 Hours****Pricing**

Meaning, importance, objectives, determinants of price; pricing methods and strategies, issues in price management in pharmaceutical industry. An overview of DPCO (Drug Price Control Order) and NPPA (National Pharmaceutical Pricing Authority).

Emerging concepts in marketing:

Vertical & Horizontal Marketing; Rural Marketing; Consumerism; Industrial Marketing; Global Marketing.

Recommended Books: (Latest Editions)

1. Philip Kotler and Kevin Lane Keller: Marketing Management, Prentice Hall of India, New Delhi
2. Walker, Boyd and Larreche : Marketing Strategy- Planning and Implementation, Tata MC GrawHill, New Delhi.
3. Dhruv Grewal and Michael Levy: Marketing, Tata MC Graw Hill
4. Arun Kumar and N Menakshi: Marketing Management, Vikas Publishing, India
5. Rajan Saxena: Marketing Management; Tata MC Graw-Hill (India Edition)
6. Ramaswamy, U.S & Nanakamari, S: Marketing Managemnt:Global Perspective, Indian Context, Macmillan India, New Delhi.
7. Shanker, Ravi: Service Marketing, Excell Books, New Delhi
8. Subba Rao Changanti, Pharmaceutical Marketing in India (GIFT – Excel series) Excel Publications.

BP804 ET: PHARMACEUTICAL REGULATORY SCIENCE (Theory)**45Hours**

Scope: This course is designed to impart the fundamental knowledge on the regulatory requirements for approval of new drugs, drug products in regulated countries like US, EU, Japan, Australia and Canada. It prepares the students to learn in detail on the regulatory requirements, documentation requirements, and registration procedures for marketing the drug products in regulated countries.

Objectives: Upon completion of the subject student shall be able to;

1. Know about the process of drug discovery and development
2. Know the regulatory authorities and agencies governing the manufacture and sale of pharmaceuticals



3. Know the regulatory approval process and their registration in Indian and international markets

Course content:

Unit I

10Hours

New Drug Discovery and development

Stages of drug discovery, Drug development process, pre-clinical studies, non-clinical activities, clinical studies, Innovator and generics, Concept of generics, Generic drug product development.

Unit II

10Hours

Regulatory Approval Process

Approval processes and timelines involved in Investigational New Drug (IND), New Drug Application (NDA), Abbreviated New Drug Application (ANDA) in US. Changes to an approved NDA / ANDA. **Regulatory authorities and agencies**

Overview of regulatory authorities of United States, European Union, Australia, Japan, Canada (Organization structure and types of applications)

Unit III

10Hours

Registration of Indian drug product in overseas market

Procedure for export of pharmaceutical products, Technical documentation, Drug Master Files (DMF), Common Technical Document (CTD), electronic Common Technical Document (eCTD), ASEAN Common Technical Document (ACTD) research.

Unit IV

08Hours

Clinical trials

Developing clinical trial protocols, Institutional Review Board / Independent Ethics committee - formation and working procedures, Informed consent process and procedures, GCP obligations of Investigators, sponsors & Monitors, Managing and Monitoring clinical trials, Pharmacovigilance - safety monitoring in clinical trials

Unit V

07Hours

Regulatory Concepts

Basic terminologies, guidance, guidelines, regulations, laws and acts, Orange book, Federal Register, Code of Federal Regulatory, Purple book



Recommended books (Latest edition):

1. Drug Regulatory Affairs by Sachin Itkar, Dr. N.S. Vyawahare, Nirali Prakashan.
2. The Pharmaceutical Regulatory Process, Second Edition Edited by Ira R. Berry and Robert P. Martin, Drugs and the Pharmaceutical Sciences, Vol.185. Informa Health care Publishers.
3. New Drug Approval Process: Accelerating Global Registrations By Richard A Guarino, MD, 5th edition, Drugs and the Pharmaceutical Sciences, Vol.190.
4. Guidebook for drug regulatory submissions / Sandy Weinberg. By John Wiley & Sons. Inc.
5. FDA Regulatory Affairs: a guide for prescription drugs, medical devices, and biologics /edited by Douglas J. Pisano, David Mantus.
6. Generic Drug Product Development, Solid Oral Dosage forms, Leon Shargel and Isader Kaufer, Marcel Dekker series, Vol.143
7. Clinical Trials and Human Research: A Practical Guide to Regulatory Compliance By Fay A. Rozovsky and Rodney K. Adams
8. Principles and Practices of Clinical Research, Second Edition Edited by John I. Gallin and Frederick P. Ognibene
9. Drugs: From Discovery to Approval, Second Edition By Rick Ng

BP 805T: PHARMACOVIGILANCE (Theory)**45 hours**

Scope: This paper will provide an opportunity for the student to learn about development of pharmacovigilance as a science, basic terminologies used in pharmacovigilance, global scenario of Pharmacovigilance, train students on establishing pharmacovigilance programme in an organization, various methods that can be used to generate safety data and signal detection. This paper also develops the skills of classifying drugs, diseases and adverse drug reactions.

Objectives: At completion of this paper it is expected that students will be able to (know, do, and appreciate):

1. Why drug safety monitoring is important?
2. History and development of pharmacovigilance
3. National and international scenario of pharmacovigilance
4. Dictionaries, coding and terminologies used in pharmacovigilance



5. Detection of new adverse drug reactions and their assessment
6. International standards for classification of diseases and drugs
7. Adverse drug reaction reporting systems and communication in pharmacovigilance
8. Methods to generate safety data during pre clinical, clinical and post approval phases of drugs' life cycle
9. Drug safety evaluation in paediatrics, geriatrics, pregnancy and lactation
10. Pharmacovigilance Program of India (PvPI)
11. ICH guidelines for ICSR, PSUR, expedited reporting, pharmacovigilance planning
12. CIOMS requirements for ADR reporting
13. Writing case narratives of adverse events and their quality.

Course Content

Unit I

10 Hours

Introduction to Pharmacovigilance

- History and development of Pharmacovigilance
- Importance of safety monitoring of Medicine
- WHO international drug monitoring programme
- Pharmacovigilance Program of India (PvPI)

Introduction to adverse drug reactions

- Definitions and classification of ADRs
- Detection and reporting
- Methods in Causality assessment
- Severity and seriousness assessment
- Predictability and preventability assessment
- Management of adverse drug reactions

Basic terminologies used in pharmacovigilance

- Terminologies of adverse medication related events
- Regulatory terminologies

Unit II

10 hours

Drug and disease classification

- Anatomical, therapeutic and chemical classification of drugs
- International classification of diseases



- Daily defined doses
- International Non proprietary Names for drugs

Drug dictionaries and coding in pharmacovigilance

- WHO adverse reaction terminologies
- MedDRA and Standardised MedDRA queries
- WHO drug dictionary
- Eudravigilance medicinal product dictionary

Information resources in pharmacovigilance

- Basic drug information resources
- Specialised resources for ADRs

Establishing pharmacovigilance programme

- Establishing in a hospital
- Establishment & operation of drug safety department in industry
- Contract Research Organisations (CROs)
- Establishing a national programme

Unit III**10 Hours****Vaccine safety surveillance**

- Vaccine Pharmacovigilance
- Vaccination failure
- Adverse events following immunization

Pharmacovigilance methods

- Passive surveillance – Spontaneous reports and case series
- Stimulated reporting
- Active surveillance – Sentinel sites, drug event monitoring and registries
- Comparative observational studies – Cross sectional study, case control study and cohort study
- Targeted clinical investigations

Communication in pharmacovigilance

- Effective communication in Pharmacovigilance
- Communication in Drug Safety Crisis management



- Communicating with Regulatory Agencies, Business Partners, Healthcare facilities & Media

Unit IV

8 Hours

Statistical methods for evaluating medication safety data

Safety data generation

- Pre clinical phase
- Clinical phase
- Post approval phase

ICH Guidelines for Pharmacovigilance

- Organization and objectives of ICH
- Expedited reporting
- Individual case safety reports
- Periodic safety update reports
- Post approval expedited reporting
- Pharmacovigilance planning
- Good clinical practice in pharmacovigilance studies

Unit V

7 hours

Pharmacogenomics of adverse drug reactions

Drug safety evaluation in special population

- Paediatrics
- Pregnancy and lactation
- Geriatrics

CIOMS

- CIOMS Working Groups
- CIOMS Form

CDSCO (India) and Pharmacovigilance

- D&C Act and Schedule Y
- Differences in Indian and global pharmacovigilance requirements

Recommended Books (Latest edition):

1. Textbook of Pharmacovigilance: S K Gupta, Jaypee Brothers, Medical Publishers.



2. Practical Drug Safety from A to Z By Barton Cobert, Pierre Biron, Jones and Bartlett Publishers.
3. Mann's Pharmacovigilance: Elizabeth B. Andrews, Nicholas, Wiley Publishers.
4. Stephens' Detection of New Adverse Drug Reactions: John Talbot, Patrick Walle, Wiley Publishers.
5. An Introduction to Pharmacovigilance: Patrick Waller, Wiley Publishers.
6. Cobert's Manual of Drug Safety and Pharmacovigilance: Barton Cobert, Jones & Bartlett Publishers.
7. Textbook of Pharmacoepidemiology edited by Brian L. Strom, Stephen E Kimmel, Sean Hennessy, Wiley Publishers.
8. A Textbook of Clinical Pharmacy Practice - Essential Concepts and Skills: G. Parthasarathi, Karin Nyfort Hansen, Milap C. Nahata
9. National Formulary of India
10. Text Book of Medicine by Yashpal Munjal
11. Text book of Pharmacovigilance: concept and practice by GP Mohanta and PK Manna
12. <http://www.who.int/dynpage.aspx?id=105825&mn1=7347&mn2=7259&mn3=7297>
13. <http://www.ich.org/>
14. <http://www.cioms.ch/>
15. <http://cdsco.nic.in/>
16. http://www.who.int/vaccine_safety/en/
17. http://www.ipc.gov.in/PvPI/pv_home.html



BP 806 ET. QUALITY CONTROL AND STANDARDIZATION OF HERBALS
(Theory)

Scope: In this subject the student learns about the various methods and guidelines for evaluation and standardization of herbs and herbal drugs. The subject also provides an opportunity for the student to learn cGMP, GAP and GLP in traditional system of medicines.

Objectives: Upon completion of the subject student shall be able to;

1. know WHO guidelines for quality control of herbal drugs
2. know Quality assurance in herbal drug industry
3. know the regulatory approval process and their registration in Indian and international markets
4. appreciate EU and ICH guidelines for quality control of herbal drugs

Unit I**10 hours**

Basic tests for drugs – Pharmaceutical substances, Medicinal plants materials and dosage forms WHO guidelines for quality control of herbal drugs.

Evaluation of commercial crude drugs intended for use

Unit II**10 hours**

Quality assurance in herbal drug industry of cGMP, GAP, GMP and GLP in traditional system of medicine.

WHO Guidelines on current good manufacturing Practices (cGMP) for Herbal Medicines

WHO Guidelines on GACP for Medicinal Plants.

Unit III**10 hours**

EU and ICH guidelines for quality control of herbal drugs.

Research Guidelines for Evaluating the Safety and Efficacy of Herbal Medicines

Unit IV**08 hours**

Stability testing of herbal medicines. Application of various chromatographic techniques in standardization of herbal products.

Preparation of documents for new drug application and export registration GMP requirements and Drugs & Cosmetics Act provisions.

Unit V**07 hours**

Regulatory requirements for herbal medicines.

WHO guidelines on safety monitoring of herbal medicines in pharmacovigilance systems

Comparison of various Herbal Pharmacopoeias.

Role of chemical and biological markers in standardization of herbal products



Recommended Books: (Latest Editions)

1. Pharmacognosy by Trease and Evans
2. Pharmacognosy by Kokate, Purohit and Gokhale
3. Rangari, V.D., Text book of Pharmacognosy and Phytochemistry Vol. I , Carrier Pub., 2006.
4. Aggrawal, S.S., Herbal Drug Technology. Universities Press, 2002.
5. EMEA. Guidelines on Quality of Herbal Medicinal Products/Traditional Medicinal Products,
6. Mukherjee, P.W. Quality Control of Herbal Drugs: An Approach to Evaluation of Botanicals. Business Horizons Publishers, New Delhi, India, 2002.
7. Shinde M.V., Dhalwal K., Potdar K., Mahadik K. Application of quality control principles to herbal drugs. International Journal of Phytomedicine 1(2009); p. 4-8.
8. WHO. Quality Control Methods for Medicinal Plant Materials, World Health Organization, Geneva, 1998.
9. WHO. Guidelines for the Appropriate Use of Herbal Medicines. WHO Regional Publications, Western Pacific Series No 3, WHO Regional office for the Western Pacific, Manila, 1998.
10. WHO. The International Pharmacopeia, Vol. 2: Quality Specifications, 3rd edn. World Health Organization, Geneva, 1981.
11. WHO. Quality Control Methods for Medicinal Plant Materials. World Health Organization, Geneva, 1999.
12. WHO. WHO Global Atlas of Traditional, Complementary and Alternative Medicine. 2 vol. set. Vol. 1 contains text and Vol. 2, maps. World Health Organization, Geneva, 2005.
13. WHO. Guidelines on Good Agricultural and Collection Practices (GACP) for Medicinal Plants. World Health Organization, Geneva, 2004.

BP 807 ET. COMPUTER AIDED DRUG DESIGN (Theory)**45 Hours**

Scope: This subject is designed to provide detailed knowledge of rational drug design process and various techniques used in rational drug design process.

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



- Design and discovery of lead molecules
- The role of drug design in drug discovery process
- The concept of QSAR and docking
- Various strategies to develop new drug like molecules.
- The design of new drug molecules using molecular modeling software

Course Content:

UNIT-I

10 Hours

Introduction to Drug Discovery and Development

Stages of drug discovery and development

Lead discovery and Analog Based Drug Design

Rational approaches to lead discovery based on traditional medicine, Random screening, Non-random screening, serendipitous drug discovery, lead discovery based on drug metabolism, lead discovery based on clinical observation.

Analog Based Drug Design: Bioisosterism, Classification, Bioisosteric replacement. Any three case studies

UNIT-II

10 Hours

Quantitative Structure Activity Relationship (QSAR) SAR versus QSAR, History and development of QSAR, Types of physicochemical parameters, experimental and theoretical approaches for the determination of physicochemical parameters such as Partition coefficient, Hammett's substituent constant and Taft's steric constant. Hansch analysis, Free Wilson analysis, 3D-QSAR approaches like COMFA and COMSIA.

UNIT-III

10 Hours

Molecular Modeling and virtual screening techniques

Virtual Screening techniques: Drug likeness screening, Concept of pharmacophore mapping and pharmacophore based Screening,

Molecular docking: Rigid docking, flexible docking, manual docking, Docking based screening. *De novo* drug design.

UNIT-IV

08 Hours

Informatics & Methods in drug design

Introduction to Bioinformatics, cheminformatics. ADME databases, chemical, biochemical and pharmaceutical databases.

UNIT-V

07 Hours



Molecular Modeling: Introduction to molecular mechanics and quantum mechanics. Energy Minimization methods and Conformational Analysis, global conformational minima determination.

Recommended Books (Latest Editions)

1. Robert GCK, ed., "Drug Action at the Molecular Level" University Park Press Baltimore.
2. Martin YC. "Quantitative Drug Design" Dekker, New York.
3. Delgado JN, Remers WA eds "Wilson & Gisvolds's Text Book of Organic Medicinal & Pharmaceutical Chemistry" Lippincott, New York.
4. Foye WO "Principles of Medicinal chemistry 'Lea & Febiger.
5. Koro Ikovas A, Burckhalter JH. "Essentials of Medicinal Chemistry" Wiley Interscience.
6. Wolf ME, ed "The Basis of Medicinal Chemistry, Burger's Medicinal Chemistry" John Wiley & Sons, New York.
7. Patrick Graham, L., An Introduction to Medicinal Chemistry, Oxford University Press.
8. Smith HJ, Williams H, eds, "Introduction to the principles of Drug Design" Wright Boston.
9. Silverman R.B. "The organic Chemistry of Drug Design and Drug Action" Academic Press New York.

BP808ET: CELL AND MOLECULAR BIOLOGY (Elective subject)

45 Hours

Scope:

- Cell biology is a branch of biology that studies cells— their physiological properties, their structure, the organelles they contain, interactions with their environment, their life cycle, division, death and cell function.
- This is done both on a microscopic and molecular level.
- Cell biology research encompasses both the great diversity of single-celled organisms like bacteria and protozoa, as well as the many specialized cells in multi-cellular organisms such as humans, plants, and sponges.

Objectives: Upon completion of the subject student shall be able to; □ Summarize cell and molecular biology history.

- Summarize cellular functioning and composition.
- Describe the chemical foundations of cell biology.



- Summarize the DNA properties of cell biology.
- Describe protein structure and function.
- Describe cellular membrane structure and function.
- Describe basic molecular genetic mechanisms.
- Summarize the Cell Cycle

Course content:**Unit I****10Hours**

- Cell and Molecular Biology: Definitions theory and basics and Applications.
- Cell and Molecular Biology: History and Summation.
- Theory of the Cell? Properties of cells and cell membrane.
- Prokaryotic versus Eukaryotic
- Cellular Reproduction
- Chemical Foundations – an Introduction and Reactions (Types)

Unit II**10 Hours**

- DNA and the Flow of Molecular Structure
- DNA Functioning
- DNA and RNA
- Types of RNA
- Transcription and Translation

Unit III**10 Hours**

- Proteins: Defined **and** Amino Acids
- Protein Structure
- Regularities in Protein Pathways
- Cellular Processes
- Positive Control and significance of Protein Synthesis

Unit IV**08 Hours**

- Science of Genetics
- Transgenics and Genomic Analysis
- Cell Cycle analysis
- Mitosis and Meiosis
- Cellular Activities and Checkpoints

Unit V**07 Hours**

- Cell Signals: Introduction



- b) Receptors for Cell Signals
- c) Signaling Pathways: Overview
- d) Misregulation of Signaling Pathways
- e) Protein-Kinases: Functioning

Recommended Books (latest edition):

1. W.B. Hugo and A.D. Russel: Pharmaceutical Microbiology, Blackwell Scientific publications, Oxford London.
2. Prescott and Dunn., Industrial Microbiology, 4th edition, CBS Publishers & Distributors, Delhi.
3. Pelczar, Chan Kreig, Microbiology, Tata McGraw Hill edn.
4. Malcolm Harris, Balliere Tindall and Cox: Pharmaceutical Microbiology.
5. Rose: Industrial Microbiology.
6. Probisher, Hinsdill et al: Fundamentals of Microbiology, 9th ed. Japan
7. Cooper and Gunn's: Tutorial Pharmacy, CBS Publisher and Distribution.
8. Pepler: Microbial Technology.
9. Edward: Fundamentals of Microbiology.
10. N.K.Jain: Pharmaceutical Microbiology, Vallabh Prakashan, Delhi
11. Bergeys manual of systematic bacteriology, Williams and Wilkins- A Waverly company
12. B.R. Glick and J.J. Pasternak: Molecular Biotechnology: Principles and Applications of RecombinantDNA: ASM Press Washington D.C.
13. RA Goldshy et. al., : Kuby Immunology.

BP809ET. COSMETIC SCIENCE(Theory)

45Hours

UNIT I

10Hours

Classification of cosmetic and cosmeceutical products

Cosmetic excipients: Surfactants, rheology modifiers, humectants, emollients, preservatives.

Classification and application

Skin: Basic structure and function of skin.

Hair: Basic structure of hair. Hair growth cycle.

Oral Cavity: Common problem associated with teeth and gums.

UNIT II

10 Hours



Principles of formulation and building blocks of skin care products:

Face wash, Moisturizing cream, Cold Cream, Vanishing cream their relative skin sensory, advantages and disadvantages. Application of these products in formulation of cosmeceuticals.

Principles of formulation and building blocks of Hair care products:

Conditioning shampoo, Hair conditioners, antidandruff shampoo.

Hair oils. Chemistry and formulation of Para-phenylene diamine based hair dye.

Principles of formulation and building blocks of oral care products:

Toothpaste for bleeding gums, sensitive teeth. Teeth whitening, Mouthwash.

UNIT III**10 Hours**

Sun protection, Classification of Sunscreens and SPF. **Role of herbs in cosmetics:** Skin Care:

Aloe and turmeric Hair care: Henna and amla.

Oral care: Neem and clove

Analytical cosmetics: BIS specification and analytical methods for shampoo, skincream and toothpaste.

UNIT IV**08 Hours**

Definition of cosmetics as per Indian and EU regulations, Evolution of cosmeceuticals from cosmetics, cosmetics as quasi and OTC drugs.

Principles of Cosmetic Evaluation: Principles of sebumeter, corneometer. Measurement of TEWL, Skin Color, Hair tensile strength, Hair combing properties Soaps, and syndet bars. Evolution and skin benefits.

UNIT V**07 Hours**

Oily and dry skin, causes leading to dry skin, skin moisturisation. Basic understanding of the terms Comedogenic, dermatitis.

Cosmetic problems associated with Hair and scalp: Dandruff, Hair fall causes Cosmetic problems associated with skin: blemishes, wrinkles, acne, prickly heat and body odor.

Antiperspirants and Deodorants- Actives and mechanism of action

References

- 1) Harry's Cosmeticology, Wilkinson, Moore, Seventh Edition, George Godwin.
- 2) Cosmetics – Formulations, Manufacturing and Quality Control, P.P. Sharma, 4th Edition, Vandana Publications Pvt. Ltd., Delhi.



BP810 ET.EXPERIMENTAL PHARMACOLOGY**Suggested title:PHARMACOLOGICAL SCREENING METHODS****45 Hours**

Scope:This subject is designed to impart the basic knowledge of preclinical studies in experimental animals including design, conduct and interpretations of results.

Objectives

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

- Appreciate the applications of various commonly used laboratory animals.
- Appreciate and demonstrate the various screening methods used in preclinical research
- Appreciate and demonstrate the importance of biostatistics and research methodology
- Design and execute a research hypothesis independently

Unit –I	08 Hours
<p>Laboratory Animals:</p> <p>Study of CPCSEA and OECD guidelines for maintenance, breeding and conduct of experiments on laboratory animals, Common lab animals: Description and applications of different species and strains of animals. Popular transgenic and mutant animals.</p> <p>Techniques for collection of blood and common routes of drug administration in laboratory animals, Techniques of blood collection and euthanasia.</p>	
Unit –II	10 Hours
<p>Preclinical screening models</p> <p>. Introduction: Dose selection, calculation and conversions, preparation of drug solution/suspensions, grouping of animals and importance of sham negative and positive control groups. Rationale for selection of animal species and sex for the study.</p> <p>. Study of screening animal models for</p> <p>Diuretics, nootropics, anti-Parkinson's, antiasthmatics, Preclinical screening models: for CNS activity-analgesic, antipyretic, anti-inflammatory, general anaesthetics, sedative and hypnotics, antipsychotic, antidepressant, antiepileptic, antiparkinsonism,</p>	



alzheimer's disease	
Unit –III Preclinical screening models: for ANS activity, sympathomimetics, sympatholytics, parasymphomimetics, parasympholytics, skeletal muscle relaxants, drugs acting on eye, local anaethetics	
Unit –IV Preclinical screening models: for CVS activity- antihypertensives, diuretics, antiarrhythmic, antidyslepidemic, anti aggregatory, coagulants, and anticoagulants Preclinical screening models for other important drugs like antiulcer, antidiabetic, anticancer and antiasthmatics.	
Research methodology and Bio-statistics Selection of research topic, review of literature, research hypothesis and study design Pre-clinical data analysis and interpretation using Students 't' test and One-way ANOVA. Graphical representation of data	05Hours

Recommended Books (latest edition):

- 1.Fundamentals of experimental Pharmacology-by M.N.Ghosh
- 2.Hand book of Experimental Pharmacology-S.K.Kulakarni
3. CPCSEA guidelines for laboratory animal facility.
4. Drug discovery and Evaluation by Vogel H.G.
5. Drug Screening Methods by Suresh Kumar Gupta and S. K. Gupta
6. Introduction to biostatistics and research methods by PSS Sundar Rao and J Richard

BP 811 ET ADVANCED INSTRUMENTATION TECHNIQUES

45 Hours

Scope: This subject deals with the application of instrumental methods in qualitative and quantitative analysis of drugs. This subject is designed to impart advanced knowledge on the



principles and instrumentation of spectroscopic and chromatographic hyphenated techniques. This also emphasizes on theoretical and practical knowledge on modern analytical instruments that are used for drug testing.

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

- understand the advanced instruments used and its applications in drug analysis
- understand the chromatographic separation and analysis of drugs.
- understand the calibration of various analytical instruments
- know analysis of drugs using various analytical instruments.

Course Content:

UNIT-I	10 Hours
Nuclear Magnetic Resonance spectroscopy	
Principles of H-NMR and C-NMR, chemical shift, factors affecting chemical shift, coupling constant, Spin - spin coupling, relaxation, instrumentation and applications	
Mass Spectrometry - Principles, Fragmentation, Ionization techniques – Electron impact, chemical ionization, MALDI, FAB, Analyzers-Time of flight and Quadrupole, instrumentation, applications	
UNIT-II	10 Hours
Thermal Methods of Analysis: Principles, instrumentation and applications of Thermogravimetric Analysis (TGA), Differential Thermal Analysis (DTA), Differential Scanning Calorimetry (DSC)	
Diffraction Methods: Origin of X-rays, basic aspects of crystals, Xray Crystallography, rotating crystal technique, single crystal diffraction, powder diffraction, structural elucidation and applications.	
UNIT-III	10 Hours
Calibration and validation -as per ICH and USFDA guidelines	
Calibration of following Instruments	
Electronic balance, UV-Visible spectrophotometer, IR spectrophotometer, Fluorimeter, Flame Photometer, HPLC and GC	
UNIT-IV	08 Hours



Radio immune assay: Importance, various components, Principle, different methods, Limitation and Applications of Radio immuno assay

Extraction techniques: General principle and procedure involved in the solid phase extraction and liquid-liquid extraction

UNIT-V

07 Hours

Hyphenated techniques-LC-MS/MS, GC-MS/MS, HPTLC-MS.

Recommended Books (Latest Editions)

1. Instrumental Methods of Chemical Analysis by B.K Sharma
2. Organic spectroscopy by Y.R Sharma
3. Text book of Pharmaceutical Analysis by Kenneth A. Connors
4. Vogel's Text book of Quantitative Chemical Analysis by A.I. Vogel
5. Practical Pharmaceutical Chemistry by A.H. Beckett and J.B. Stenlake
6. Organic Chemistry by I. L. Finar
7. Organic spectroscopy by William Kemp
8. Quantitative Analysis of Drugs by D. C. Garrett
9. Quantitative Analysis of Drugs in Pharmaceutical Formulations by P. D. Sethi
10. Spectrophotometric identification of Organic Compounds by Silverstein

Semester VIII – Elective course on Pharmaceutical Product Development

No of Hours: 3

Tutorial:1

Credit points:4

Unit-I

10 Hours

Introduction to pharmaceutical product development, objectives, regulations related to preformulation, formulation development, stability assessment, manufacturing and quality control testing of different types of dosage forms

Unit-II

10 Hours

An advanced study of Pharmaceutical Excipients in pharmaceutical product development with a special reference to the following categories

- Solvents and solubilizers
- Cyclodextrins and their applications
- Non - ionic surfactants and their applications
- Polyethylene glycols and sorbitols



- Suspending and emulsifying agents
- Semi solid excipients

Unit-III**10 Hours**

An advanced study of Pharmaceutical Excipients in pharmaceutical product development with a special reference to the following categories

- Tablet and capsule excipients
- Directly compressible vehicles
- Coat materials
- Excipients in parenteral and aerosols products
- Excipients for formulation of NDDS

Selection and application of excipients in pharmaceutical formulations with specific industrial applications

Unit-IV**08 Hours**

Optimization techniques in pharmaceutical product development. A study of various optimization techniques for pharmaceutical product development with specific examples. Optimization by factorial designs and their applications. A study of QbD and its application in pharmaceutical product development.

Unit-V**07 Hours**

Selection and quality control testing of packaging materials for pharmaceutical product development- regulatory considerations.

Recommended Books (Latest editions)

1. Pharmaceutical Statistics Practical and Clinical Applications by Stanford Bolton, Charles Bon; Marcel Dekker Inc.
2. Encyclopedia of Pharmaceutical Technology, edited by James Swarbrick, Third Edition, Informa Healthcare publishers.
3. Pharmaceutical Dosage Forms, Tablets, Volume II, edited by Herbert A. Lieberman and Leon Lachman; Marcel Dekker, Inc.
4. The Theory and Practice of Industrial Pharmacy, Fourth Edition, edited by Roop kKhar, S P Vyas, Farhan J Ahmad, Gaurav K Jain; CBS Publishers and Distributors Pvt.Ltd. 2013.



5. Martin's Physical Pharmacy and Pharmaceutical Sciences, Fifth Edition, edited by Patrick J. Sinko, BI Publications Pvt. Ltd.
6. Targeted and Controlled Drug Delivery, Novel Carrier Systems by S. P. Vyas and R.K.Khar, CBS Publishers and Distributors Pvt. Ltd, First Edition 2012.
7. Pharmaceutical Dosage Forms and Drug Delivery Systems, Loyd V. Allen Jr., Nicholas B. Popovich, Howard C. Ansel, 9th Ed. 40
8. Aulton's Pharmaceutics – The Design and Manufacture of Medicines, Michael E. Aulton, 3rd Ed.
9. Remington – The Science and Practice of Pharmacy, 20th Ed.
10. Pharmaceutical Dosage Forms – Tablets Vol 1 to 3, A. Liberman, Leon Lachman and Joseph B. Schwartz
11. Pharmaceutical Dosage Forms – Disperse Systems Vol 1 to 3, H.A. Liberman, Martin, M.R and Gilbert S. Banker.
12. Pharmaceutical Dosage Forms – Parenteral Medication Vol 1 & 2, Kenneth E. Avis and H.A. Libermann.
13. Advanced Review Articles related to the topics.

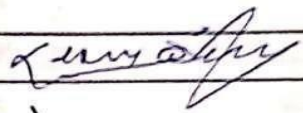
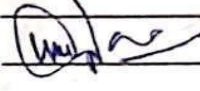
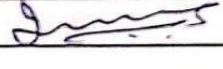
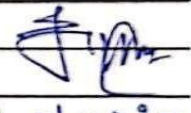


ANNEXURE IV (MINUTES OF GOVERNING BODY MEETING)



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<u>Minutes of The Meeting:</u>	
The Governing Body Meeting of Anuradha College of Pharmacy, Chikhli was conducted by online mode on ZOOM platform at 3:00 PM, on Saturday, At. 29 th August, 2020.	
The following members attended the meeting by distant (online, zoom platform) mode-	
① Shri. Siddharinayak K. Bondre -	
② Shri. Rahul S. Bondre -	
③ Dr. V. R. Yadav -	
④ Shri. Siddheshwar M. Wanare -	
⑤ Dr. K. R. Biyani -	
<u>The following agenda was discussed during the meeting:</u>	
① <u>Confirmation of minutes of previous meeting:</u>	
Honourable Members attending the online meeting unanimously confirm the minutes of previous meeting held on Saturday, At. 15 th Jan, 2020.	
② <u>Discussion about covid-19 pandemic and its effect on our college:</u>	
All the Honourable Members expressed	



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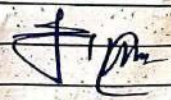
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	stakeholders. The Members also expressed a concern about the modalities of all the routine procedures like conduct of academics, admission attendance of staff etc.
	Honourable Secretary informed all the Honourable Members about the COVID-19 guidelines issued by the Government & SGBAU, Amravati. All the members advised The Principal to abide to the guidelines in view of the health concerns of all the stakeholders.
	<u>③ Discussion about admissions:</u> Honourable Secretary informed the status of admissions to all the Honourable Members & all the Members appreciated that despite of COVID situation the flow of admissions was high.
	<u>④ Discussion about Budget:</u> Honourable Secretary proposed an annual budget for the academic session 2020-21. All the members discussed about the budget critically. Honourable Members also discussed about the



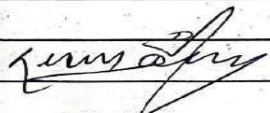


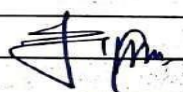
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	possibilities of difficulty in revenue collection in view of COVID pandemic & suggested to make appropriate arrangements for emergency expense if required. The members sanctioned the budget unanimously & authorized the Principal to take appropriate decisions from time-to-time.
	<p><u>5) Discussion about recruitments:</u> All the members authorized the Principal to take appropriate decisions about recruitment of faculty & supporting staff, if any, in order to conduct the ongoing work. All such recruitments shall be according to the norms of the Society/ Govt. of Maharashtra/ PCI, New Delhi/ SGBAU, Amravati &/or MSBTE, Mumbai as applicable.</p>
	<p><u>6) Any other issue, with the permission of The Chair:-</u> As there were no further issues, the meeting ended with thanks to The Chair.</p>
	

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<u>Minutes of The Meeting</u>	
The meeting of Governing Body of Anuradha College of Pharmacy, Chikhli was conducted on Saturday, Dt. 30 th January, 2021 at 3.00 P.M. by online mode. The meeting was conducted on ZOOM PLATFORM. The following members attended the meeting by online mode-	
① Shri. Siddhavinayak K. Bondre-	
② Shri. Rahul S. Bondre-	
③ Dr. V. R. Yadav-	
④ Shri. Siddhavinayak	
④ Shri. Siddheshwar M. Wanere-	
⑤ Dr. K. R. Biyani-	
<u>The following agenda was discussed during the meeting:-</u>	
① <u>Confirmation of minutes of previous meeting:-</u>	
	Honourable Members attending the online meeting unanimously confirmed the minutes of previous meeting held on Saturday, Dt. 29 th August, 2020 by distant mode.
② <u>Review of Academics:-</u>	
	Honourable Secretary presented the

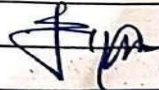


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	records of online classes & explained the modality of online teaching to all the Honourable Members. The members expressed satisfaction about the academics conducted regularly even during pandemic. The Secretary also presented the results of previous exams. before the Honourable Members. The members were satisfied with the results.
③	<p><u>Review of Budget:</u> The Honourable Members reviewed the sufficiency & utilization of budget sanctioned for the session 2020-21. The members also reviewed the revenue collection scrupulously & expressed satisfaction about the fee collection despite of COVID situation. All the members also expressed their views to consider the pendency sympathetically.</p>
④	<p><u>Review of Construction:</u> All the members took a review of the ongoing civil work & finishing work of constructions. The Honourable members authorized Honorable Secretary</p>

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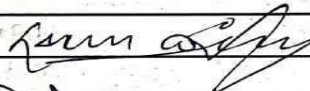

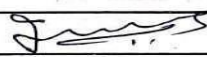
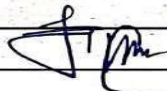
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	to take appropriate decision in this regard.
(5)	<p><u>Any other issues with permission of The Chair;</u></p> <p>Honourable Member Shri. Rahul S. Bondre proposed to constitute an Advisory Board to improve ^{further elevate} the status of educational standards & to provide an on-field experience to the students. In view of this, the following members were invited to the advisory board of The College -</p> <ul style="list-style-type: none"> - Honourable Shri. Hareeshbhai Shah, Director, Lehen Life Sciences, Akola. - Honourable Dr. Tatyarajji Lahane, Dean, J.J. Medical College, Mumbai. - Honourable Shri. Omprakashji Shete, OSD, Ministry of Health, Govt. of Maharashtra, Mumbai. <p>All the members unanimously approved the proposal.</p> <p>As there were no further issues, the meeting ended with thanks to The Chair.</p>
	



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<u>MINUTES OF THE MEETING:-</u>	
An online meeting of Governing Body of Anuradha College of Pharmacy, Chikhli was held at 3.00 PM. on Saturday, Dt. 4th Sept., 2021 on ZOOM PLATFORM.	
The following members were present for the meeting by online mode-	
① Shri. Siddhavinayak K. Bondre-	
② Shri. Rahul S. Bondre-	
③ Dr. V.R. Yadav-	
④ Shri. Siddheshwar M. Wanare-	
⑤ Dr. K.R. Bixari-	
<u>The following agenda was discussed during the meeting:-</u>	
① <u>Confirmation of minutes of previous meeting:-</u>	
	All the members unanimously confirmed the minutes of previous meeting held on Saturday, 30th January, 2021.
② <u>Discussion about admissions:-</u>	
	Honourable Secretary presented the upto date information about the students admissions & the modality of admission process. All the Honourable Members expressed satisfaction about the completion

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	of admissions and smooth conduct of the entire process.
③	<p><u>Discussion about the Budget:-</u> Honourable Secretary presented the proposed budget for the academic session 2021-22 before the learned members. All the members critically discussed about the anticipated revenue & expenses. All the members sanctioned the proposed expenses for book purchase, salary, chemicals, glass wares & equipment. Honourable Members authorized the Principal to take appropriate decisions in this regard from time to time. The budget was sanctioned unanimously.</p>
④	<p><u>Discussion about New Recruitments:-</u> Honourable Members Unanimously authorized the Principal to make the necessary recruitments in view of extracting the existing teaching load and for conduct of regular processes of the college. All such appointments shall be subject to the sanction/approval by SGBAU, Amravati/MSBTE, Mumbai.</p>



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	<p>It will be in accordance with norms laid-down by PCI, New Delhi, Govt. of Maharashtra, SGBAU, Amravati / M.S.B.T.E, Mumbai & P.R.M.S.S., Chikhli.</p>
	<p>⑤ <u>Discussion about academics:-</u> All the Honourable Members were made aware about conduct of online classes regularly. The Members express satisfaction about the regularity of online classes. The results of previous University & Board Exams. were presented before the members by Honourable Secretary. All the members expressed satisfaction about the results & congratulated The Principal & Staff for excellent results. The Members appreciated The College for the outstanding performance in G-PAT & NIPER exams.</p>
	<p>⑥ <u>Any other issues with permission of The Chair:-</u> As there were no further issues, the meeting concluded with thanks to The Chair.</p>
	