



# **Sanjay Ghodawat University**

**Kolhapur**

Established under section 2(f) of UGC act 1956  
Sanjay Ghodawat University Act XL of 2017 of Govt. of Maharashtra  
Approved by PCI, COA & AICTE

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*Empowering Lives Globally!*

## **School of Pharmaceutical Sciences**

**F. Y. B. Pharm.**

**Curriculum**

**Academic Year 2022-23**

**Revised Ordinance Governing  
Bachelor of Pharmacy (B. Pharm.)  
Degree Course  
Pharmacy Council of India.**

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**Rules & Syllabus for the Bachelor of  
Pharmacy**

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**(F. Y. B. Pharm) Course**



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## **SANJAY GHODAWAT UNIVERSITY KOLHAPUR**

Sanjay Ghodawat University (SGU) is established in the Academic Year 2017-18, as a State Private University under Govt. of Maharashtra Act No. XL of 2017 dated 3rd May 2017, with the approval of the UGC and the state Government. "For the true measure of giving is giving without measure." Spread across 150 Acres, Sou. Sushila Danchand Ghodawat Charitable Trust's Sanjay Ghodawat University (SGU) is situated in serene atmosphere amidst idyllic hills and lush green meadows to study in harmony with Nature. The Institution aspires to run along the lines of best-in- the-world education and become a world-class institution where teaching-learning process gets a far deeper meaning. SGU always stands as the guiding star of brilliance, quality and deliverance beyond expectations. Innovativeness and Creativity are the hallmarks of a genius enterprise and SGU stands to be a stage where these qualities would be nurtured, encouraged and blossomed. The genius is incomplete without the sense of social responsibility and SGU's ultimate goal remains the development of an attitude of gratitude that freely gives back without expectations. The Sanjay Ghodawat University stands as a beacon of light to guide the younger generation of the day on the right path to fulfillment in career and life. The USP of the University is its research based curriculum and academically oriented teaching staff. The world class ambience and infrastructure helps the students to easily accommodate themselves in an environment that is conducive to the teaching- learning process. Hands on experience, challenge based case studies, maximum participation of students in the classroom, use of modern digital technology, smart classrooms, solution oriented thinking promotion, stress on research and innovation, international tie ups, choice based credit system for flexibility in choosing areas of interest etc. are some of the features of the University. The university will help students develop as a unique individual-to be educated as a whole person, intellectually, emotionally, socially, ethically, and spiritually. The educational program designs are worked out meticulously in line with best in class universities with special focus on:

- Flexible Choice Based Credit System
- OBE - Outcome Based Education System
- Experiential Learning
- Project Based Learning
- Case Based Learning
- Training need analysis based on Performance Appraisal System
- Active Learning tools for effective delivery
- Mentoring / Proctorship
- On line learning /Self learning platforms
- Flipped Classroom concept
- Effective Student Feedback Mechanism



## **VISION**

Internationally recognized university of excellence in creating and disseminating knowledge through value-based quality education leading to betterment of mankind

## **MISSION**

- To prepare students for life-long learning and leadership in a global academic culture
- To create intellectual manpower relevant to the industry and society at large
- To collaborate with institutions of international repute for academic excellence
- To promote research and development through conducive environment
- To encourage entrepreneurship and skill development programs

## **CORE VALUES**

- Integrity
- Transparency
- Accountability
- Equality
- Empathy
- Stewardship

## **QUALITY POLICY**

Sanjay Ghodawat University is committed to establish high standards in value-based quality education to enhance and nurture young minds to excel in their chosen profession and develop into socially responsible citizens through resourceful collaboration, innovation and research

## OUTCOME BASED EDUCATION (OBE) MODEL

Sanjay Ghodawat University (SGU) has implemented OBE model of education, which is a learner centered approach. SGU has witnessed a sea change in the entire academic systems with implementation of all three components of OBE – Design, Delivery and Assessment. The SGU model of autonomy focuses on experiential learning which believes in learning by doing. This is achieved through hands on experience, industrial assignments, mini projects and live problem solving and collaboration with industries.

SGU is set in to dynamics of transformation and witnessing a shift in focus from teaching to learning and entire academic system of SGU is designed to provide multiple learning opportunities for students to acquire and demonstrate the Knowledge, Skills and Attitudes (KSA) for rewarding career. The Vision and Mission of the Management, contribution from eminent BOG members and knowledgeable members of Academic Council and Board of Studies, the motivation and drive of the Director, the relentless efforts of the fellow Deans and Head of Departments and all teaching and non-teaching staff along with commitment to learning of students made it possible to successfully transform the institute and stand out to carve a niche for itself as an Institute of repute.

OBE is an approach of curriculum design and teaching that focuses on what students should be able to do (attained) at the end of course/ program. Outcome based education (OBE) is student-centered instruction model that focuses on measuring student performance through outcomes. Outcomes include knowledge, skills and attitudes (KSA). Its focus remains on evaluation of outcomes of the program by stating the knowledge, skill and behavior a graduate is expected to attain upon completion of a program and after 4 – 5 years of graduation. In the OBE model, the required knowledge and skill sets for a particular degree is predetermined and the students are evaluated for all the required parameters (Outcomes) during the course of the program.

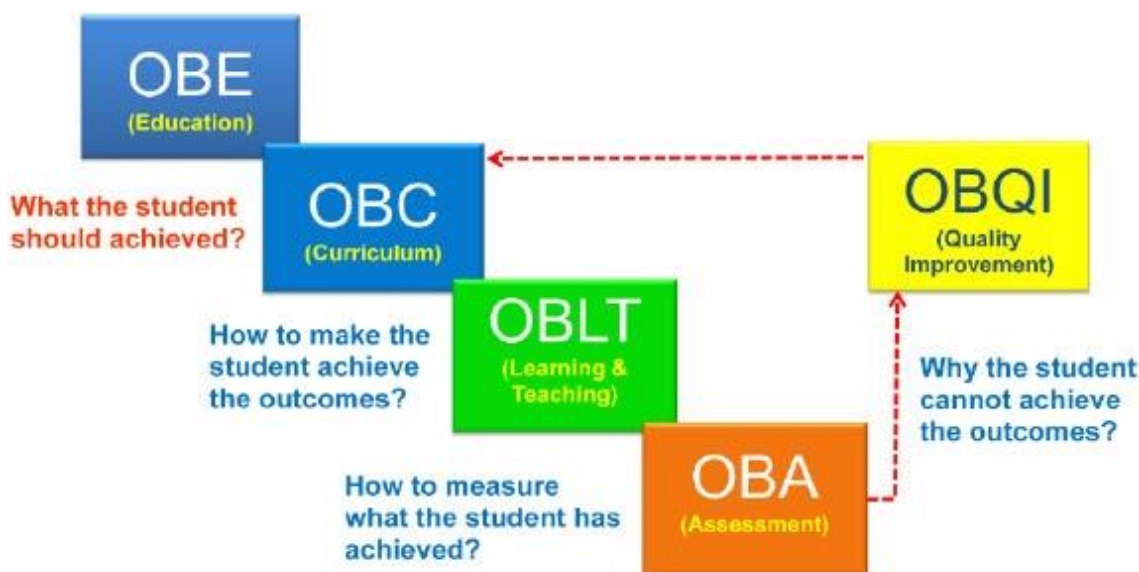
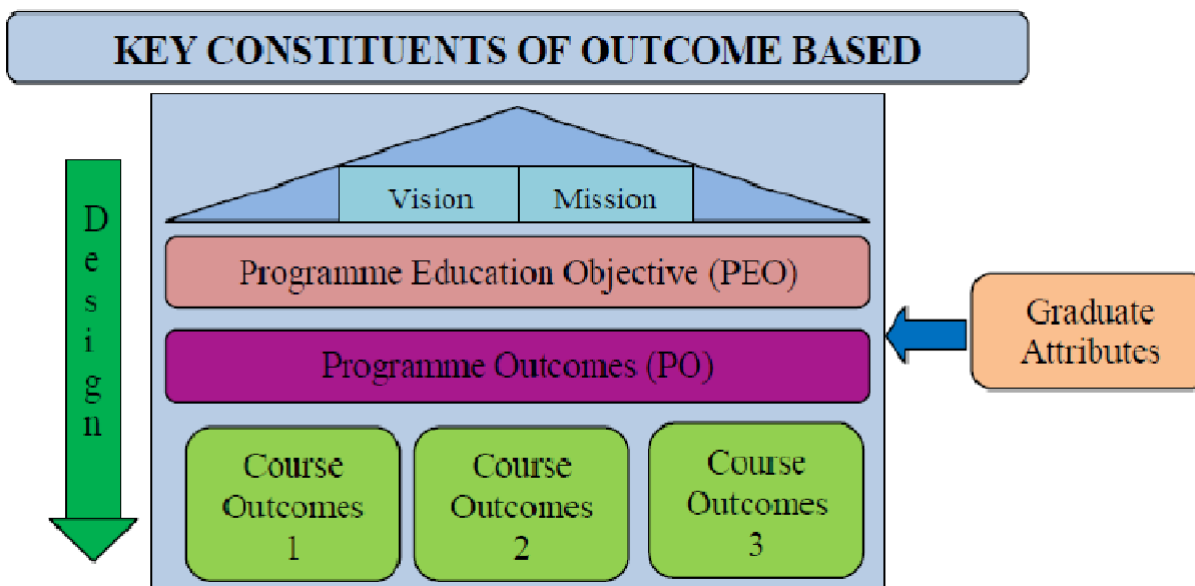


Figure 1: OBE flows and description



The OBE model measures the progress of the graduate in three parameters, which are

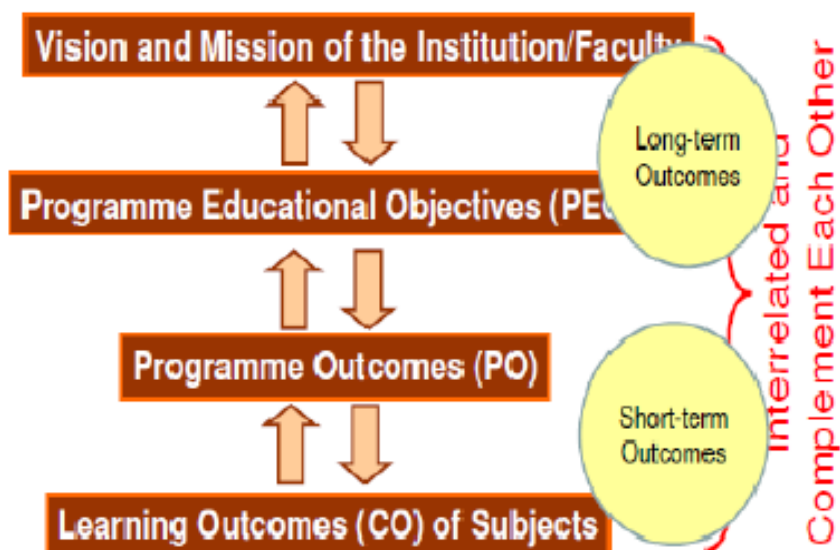
- Program Educational Objectives (PEO)
- Program Outcomes (PO)
- Course Outcomes (CO)

Program Educational Objectives (PEO) are broad statements that describe the career and professional accomplishments that the program is preparing the graduates to achieve. PEO's are measured 4-5 years after graduation. Program outcomes are narrower statements that describe what students are expected to know and be able to do by the time of graduation. They must reflect the Graduate attributes. Course outcomes are the measurable parameters which evaluates each students performance for each course that the student undertakes in every semester.

The various assessment tools for measuring Course Outcomes include Tests and End Semester Examinations, Tutorials, Assignments, Project work, Labs, Presentations, Employer/Alumni Feedback etc,. These course outcomes are mapped to Graduate attributes and Program outcomes based on relevance. This evaluation pattern helps Institutions to measure the Program Outcome. The Program Educational Objective is measure through Employer satisfaction survey (Yearly), Alumni survey (Yearly), Placement records and higher education records.

## Outcomes in OBE

### A Model Hierarchy of Outcomes



### Special Features of OBE

- OBE is an educational process that focuses on what students can do or the qualities they should develop after they are taught.
- OBE involves the restructuring of curriculum, assessment and reporting practices in education to reflect the achievement of high order learning and mastery rather than accumulation of course credits.
- Both structures and curricula are designed to achieve those capabilities or qualities.
- Discourages traditional education approaches based on direct instruction of facts and standard methods.
- It requires that the students demonstrate that they have learnt the required skills and content.





# **CHAPTER- I:**

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# **REGULATIONS**



## **1. 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.

## **2. Minimum qualification for admission**

### **2.1 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.

### **2.2 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.

## **3. 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.

## **4. Medium of instruction and examinations**

Medium of instruction and examination shall be in English.

## **5. Working days in each semester**

Each semester shall 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.

## **6. 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.



## 7.1 Credit assignment

### 7.1.1 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.

Sr. No	Component	Hours	Credit
	<b>B. Pharm (Direct)</b>		
1	Theory	1hr	1
2	Tutorial	1hr	1
3	Practical	Hr	½ per Hr
	<b>Lateral Entry</b>		
	D. Pharm		52
	Remedial Course Communication Skills (Theory and Practical) and 'Computer Applications in Pharmacy)		7

## 7.2 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
<b>Total</b>		32/34 <sup>§</sup> /36 <sup>#</sup>	4	27/29 <sup>§</sup> /30 <sup>#</sup>

# 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) course.

\* 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
<b>Total</b>		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
BP308P	Pharmaceutical Engineering (Practical)	4	-	2
<b>Total</b>		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
<b>Total</b>		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	Industrial 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	Industrial Pharmacy-I (Practical)	4	-	2
BP507P	Pharmacology-II (Practical)	4	-	2
BP508P	Pharmacognosy and Phytochemistry-II (Practical)	4	-	2
<b>Total</b>		<b>27</b>	<b>5</b>	<b>26</b>

**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
<b>Total</b>		<b>30</b>	<b>6</b>	<b>30</b>

**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-II (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
<b>Total</b>		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	Pharma Marketing Management	3 + 3 = 6	1 + 1 = 2	4 + 4 = 8
BP804ET	Pharmaceutical Regulatory Science			
BP805ET	Pharmacovigilance			
BP806ET	Quality Control and Standardization of Herbals			
BP807ET	Computer Aided Drug Design			
BP808ET	Cell and Molecular Biology			
BP809ET	Cosmetic Science			
BP810ET	Experimental Pharmacology			
BP811ET	Advanced Instrumentation Techniques			
BP812ET	Dietary Supplements and Nutraceuticals			
BP813PW	Project Work	12	-	6
<b>Total</b>		24	4	22

**Table IX: Semester wise credits distribution**

Semester	Credit Points
I	27/29 <sup>s</sup> /30 <sup>#</sup>
II	29
III	24
IV	28
V	26
VI	30
VII	24
VIII	22
Extracurricular/ Cocurricular activities	01*
Total credit points for the program	210/212 <sup>s</sup> /213 <sup>#</sup> + (01*)

\* 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 Sessional exam (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.

### **11.1 End semester examinations**

The End Semester Examinations (ESE) 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.

**Table X: SEMESTER-I**

Course Code	Course Title	L	T	P	C	Component (Marks)	Exam	WT		Passing Min. (%)
BP101T	Human Anatomy and Physiology-I (Theory)	3	1	-	4	Theory (100)	CA	10	10	50
							Sessional-1	15	15	
							Sessional-2	15		
							ESE		75	
BP102T	Pharmaceutical Analysis-I (Theory)	3	1	-	4	Theory (100)	CA	10	10	50
							Sessional-1	15	15	
							Sessional-2	15		
							ESE		75	
BP103T	Pharmaceutics-I (Theory)	3	1	-	4	Theory (100)	CA	10	10	50
							Sessional-1	15	15	
							Sessional-2	15		
							ESE		75	
BP104T	Pharmaceutical Inorganic Chemistry (Theory)	3	1	-	4	Theory (100)	CA	10	10	50
							Sessional-1	15	15	
							Sessional-2	15		
							ESE		75	
BP105T	Communication Skills – (Theory)*	2	-	-	2	Theory (50)	CA	05	05	50
							Sessional-1	10	10	
							Sessional-2	10		
							ESE		35	
BP106RBT BP106RMT	Remedial Biology (RB)/ Mathematics (RM) (Theory)*	2	-	-	2	Theory (50)	CA	05	05	50
							Sessional-1	10	10	
							Sessional-2	10		
							ESE		35	
BP107P	Human Anatomy and Physiology (Practical)	-	-	4	2	Practical (50)	CA	05	05	50
							Sessional-1	10	10	
							Sessional-2	10		
							ESE		35	
BP108P	Pharmaceutical Analysis-I (Practical)	-	-	4	2	Practical (50)	CA	05	05	50
							Sessional-1	10	10	
							Sessional-2	10		
							ESE		35	
BP109P	Pharmaceutics-I (Practical)	-	-	4	2	Practical (50)	CA	05	05	50
							Sessional-1	10	10	
							Sessional-2	10		
							ESE		35	
BP110P	Pharmaceutical Inorganic Chemistry (Practical)	-	-	4	2	Practical (50)	CA	05	05	50
							Sessional-1	10	10	
							Sessional-2	10		
							ESE		35	
BP111P	Communication Skills (Practical)*	-	-	2	1	Practical (25)	CA	05	05	50
							Sessional-1	05	05	
							Sessional-2	05		
							ESE		15	
BP112RBP	Remedial Biology (RB) (Practical)*	-	-	2	1	Practical (25)	CA	05	05	50
							Sessional-1	05	05	
							Sessional-2	05		
							ESE		15	
<b>Total hrs =32/34<sup>§</sup>/36<sup>#</sup></b>		<b>14/16</b>	<b>4</b>	<b>18/20</b>	<b>27/29<sup>§</sup>/30<sup>#</sup></b>					

\*Non University Examination (NUE). #Applicable ONLY for the students studied PCM at HSC and appearing for RB course. \$Applicable ONLY for the students studied PCB at HSC and appearing for (RM course).

**Table X: SEMESTER-II**

Course Code	Course Title	L	T	P	C	Component (Marks)	Exam	WT		Passing Min (%)
BP201T	Human Anatomy and Physiology-II (Theory)	3	1	-	4	Theory (100)	CA	10	10	50
							Sessional-1	15	15	
							Sessional-2	15		
							ESE		75	
BP202T	Pharmaceutical Organic Chemistry-I (Theory)	3	1	-	4	Theory (100)	CA	10	10	50
							Sessional-1	15	15	
							Sessional-2	15		
							ESE		75	
BP203T	Biochemistry (Theory)	3	1	-	4	Theory (100)	CA	10	10	50
							Sessional-1	15	15	
							Sessional-2	15		
							ESE		75	
BP204T	Pathophysiology (Theory)	3	1	-	4	Theory (100)	CA	10	10	50
							Sessional-1	15	15	
							Sessional-2	15		
							ESE		75	
BP205T	Computer Applications in Pharmacy (Theory)*	3	-	-	3	Theory (75)	CA	10	10	50
							Sessional-1	15	15	
							Sessional-2	15		
							ESE		50	
BP206T	Environmental Sciences (Theory)*	3	-	-	3	Theory (75)	CA	10	10	50
							Sessional-1	15	15	
							Sessional-2	15		
							ESE		50	
BP207P	Human Anatomy and Physiology-II (Practical)	-	-	4	2	Practical (50)	CA	05	05	50
							Sessional-1	10	10	
							Sessional-2	10		
							ESE		35	
BP208P	Pharmaceutical Organic Chemistry-I (Practical)	-	-	4	2	Practical (50)	CA	05	05	50
							Sessional-1	10	10	
							Sessional-2	10		
							ESE		35	
BP209P	Biochemistry (Practical)	-	-	4	2	Practical (50)	CA	05	05	50
							Sessional-1	10	10	
							Sessional-2	10		
							ESE		35	
BP210P	Computer Applications in Pharmacy (Practical)*	-	-	2	1	Practical (25)	CA	05	05	50
							Sessional-1	05	05	
							Sessional-2	05		
							ESE		15	
<b>Total hrs= 32</b>		<b>18</b>	<b>4</b>	<b>14</b>	<b>29</b>					

\*Non University Examination (NUE)



## 11.2 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**

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

**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

### 11.2.1 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***

<b>I</b>	Multiple Choice Questions (MCQs) (10 x 1) OR Objective Type Questions (5 x 2) (Answer all questions)	10 x 1 = 10  05 x 2 = 10
<b>II</b>	Long Answer Questions (Answer 1 out of 2)	01 x 10 = 10
<b>III</b>	Short Answers (Answer 2 out of 3)	02 x 05 = 10
<b>Total</b>		<b>30 marks</b>

***For subjects having Non University Examination***

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

***Question paper pattern for practical sessional examinations***

<b>I</b>	Synopsis	10
<b>II</b>	Experiments Major experiment Minor experiment	15 10
<b>III</b>	Viva voce	05
<b>Total</b>		<b>40 marks</b>

**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 secure 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 Assessment 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.

**15. Re-examination of end semester examinations**

Reexamination of end semester examination 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**

<b>For 75 marks paper</b>		
I	Multiple Choice Questions(MCQs) OR Objective Type Questions (10 x 2) (Answer all the questions)	20 x 1= 20 OR 10 x 2= 20
II	Long Answers (Answer 2 out of 3)	2 x 10 = 20
III	Short Answers (Answer 7 out of 9)	7 x 5 = 35
		<b>Total 75 marks</b>
<b>For 50 marks paper</b>		
I.	Long Answers (Answer 2 out of 3)	2 x 10 = 20
II.	Short Answers (Answer 6 out of 8)	6 x 05 = 30
		<b>Total 50 marks</b>
<b>For 35 marks paper</b>		
I.	Long Answers (Answer 1 out of 2)	1 x 10 =10
II.	Short Answers (Answer 5 out of 7)	5 x 5 = 25
		<b>Total 35 marks</b>
<b>Question paper pattern for end semester practical examinations</b>		
I.	Synopsis	5
II.	Experiments	25
III.	Viva voce	5
		<b>Total 35 marks</b>



## **16. 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**

### **17.1 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 – XIV.

**Table XIV: 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 C<sub>1</sub>, C<sub>2</sub>, C<sub>3</sub>, C<sub>4</sub> and C<sub>5</sub> and the student’s grade points in these courses are G<sub>1</sub>, G<sub>2</sub>, G<sub>3</sub>, G<sub>4</sub> and G<sub>5</sub>, respectively, and then students’ SGPA is equal to:

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

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:

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

**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:

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

where C<sub>1</sub>, C<sub>2</sub>, C<sub>3</sub>,... is the total number of credits for semester I,II,III,... and S<sub>1</sub>,S<sub>2</sub>, S<sub>3</sub>,...is





the SGPA of semester I,II,III,.... .

## **20. Declaration of class**

The class shall be awarded on the basis of CGPA as follows:

<b>First Class with Distinction</b>	=	<b>CGPA of 7.50 and above</b>
<b>First Class</b>	=	<b>CGPA of 6.00 to 7.49</b>
<b>Second Class</b>	=	<b>CGPA of 5.00 to 5.99</b>

## **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
<b>Total</b>	<b>75 Marks</b>

### ***Evaluation of Presentation:***

Presentation of work	25 Marks
Communication skills	20 Marks
Question and answer skills	30 Marks
<b>Total</b>	<b>75 Marks</b>

*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.

### **28. Audit Course:**

A student may have to register for an audit course in a D. Pharm part-I or Part-II which could be institute requirement or department requirement.

An audit course may include either a) a regular course required to be done as per structure or required as pre-requisite of any higher level course or b) the programs like practical training, industry visits, societal activities etc

Audit course shall not carry any credits but shall be reflected in Grade Card as "PP"/"NP" depending upon the satisfactory performance in the semester evaluation as per the course



curriculum structure.

## **29. Facilitation to Students:**

### **29.1 Faculty Advisor:**

On joining the institute, a student or a group of students shall be assigned to a faculty advisor who shall be mentor for a student throughout his/her tenure in the institute. A student shall be expected to consult the faculty advisor on any matter relating to his/her academic performance and the courses he/she may take in various semesters / summer term. A faculty advisor shall be the person to whom the parents/guardians should contact for performance related issues of their ward.

#### **The role of the Faculty Advisor is outlined below:**

- a) Guide the students about the rules and regulations governing the courses of study for a particular degree.
- b) Advise the students for registering courses as per curriculum given. For this purpose, the Faculty Adviser has to discuss with the student his/her academic performance during the previous semester and then decide the number and nature of the courses for which He / She can register during the semester as per the curriculum.
- c) Approve the registration of the students.
- d) Advise students to overload/ drop one or more courses/activities based on her/his academic performance as per the prescribed rules.
- e) At the end of the first semester/year, the Faculty Adviser may even advise a reduced load program for a poorly performing student.
- f) Pay special attention to weak students and carefully monitor performance of students recommended for slow track option.
- g) Advise students for Course Adjustment / Dropping of courses during the Semester within the stipulated time frame given in the Academic calendar.
- h) Advise students seeking semester drop either during the ongoing semester or before the commencement of the semester. FA has to ensure strict compliance of rules and regulations laid down for this purpose. Recommend the cases to the appropriate authorities for consideration.
- i) Make revised plan of study for weak/bright students based on their semester wise performance.
- j) Suggest modalities for course/credit requirements for the students recommended for exchange program.
- k) Guidance and liaison with parents of students for their performance.
- l) To ensure that students are not permitted to reregister for courses, which they have already passed.
- m) Inform students that any academic activity (course / Lab. / seminar / project / noncredit requirement etc.) undergone without proper registration will not be counted towards the requirements of his/her degree.



- n) Strictly warn students that if she/he fails to register during any semester without prior approval, his/her studentship is liable to be cancelled.
- o) Keep the students updated about the Academic Administration of the University.

## **29 .2. Helping Weaker Students:**

A student with backlog/s should continuously seek help from his/her faculty advisor, Head of the Department and the Dean of respective schools. Additionally, he/she must also be in constant touch with his/her parents/local guardians for keeping them informed about academic performance. The university also shall communicate to the parents/guardians of such student at-least once during each semester regarding his/her performance in various tests and examination and also about his/her attendance. It shall be expected that the parents/guardians too keep constant touch with the concerned faculty advisor or Head of the Department, and if necessary - the Dean of the respective school.

## **30. Discipline and Conduct:**

- Every student shall be required to observe discipline and decorous behavior both inside and outside the campus and not to indulge in any activity, which shall tend to bring down the prestige of the university.
- Any act of indiscipline of a student reported to the Dean, Student Development, shall be discussed in a Disciplinary Action Committee of the institute. The Committee shall enquire into the charges and recommend suitable punishment if the charges are substantiated.
- If a student while studying in the university is found indulging in anti-national activities contrary to the provisions of acts and laws enforced by Government, he/she shall be liable to be expelled from the institute without any notice.
- If a student is involved in any kind of ragging, the student shall be liable for strict action as per provisions in the Maharashtra anti-ragging act.
- If any statement/information supplied by the student in connection with his/her admission is found to be false/ incorrect at any time, his/ her admission shall be cancelled and he/she shall be expelled from the university and fees paid shall be forfeited.
- If a student is found guilty of malpractice in examinations, then he/she shall be punished as per the recommendations of the Grievance Redressal Committee (CRC) constituted by Board of Examinations.
- Every admitted student shall be issued photo identification (ID) card which must be retained by the student while he/she is registered at Sanjay Ghodawat University Kolhapur. The student must have valid ID card with him/her while in the University campus.
- Any student who alters or intentionally mutilates an ID card or who uses the ID card of another student or allows his/her ID card to be used by another, student shall be subjected to disciplinary action.
- The valid ID card must be presented for identification purpose as and when



demanded by authorities. Any student refusing to provide an ID card shall be subjected to disciplinary action.

- Students should switch off the Mobiles during the Instructional hours and in the academic areas of University building, Library, Reading room etc. Strict action will be taken if students do not adhere to this.
- During the conduct of any Tests and Examination students must not bring their mobiles. A student in possession of the mobile whether in use or switched off condition will face disciplinary action and will be debarred from appearing for the Test / Examination.

### **31. Academic Calendar**

The academic activities of the institute are regulated by Academic Calendar and are made available to the student's/ faculty members and all other concerned in electronic form or hard copy. It shall be mandatory for students / faculty to strictly adhere to the academic calendar for completion of academic activities.



## **CHAPTER - II:**

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## **SYLLABUS**



# Semester I

Course code	Name of the course	No. of hrs	Tutorial	Internal		ESE	Credit points
				CA	SE		
<b>BP101T</b>	Human Anatomy and Physiology I-(T)	3	1	10	15	75	<b>4</b>
<b>BP102T</b>	Pharmaceutical Analysis I – (T)	3	1	10	15	75	<b>4</b>
<b>BP103T</b>	Pharmaceutics I – (T)	3	1	10	15	75	<b>4</b>
<b>BP104T</b>	Pharmaceutical Inorganic Chemistry –(T)	3	1	10	15	75	<b>4</b>
<b>BP105T</b>	Communication Skills – (T)*	2	-	5	10	35	<b>2</b>
<b>BP106RBT</b> <b>BP106RMT</b>	Remedial Biology/ Remedial Mathematics – (T)*	2	-	5	10	35	<b>2</b>
<b>BP107P</b>	Human Anatomy and Physiology –(P)	4	-	5	10	35	<b>2</b>
<b>BP108P</b>	Pharmaceutical Analysis I –(P)	4	-	5	10	35	<b>2</b>
<b>BP109P</b>	Pharmaceutics I –(P)	4	-	5	10	35	<b>2</b>
<b>BP110P</b>	Pharmaceutical Inorganic Chemistry –(P)	4	-	5	10	35	<b>2</b>
<b>BP111P</b>	Communication Skills –(P)*	2	-	5	5	15	<b>1</b>
<b>BP112RBP</b>	Remedial Biology – (P)*	2	-	5	5	15	<b>1</b>
<b>Total</b>		32/ 34 <sup>§</sup> / 36 <sup>#</sup>	4	70/ 75 <sup>§</sup> / 80 <sup>#</sup>	115/ 125 <sup>§</sup> / 130 <sup>#</sup>	490/ 525 <sup>§</sup> / 540 <sup>#</sup>	<b>27/29<sup>§</sup>/ 30<sup>#</sup></b>
				<b>675/ 725<sup>§</sup>/ 750<sup>#</sup></b>			

\* Non University Examination (NUE).

# Applicable ONLY for the students studied PCM at HSC and appearing for RB course.

§ Applicable ONLY for the students studied PCB at HSC and appearing for RM course.



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

**45 Hours**

Course Code	Course Title	L	T	P	C	Component	Exam	WT		Passing Min. (%)
BP101T	Human Anatomy and Physiology- I (Theory)	3	1	-	4	Theory (100 marks)	CA	10	10	50
							Sessional-1	15	15	
							Sessional-2	15		
							ESE		75	

**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

- CLO1. Illustrate<sup>3</sup>** cellular and tissue levels of organization of human body.
- CLO2. Explain<sup>2</sup>** gross morphology, structure, physiology and functions of various organs and systems of the human body.
- CLO3. Illustrate<sup>3</sup>** various body fluids, their compositions, functions and disorders associated with it.
- CLO4. Draw<sup>5</sup>** anatomical structures of various organs and flow diagrams of physiological and homeostasis mechanisms of body systems.
- CLO5. Describe<sup>2</sup>** various physiological and homeostatic mechanisms and their imbalances.

**Course Content:**

UNIT	Description	Hrs
<b>I</b>	<b>Introduction to human body:</b> Definition and scope of anatomy and physiology, levels of structural organization and body systems, basic life processes, homeostasis, basic anatomical terminology. <b>Cellular level of organization:</b> 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, Introduction to receptors. <b>Tissue level of organization:</b> Classification of tissues, structure, location and functions of epithelial, muscular and nervous and connective tissues.	10
<b>II</b>	<b>Integumentary system:</b> Structure and functions of skin <b>Skeletal system:</b> 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 <b>Joints:</b> Structural and functional classification, types of joints movements and	10





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	its articulation	
<b>III</b>	<b>Body fluids and blood:</b> 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. <b>Lymphatic system:</b> Lymphatic organs and tissues, lymphatic vessels, lymph circulation and functions of lymphatic system.	10
<b>IV</b>	<b>Peripheral nervous system:</b> Classification of peripheral nervous system, Structure and functions of sympathetic and parasympathetic nervous system. Origin and functions of spinal and cranial nerves. <b>Special senses:</b> Structure and functions of eye, ear, nose and tongue and their disorders.	08
<b>V</b>	<b>Cardiovascular system:</b> 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.	07

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#### Recommended Books (Latest Editions)

1. Guyton AC, Hall JE. **Textbook of medical physiology**. Philadelphia: Elsevier Saunders.
2. Tortora GJ, Derrickson BH. **Principles of anatomy and physiology**. Singapore: John Wiley & Sons (Asia) Pte Ltd
3. Waugh A. Grant A. **Ross and Wilson's Anatomy and physiology in health and illness**. New York: Churchill Livingstone (Elsevier).
4. Tandon OP, Tripathi Y, Editors. **Best and Taylor's Physiological basis of medical practice**. New Delhi: Wolters Kluwer Helth (India), Lippincott Williams and Wilkins, Co
5. Sembulingam K, Sembulingam P. **Essentials of medical physiology**. New Delhi: Jaypee Brothers Medical Publishers (P) Ltd,

#### Reference Books (Latest Editions)

1. Guyton AC, Hall JE. **Textbook of medical physiology**. Philadelphia: Elsevier Saunders.
2. Tandon OP, Tripathi Y, Editors. **Best and Taylor's Physiological basis of medical practice**. New Delhi: Wolters Kluwer Helth (India), Lippincott Williams and Wilkins, Co
3. John NA, editor. **CC Chatterrje's Human physiology (Vol 1 and 2)**. New Delhi. CBS Publishers and Distributors Pvt Ltd.

#### Recommended Journals:

1. **Physiological reviews**. American Physiological Society publication.
2. **The Journal of Physiology**. The physiological society. London
3. **Indian journal of physiology and pharmacology**. Official publication of Association of Physiologists and Pharmacologists of India



**BP107P. HUMAN ANATOMY AND PHYSIOLOGY-I (Practical)**

**4 Hours / week**

Course Code	Course Title	L	T	P	C	Component	Exam	WT		Passing Min. (%)
BP107P	Human Anatomy and Physiology-I  (Practical)	-	-	4	2	Practical (50 Marks)	CA	05	05	50
							Sessional-1	10	10	
							Sessional-2	10		
							ESE		35	

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.

**Objectives:**

Upon completion of this course the student should be able to

**CLO1. Illustrate<sup>3</sup>** components of microscope, and composition, function, mechanism of various fluids used for microscopic examinations of cell and tissue.

**CLO2. Identify<sup>1</sup>** various tissues and organs of different systems of human body.

**CLO3. Estimate<sup>6</sup>** RBC, WBC, ESR and levels of Hb.

**CLO4. Determine<sup>5</sup>** bleeding time, clotting time, blood group, HR, Pulse rate, and BP

No.	Description
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.	Introduction to hemocytometry
7.	Enumeration of white blood cell (WBC) count
8.	Enumeration of total red blood corpuscles (RBC) count
9.	Determination of bleeding time
10.	Determination of clotting time
11.	Estimation of hemoglobin content
12.	Determination of blood group
13.	Determination of erythrocyte sedimentation rate (ESR)
14.	Determination of heart rate and pulse rate
15.	Recording of blood pressure



### **Recommended Books (Latest Editions)**

1. Tortora GJ, Derrickson BH. **Principles of Anatomy and Physiology**. Singapore: John Wiley & Sons (Asia) Pte Ltd
2. Singh I. **Textbook of human histology**. New Delhi: Jaypee Brothers Medical Publishers Pvt Ltd.
3. Varshney VP, Bedi M, editors. Ghai's **Textbook of practical physiology**. New Delhi: Jaypee brothers medical publishers (P) Ltd.
4. Sri Nageswari K, Sharma R. **Practical workbook of human physiology**. New Delhi: Jaypee brothers medical publishers (P) Ltd.

### **Reference Books (Latest Editions)**

1. Guyton AC, Hall JE. **Textbook of medical physiology**. Philadelphia: Elsevier Saunders.
2. Tandon OP, Tripathi Y, Editors. **Best and Taylor's Physiological basis of medical practice**. New Delhi: Wolters Kluwer Helth (India), Lippincott Williams and Wilkins,Co
3. John NA, editor. **CC Chatterrje's Human Physiology (Vol 1 and 2)**. New Delhi. CBS Publishers and Distributors Pvt Ltd.

### **Recommended Journals:**

1. **Physiological reviews**. American Physiological Society publication.
2. **The Journal of Physiology**. The physiological society. London
3. **Indian journal of physiology and pharmacology**. Official publication of Association of Physiologists and Pharmacologists of India

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

Course Code	Course Title	L	T	P	C	Component	Exam	WT		Passing Min. (%)
BP102T	Pharmaceutical Analysis-I (Theory)	3	1	-	4	Theory (100 marks)	CA	10	10	50
							Sessional-1	15	15	
							Sessional-2	15		
							ESE		75	

**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

**CLO1. Define<sup>1</sup>** and **classify** the types, techniques and errors in pharmaceutical analysis.

**CLO2. Describe<sup>2</sup>** principles, types, methods and application of volumetric analysis.

**CLO3. Illustrate<sup>3</sup>** principles, types, methods, instruments and applications of electrochemical analysis.

**CLO4. Draw<sup>5</sup>** flow charts and ray diagrams of analytical methods and instruments used for analysis.

**Course Content**

UNIT	Description	Hrs
<b>I</b>	<b>1) Pharmaceutical analysis-</b> Definition and scope i. Different techniques of analysis ii. Methods of expressing concentration iii. Primary and secondary standards. iv. 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>2) Errors:</b> Sources of errors, types of errors, methods of minimizing errors, accuracy, precision and significant figures. <b>3) Pharmacopoeia,</b> Sources of impurities in medicinal agents, limit tests.	10
<b>II</b>	<b>1) Acid base titration:</b> 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 <b>2) Non aqueous titration:</b> Solvents, acidimetry and alkalimetry titration and estimation of Sodium benzoate and Ephedrine HCl	10
<b>III</b>	<b>1) Precipitation titrations:</b> Mohr's method, Volhard's, Modified Volhard's,	10



Fajans method, estimation of sodium chloride.

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

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

4) Basic Principles, methods and application of diazotisation titration.

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**IV 1) Redox titrations 08**

a) Concepts of oxidation and reduction

b) Types of redox titrations (Principles and applications)

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

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**V 1) Electrochemical methods of analysis 07**

i. **Conductometry-** Introduction, conductivity cell, conductometric titrations, applications.

ii. **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.

iii. **Polarography** - Principle, Ilkovic equation, construction and working of dropping mercury electrode and rotating platinum electrode, applications

iv. **Refractometry:** Introduction, Principle and application

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**Recommended Books: (Latest Editions)**

1. Beckett AH, Stenlakes JB. **Practical pharmaceutical chemistry Vol I & II**, London: Stahlone Press of University.
2. Svehla G, Sivasankar B. **Vogel's Qualitative inorganic analysis**. Noida: Pearson Education.
3. Rao PG. **Pharmaceutical and medicinal inorganic chemistry**. New Delhi: Vallabh prakashan
4. Atherden LM. **Bentley and Driver's, Textbook of pharmaceutical chemistry**. Mumbai: Oxford University Press.
5. Kennedy JH. **Analytical chemistry principles**. San Diego: Harcourt Brace Jovanovich.
6. Anonymus. **Indian pharmacopoeia**. Ghaziabad: Indian Pharmacopoeia Commission Ministry of Health & Family Welfare, Govt. of India.

**BP108P. PHARMACEUTICAL ANALYSIS-I (Practical)****4 Hours / Week**

Course Code	Course Title	L	T	P	C	Component	Exam	WT		Min. Passing (%)
BP108P	Pharmaceutical Analysis-I (Practical)	-	-	4	2	Practical (50 marks)	CA	05	05	50
							Sessional-1	10	10	
							Sessional-2	10		
							ESE		35	

**Scope:**

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

**Objectives:**

Upon completion of the course student shall be able to

**CLO1. Describe<sup>2</sup>** good laboratory practice and principles of analytical methods.

**CLO2. Draw<sup>5</sup>** flow charts and ray diagrams of analytical methods and instruments used for analysis.

**CLO3. Perform<sup>3</sup>** limit tests, preparation and standardization of selected compounds.

**CLO4. Estimate<sup>6</sup>** presence and quantity of selected chemicals using various assay methods.

**CLO5. Determine<sup>5</sup>** normality by electrochemical analytical method.

No.	Description
1.	<b>Good laboratory Practices</b>
2.	<b>Limit Test of the following:</b> 1) Chloride, 2) Sulphate, 3) Iron, 4) Arsenic
3.	<b>Preparation and standardization of:</b> 1) Sodium hydroxide, 2) Sulphuric acid, 3) Sodium thiosulfate, 4) Potassium permanganate, 5) Ceric ammonium sulphate
4.	<b>Assay of the following compounds along with Standardization of Titrant:</b> 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
5.	<b>Determination of Normality by electro-analytical methods</b> 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 4) Refractometry analysis

**Recommended Books: (Latest Editions)**

1. Beckett AH, Stenlakes JB. **Practical pharmaceutical chemistry Vol I & II**, London: Stahlone Press of University.
2. Anonymus. **Indian pharmacopoeia**. Ghaziabad: Indian Pharmacopoeia Commission.

**BP103T. PHARMACEUTICS-I (Theory)****45 Hours**

Course Code	Course Title	L	T	P	C	Component	Exam	WT		Passing Min. (%)
BP103T	Pharmaceutics-I (Theory)	3	1	-	4	Theory (100 Marks)	CA	10	10	50
							Sessional-1	15	15	
							Sessional-2	15		
							ESE		75	

**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:

- CLO1. Know<sup>1</sup>** the history of profession of pharmacy
- CLO2. Describe<sup>2</sup>** basics of prescription, pharmaceutical incompatibilities and pharmaceutical calculations.
- CLO3. Illustrate<sup>3</sup>** principles, types, composition and preparation methods of solid, semisolid and liquid dosage form.
- CLO4. Summarise<sup>5</sup>** advantages and disadvantages of various dosage forms

**Course Content:**

UNIT	Description	Hrs
<b>I</b>	<b>Historical background and development of profession of pharmacy:</b> 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. <b>Dosage forms:</b> Introduction to dosage forms, classification and definitions <b>Prescription:</b> Definition, Parts of prescription, handling of Prescription and Errors in prescription. <b>Posology:</b> Definition, Factors affecting posology. Pediatric dose calculations based on age, body weight and body surface area	10
<b>II</b>	<b>Pharmaceutical calculations:</b> Weights and measures – Imperial & Metric system, Calculations involving percentage solutions, alligation, proof spirit and isotonic solutions based on freezing point and molecular weight. <b>Powders:</b> Definition, classification, advantages and disadvantages, Simple & compound powders – official preparations, dusting powders, effervescent, efflorescent and hygroscopic powders, eutectic mixtures. Geometric dilutions. <b>Liquid dosage forms:</b> Advantages and disadvantages of liquid dosage forms. Excipients used in formulation of liquid dosage forms. Solubility enhancement techniques	10
<b>III</b>	<b>Monophasic liquids:</b> Definitions and preparations of Gargles, Mouthwashes, Throat Paint, Eardrops, Nasal drops, Enemas, Syrups, Elixirs, Liniments and	10



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Lotions.

**Biphasic liquids:**

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

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

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- IV Suppositories:** Definition, types, advantages and disadvantages, types of bases, methods of preparations. Displacement value & its calculations, evaluation of suppositories. 08

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

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- V 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. 07

**Layout of production of various dosage forms.**

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**Recommended Books: (Latest Editions)**

1. Allen LV, Popovich NG, Ansel HC. **Ansel's pharmaceutical dosage form and drug delivery system.** Philadelphia: Wolter Kluwer Health, Lippincott Williams and Walkins.
2. Carter SJ. **Cooper and Gunn's- dispensing for pharmaceutical students.** New Delhi: CBS publishers.
3. Aulton ME. **Pharmaceutics: the science & dosage form design.** Edinburgh: Churchill Livingstone.
4. Anonymus. **Indian pharmacopoeia.** Ghaziabad: Indian Pharmacopoeia Commission Ministry of Health & Family Welfare, Govt. of India
5. Anonymus. **British pharmacopoeia.** UK: The British Pharmacopoeia Commission (BPC), The Department of Health and Social Care.
6. Lachman L, Lieberman HA, Kanig J L. **Theory and Practice of Industrial Pharmacy.** Philadelphia: Lea & Febiger.
7. Troy DB, Remington JP. **The science and practice of pharmacy.** Philadelphia: Lippincott Williams.
8. Carter SJ. **Cooper and Gunn's Tutorial pharmacy.** New Delhi: CBS Publications.
9. Rawlins .EA. **Bentley's Text book of pharmaceutics.** USA: Elsevier Health Sciences.
10. Sellassie IG. **Pharmaceutical pelletization technology.** New York: Marcel Dekker, INC
11. Parikh DM. **Handbook of pharmaceutical granulation technology.** New York: Marcel Dekker, INC.
12. Nieloud F, Marti-Mestres G. **Pharmaceutical emulsions and suspensions.** New York: Marcel Dekker, INC,



**BP109P. PHARMACEUTICS-I (Practical)****4 Hours / week**

Course Code	Course Title	L	T	P	C	Component	Exam	WT		Passing Min. (%)
BP109P	Pharmaceutics-I (Practical)	-	-	4	2	Practical (50 Marks)	CA	05	05	50
							Sessional-1	10	10	
							Sessional-2	10		
							ESE		35	

**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:

**CLO1. Prepare<sup>4</sup>** various monophasic dosage forms.

**CLO2. Prepare<sup>4</sup>** various biphasic dosage forms.

**CLO3. Prepare<sup>4</sup>** various solid and semisolid dosage forms.

**CLO4. Determine<sup>5</sup>** the quantity of ingredient required for various dosage forms

No.	Description
1.	<b>Syrups:</b> 1) Syrup IP'66, 2) Compound syrup of Ferrous Phosphate BPC'68
2.	<b>Elixirs:</b> 1) Piperazine citrate elixir, 2) Paracetamol pediatric elixir/syrup
3.	<b>Linctus:</b> 1) Terpin Hydrate Linctus IP'66, 2) Iodine Throat Paint (Mandles Paint)
4.	<b>Solutions:</b> 1) Strong solution of ammonium acetate, 2) Cresol with soap solution/ Chloroxylenol soap solution, 3) Lugol's solution,
5.	<b>Suspensions:</b> 1) Calamine lotion, 2) Magnesium Hydroxide mixture, 3) Aluminium Hydroxide gel
6.	<b>Emulsions:</b> 1) Turpentine Liniment, 2) Liquid paraffin emulsion
7.	<b>Powders and Granules:</b> 1) ORS powder (WHO), 2) Effervescent granules, 3) Dusting powder, 4) Divided powders
8.	<b>Suppositories:</b> 1) Glycero gelatin suppository, 2) Cocoa butter suppository 3) Zinc Oxide suppository, Artemether suppository,
9.	<b>Semisolids:</b> 1) Sulphur ointment, 2) Non staining-iodine ointment with methyl salicylate, 3) Carbopal gel Diclofenac gel (Carbopol based), Emulgel, Ointment containing each base type
10.	<b>Gargles and Mouthwashes:</b> 1) Iodine gargle, 2) Chlorhexidine mouthwash

**Recommended Books: (Latest Editions)**

1. Anonymus. **Indian pharmacopoeia.** Ghaziabad: Indian Pharmacopoeia Commission Ministry of Health & Family Welfare, Govt. of India
2. Anonymus. **British pharmacopoeia.** UK: The British Pharmacopoeia Commission (BPC), The Department of Health and Social Care.
3. Carter SJ. **Cooper and Gunn's Tutorial pharmacy.** New Delhi: CBS Publications.
4. Rawlins .EA. **Bentley's Text book of pharmaceutics.** USA: Elsevier Health Sciences.
5. Nieloud F, Marti-Mestres G. **Pharmaceutical emulsions and suspensions.** New York: Marcel Dekker, INC.,

**BP104T. PHARMACEUTICAL INORGANIC CHEMISTRY (Theory)****45 Hours**

Course Code	Course Title	L	T	P	C	Component	Exam	WT		Passing Min. (%)
BP104T	Pharmaceutical Inorganic Chemistry (Theory)	3	1	-	4	Theory (100 marks)	CA	10	10	50
							Sessional-1	15	15	
							Sessional-2	15		
							ESE		75	

**Scope:**

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

**Objectives:**

Upon completion of course student shall be able to

- CLO1. Describe<sup>2</sup>** the sources type of impurities and methods to determine the impurities in inorganic drugs and pharmaceuticals
- CLO2. Illustrate<sup>3</sup>** the buffers system, electrolytes and its physiological and therapeutic importance.
- CLO3. Summarize<sup>5</sup>** therapeutic and pharmaceutical importance of inorganic compounds.
- CLO4. Appraise<sup>4</sup>** the importance and application of radiopharmaceuticals.

**Course Content:**

UNIT	Description	Hours
<b>I</b>	<p><b>Impurities in pharmaceutical substances:</b> 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</p> <p><b>General methods of preparation,</b> assay for the compounds superscripted with asterisk (*), properties and medicinal uses of inorganic compounds belonging to the following classes.</p>	10
<b>II</b>	<p><b>Acids, Bases and Buffers:</b> 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.</p> <p><b>Major extra and intracellular electrolytes:</b> Functions of major physiological ions, Electrolytes used in the replacement therapy: Sodium chloride*, Potassium chloride, Calcium gluconate* and Oral Rehydration Salt (ORS), Physiological acid base balance.</p> <p><b>Dental products:</b> Dentifrices, role of fluoride in the treatment of dental caries, Desensitizing agents, Calcium carbonate, Sodium fluoride, and Zinc eugenol cement, Calcium pyrophosphate. .</p>	10



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**III Gastrointestinal agents** 10

**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

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**IV Miscellaneous compounds** 08

Expectorants: Potassium iodide, Ammonium chloride\*. Emetics: Copper sulphate\*, Sodium potassium tartarate Haematinics: Ferrous sulphate\*, Ferrous gluconate

**Poison and Antidote:** Sodium thiosulphate\*, Activated charcoal, Sodium nitrite<sup>333</sup>

**Astringents:** Zinc Sulphate, Potash Alum

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**V Radiopharmaceuticals:** Radio activity, Measurement of radioactivity, Properties of  $\alpha$ ,  $\beta$ ,  $\gamma$  radiations, Half life, radio isotopes and study of radio isotopes - Sodium iodide I131, Storage conditions, precautions & pharmaceutical application of radioactive substances 07

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**Recommended Books (Latest Editions)**

1. Beckett AH, Stenlakes JB. **Practical pharmaceutical chemistry Vol I & II**, London: Stahlone Press of University.
2. Svehla G, **Vogel's Text book of quantitative inorganic analysis**. Pearson publisher, South Asia.
3. Rao GP. **Inorganic Pharmaceutical Chemistry**. New Delhi: Vallabh Prakashan.
4. Schroff ML. **Pharmaceutical Chemistry Part-II: Inorganic**. Calcutta: National Book centre.
5. Atherden LM. **Bentley and Driver's., Textbook of pharmaceutical chemistry**. Mumbai: Oxford University Press.
6. Chatwal GR. **Pharmaceutical Chemistry –Inorganic**. Mumbai: Himalaya publishing house.
7. Anonymus. **Indian pharmacopoeia**. Ghaziabad: Indian Pharmacopoeia Commission Ministry of Health & Family Welfare, Govt. of India

**BP110P. PHARMACEUTICAL INORGANIC CHEMISTRY (Practical)****4 Hours / Week**

Course Code	Course Title	L	T	P	C	Component	Exam	WT		Passing Min. (%)
BP110P	Pharmaceutical Inorganic Chemistry (Practical)	-	-	4	2	Practical (50 Makrs)	CA	05	05	50
							Sessional-1	10	10	
							Sessional-2	10		
							ESE		35	

**Scope:**

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

**Objectives:**

Upon completion of course student shall be able to

**CLO1. Illustrate<sup>3</sup>** the principle and use of equipments, glasswares used in practical inorganic chemistry and follow the safety rules.

**CLO2. Estimate<sup>6</sup>** the presence and/or quantity of inorganic substances by performing limit tests and assay.

**CLO3. Evaluate<sup>6</sup>** the purity of inorganic pharmaceuticals.

**CLO4. Prepare<sup>5</sup>** the inorganic pharmaceuticals.

No.	Description
1.	<b>Introduction to equipments and glasswares, used in inorganic chemistry practicals.</b> <b>Hazards and safety</b> <b>Limit tests for following ions:</b> 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.
2.	<b>Identification test and assay:</b> Magnesium hydroxide, Ferrous sulphate, Sodium bicarbonate, Calcium gluconate, Copper sulphate
3.	<b>Test for purity:</b> Swelling power of Bentonite, Neutralizing capacity of aluminum hydroxide gel, Determination of potassium iodate and iodine in potassium Iodide
4.	<b>Preparation of inorganic pharmaceuticals:</b> Boric acid, Potash alum, Ferrous sulphate

**Recommended Books (Latest Editions)**

1. Svehla G, **Vogel's Text book of quantitative inorganic analysis.** Pearson publisher, South Asia.
2. Chatwal GR. **Pharmaceutical Chemistry –Inorganic.** Mumbai: Himalaya publishing house.
3. Anonymus. **Indian pharmacopoeia.** Ghaziabad: Indian Pharmacopoeia Commission Ministry of Health & Family Welfare, Govt. of India



**BP105T. COMMUNICATION SKILLS (Theory)**

**30 Hours**

Course Code	Course Title	L	T	P	C	Component	Exam	WT		Passing Min. (%)
BP105T	Communication Skills (Theory)*	2	-	-	2	Theory (50 Marks)	CA	05	05	50
							Sessional-1	10	10	
							Sessional-2	10		
							ESE		35	

**Scope:**

This course will prepare the 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

- CLO1. Appraise<sup>5</sup>** the behavioral needs for a Pharmacist to function effectively in the areas of pharmaceutical operation
- CLO2. Communicate<sup>2</sup>** effectively (Verbal and NonVerbal)
- CLO3. Perform<sup>3</sup>** effectively as team leader and team player
- CLO4. Develop<sup>6</sup>** interview skills
- CLO5. Develop<sup>6</sup>** leadership qualities and essentials

**Course content:**

UNIT	Description	Hours
I	<p><b>Communication Skills:</b> Introduction, Definition, The Importance of Communication, The Communication Process – Source, Message, Encoding, Channel, Decoding, Receiver, Feedback, Context</p> <p><b>Barriers to communication:</b> Physiological Barriers, Physical Barriers, Cultural Barriers, Language Barriers, Gender Barriers, Interpersonal Barriers, Psychological Barriers, Emotional barriers</p> <p><b>Perspectives in Communication:</b> Introduction, Visual Perception, Language, Other factors affecting our perspective - Past Experiences, Prejudices, Feelings, Environment</p>	07
II	<p><b>Elements of Communication:</b> Introduction, Face to Face Communication - Tone of Voice, Body Language (Non-verbal communication), Verbal Communication, Physical Communication</p> <p><b>Communication Styles:</b> Introduction, The Communication Styles Matrix with example for each -Direct Communication Style, Spirited</p>	07



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	Communication Style, Systematic Communication Style, Considerate Communication Style	
<b>III</b>	<b>Basic Listening Skills:</b> Introduction, Self-Awareness, Active Listening, Becoming an Active Listener, Listening in Difficult Situations <b>Effective Written Communication:</b> Introduction, When and When Not to Use Written Communication - Complexity of the Topic, Amount of Discussion Required, Shades of Meaning, Formal Communication <b>Writing Effectively:</b> Subject Lines, Put the Main Point First, Know Your Audience, Organization of the Message	07
<b>IV</b>	<b>Interview Skills:</b> Purpose of an interview, Do's and Dont's of an interview <b>Giving Presentations:</b> Dealing with Fears, Planning your Presentation, Structuring Your Presentation, Delivering Your Presentation, Techniques of Delivery	05
<b>V</b>	<b>Group Discussion:</b> Introduction, Communication skills in group discussion, Do's and Dont's of group discussion. Professional Conflict resolution.	04

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**Recommended Books: (Latest Edition)**

1. Ruther AJ. **Basic communication skills for Technology**, Delhi: Pearson Education.
2. Sanjay Kumar, Pushpa Lata. **Communication skills**. New Delhi: Oxford University Press.
3. Robbins SP, Judge TA, Vohra N. **Organizational Behaviour**. Delhi: Pearson Education
4. Hasson G. **Brilliant communication skills**. Pearson Life
5. Dalley D, Burton L, Greenhall M. **Developing Your Influencing Skills: How to Influence People by Increasing Your Credibility, Trustworthiness and Communication Skills** Universe of Learning LTD.
6. Nira K. **Communication skills for professionals**. New Delhi: PHI Learning Private Limited
7. Butterfield J. **Soft skill for everyone**. Noida: Cengage Learning India Private Limited
8. Francis Peters SJ. **Soft skills and professional communication**. Noida: McGraw-Hill Education
9. Adair J. **Effective communication**. Sydney: Pan Macmillan
10. Daniels AC. **Bringing out the best in people**. Noida: McGraw-Hill Education.



**BP111P. COMMUNICATION SKILLS (Practical)**

**2 Hours / week**

Course Code	Course Title	L	T	P	C	Component	Exam	WT		Passing Min. (%)
BP111P	Communication Skills (Practical)*	-	-	2	1	Practical (25 Marks)	CA	05	05	50
							Sessional-1	05	05	
							Sessional-2	05		
							ESE		15	

**Objectives:**

Upon completion of the course the student shall be able to

**CLO1. Communicate<sup>2</sup>** effectively using verbal and nonverbal modes.

**CLO2. Illustrate<sup>3</sup>** and use the different types of pronunciation.

**CLO3. Comprehend<sup>2</sup>** listening and writing.

The following learning modules are to be conducted using wordsworth<sup>®</sup> English language lab software

No.	Description
1.	<b>Basic communication covering the following topics:</b> Meeting People, Asking Questions, Making Friends, What did you do? Do's and Don't's
2.	<b>Pronunciations covering the following topics:</b> Pronunciation (Consonant Sounds) Pronunciation and Nouns Pronunciation (Vowel Sounds)
3.	<b>Advanced Learning:</b> Listening Comprehension / Direct and Indirect Speech Figures of Speech, Effective Communication, Writing Skills, Effective Writing, Interview Handling Skills, E-Mail etiquette, Presentation Skills. <b>Personality development</b>

**Recommended Books: (Latest Edition)**

1. Robbins SP, Judge TA, Vohra N. **Organizational Behaviour**. Delhi: Pearson Education
2. Hasson G. **Brilliant communication skills**. Pearson Life
3. Ramesh G., Ramesh M. **The Ace of Soft Skills: Attitude, Communication and Etiquette for success**. Delhi: Pearson Education
4. Dalley D, Burton L, Greenhall M. **Developing Your Influencing Skills: How to Influence People by Increasing Your Credibility, Trustworthiness and Communication Skills** Universe of Learning LTD.
5. Nira K. **Communication skills for professionals**. New Delhi: PHI Learning Private Limited.
6. Mitra BK. **Personality development and soft skills**. New Delhi: Oxford University Press



**BP106RBT. REMEDIAL BIOLOGY (Theory)**

**30 Hours**

Course Code	Course Title	L	T	P	C	Component	Exam	WT		Passing Min. (%)
BP106RBT	Remedial Biology (Theory)	2	-	-	2	Theory (50 marks)	CA	05	05	50
							Sessional-1	10	10	
							Sessional-2	10		
							ESE		35	

**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

- CLO1. Classify<sup>2</sup>** five kingdoms of life and explain its salient features.
- CLO2. Describe<sup>2</sup>** basic components of anatomy & physiology of plant.
- CLO3. Discuss<sup>2</sup>** basic components of anatomy & physiology of animal with special reference to human.
- CLO4. Illustrate<sup>3</sup>** the anatomy and physiology of chemical and neurological controls and regulation in human body

**Course content:**

UNIT	Description	Hrs
<b>I</b>	<p><b>Living world:</b> 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,</p> <p><b>Morphology of Flowering plants:</b> Morphology of different parts of flowering plants – Root, stem, inflorescence, flower, leaf, fruit, seed.</p> <p>General Anatomy of Root, stem, leaf of monocotyledons &amp; Dicotyledones</p>	07
<b>II</b>	<p><b>Body fluids and circulation:</b> 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</p> <p><b>Digestion and Absorption:</b> Human alimentary canal and digestive glands. Role of digestive enzymes. Digestion, absorption and assimilation of digested food.</p> <p><b>Breathing and respiration:</b> Human respiratory system. Mechanism of</p>	07





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breathing and its regulation. Exchange of gases, transport of gases and regulation of respiration. Respiratory volumes

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**III Excretory products and their elimination:** Modes of excretion. Human excretory system- structure and function. Urine formation. Renin angiotensin system 07

**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

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**IV Plants and mineral nutrition:** Essential mineral, macro and micronutrients. Nitrogen metabolism, Nitrogen cycle, biological nitrogen fixation 05

**Photosynthesis:** Autotrophic nutrition, photosynthesis, Photosynthetic pigments, Factors affecting photosynthesis

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**V Plant respiration:** Respiration, glycolysis, fermentation (anaerobic). 04

**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

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#### **Text Books**

- 1) A Text book of Biology by S.B Gokhale
- 2) A Text book of Biology by Dr. Thulajappa and Dr. Seetaram.

#### **Reference Books**

- 1) A Text book of Biology by B.V. Sreenivasa Naidu
- 2) A Text book of Biology by Naidu and Murthy
- 3) Botany for Degree students By A.C.Dutta.
- 4) Outlines of Zoology by M. Ekambaranatha ayyer and T. N. Ananthakrishnan.
- 5) A manual for pharmaceutical biology practical by S.B. Gokhale and C. K. Kokate

**BP112RBP.REMEDIAL BIOLOGY (Practical)****2 Hours/ week**

Course Code	Course Title	L	T	P	C	Component	Exam	WT		Passing Min. (%)
BP112RBP	Remedial Biology (Practical)*	-	-	2	1	Practical (25 Marks)	CA	05	05	50
							Sessional-1	05	05	
							Sessional-2	05	05	
							ESE		15	

**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

- CLO1. Demonstrate<sup>3</sup>** the basic techniques of microscopical studies.
- CLO2. Identify<sup>3</sup>** the macroscopic and microscopic parts of human body and animals.
- CLO3. Identify<sup>3</sup>** the tissues of plants by microscopic observations.
- CLO4. Determine<sup>5</sup>** blood group, blood pressure and tidal volume.

No.	Description
<b>1.</b>	<b>Introduction to experiments in biology</b> 1) Study of Microscope 2) Section cutting techniques 3) Mounting and staining 4) Permanent slide preparation
<b>2.</b>	Study of cell and its inclusions
<b>3.</b>	Study of Stem, Root, Leaf, seed, fruit, flower and their modifications
<b>4.</b>	Detailed study of frog by using computer models
<b>5.</b>	Microscopic study and identification of tissues pertinent to Stem, Root Leaf, seed, fruit and flower
<b>6.</b>	Identification of bones
<b>7.</b>	Determination of blood group
<b>8.</b>	Determination of blood pressure
<b>9.</b>	Determination of tidal volume

**Reference Books:**

1. Kale SR, Kale RR. **Practical human anatomy and physiology**. Pune: Nirali Prakashan
2. Gokhale SB, Kokate CK, Shriwastava SP. **A Manual of pharmaceutical biology practical**
3. Shafi MJH. **Biology practical manual according to National core curriculum**. Biology forum of Karnataka.



**BP106RMT. REMEDIAL MATHEMATICS (Theory)**

**30 Hours**

Course Code	Course Title	L	T	P	C	Component	Exam	WT		Min. Passing (%)
BP106RMT	Remedial Mathematics (Theory)*	2	-	-	2	Theory (50 Marks)	CA	05	05	50
							Sessional-1	10	10	
							Sessional-2	10		
							ESE		35	

**Scope:**

This is an introductory course in mathematics. This subject deals with the introduction to Partial fraction, Logarithm, matrices and Determinant, Analytical geometry, Calculus, differential equation and Laplace transform.

**Objectives:**

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

**CLO1. Know<sup>1</sup>** the theory and their application in Pharmacy

**CLO2. Solve<sup>3</sup>** the different types of problems by applying theory

**CLO3. Appreciate<sup>3</sup>** the important application of mathematics in Pharmacy

**Course Content**

UNIT	Description	Hrs
I	<p><b>Partial fraction:</b> Introduction, Polynomial, Rational fractions, Proper and Improper fractions, Partial fraction , Resolving into Partial fraction, Application of Partial Fraction in Chemical Kinetics and Pharmacokinetics</p> <p><b>Logarithms:</b> Introduction, Definition, Theorems/Properties of logarithms, Common logarithms, Characteristic and Mantissa, worked examples, application of logarithm to solve pharmaceutical problems.</p> <p><b>Function:</b> Real Valued function, Classification of real valued functions,</p> <p><b>Limits and continuity :</b> Introduction , Limit of a function, Definition of limit of a function (<math>\epsilon - \delta</math> definition)</p> $\lim_{x \rightarrow a} \frac{x^n - a^n}{x - a} = na^{n-1}, \quad \lim_{\theta \rightarrow 0} \frac{\sin \theta}{\theta} = 1,$	06
II	<p><b>Matrices and Determinant:</b> 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</p>	06



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matrix, Cayley–Hamilton theorem, Application of Matrices in solving Pharmacokinetic equations

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**III** **Calculus:** Introductions, Derivative of a function, Derivative of a constant, Derivative of a product of a constant and a function, Derivative of the sum or difference of two functions, Derivative of the product of two functions (product formula), Derivative of the quotient of two functions (Quotient formula) – Without Proof, Derivative of  $x^n$  w.r.t.x, where  $n$  is any 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. 06

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**IV** **Analytical Geometry** 06

**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

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**V** **Differential Equations :** Some basic definitions, Order and degree, Equations in separable form, Homogeneous equations, Linear Differential equations, Exact equations, Application in solving Pharmacokinetic equations 06

**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

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**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
4. Higher Engineering Mathematics by Dr.B.S.Grewal



## **Semester II**

<b>Course Code</b>	<b>Name of the course</b>	<b>No. of hours</b>	<b>Tutorial</b>	<b>CA</b>	<b>SE</b>	<b>ESE</b>	<b>Credit points</b>
<b>BP201T</b>	Human Anatomy and Physiology II – (T)	3	1	10	15	75	<b>4</b>
<b>BP202T</b>	Pharmaceutical Organic Chemistry I –(T)	3	1	10	15	75	<b>4</b>
<b>BP203T</b>	Biochemistry –(T)	3	1	10	15	75	<b>4</b>
<b>BP204T</b>	Pathophysiology –(T)	3	1	10	15	75	<b>4</b>
<b>BP205T</b>	Computer Applications in Pharmacy –(T) *	3	-	10	15	50	<b>3</b>
<b>BP206T</b>	Environmental sciences –(T)*	3	-	10	15	50	<b>3</b>
<b>BP207P</b>	Human Anatomy and Physiology II –(P)	4	-	5	10	35	<b>2</b>
<b>BP208P</b>	Pharmaceutical Organic Chemistry I–(P)	4	-	5	10	35	<b>2</b>
<b>BP209P</b>	Biochemistry –(P)	4	-	5	10	35	<b>2</b>
<b>BP210P</b>	Computer Applications in Pharmacy –(P)*	2	-	5	5	15	<b>1</b>
<b>Total</b>		<b>32</b>	<b>4</b>	<b>80</b>	<b>125</b>	<b>520</b>	<b>29</b>
				<b>Total = 725</b>			



**BP201T. HUMAN ANATOMY AND PHYSIOLOGY-II (Theory)**

**45 Hours**

Course Code	Course Title	L	T	P	C	Component	Exam	WT		Passing Min. (%)
BP201T	Human Anatomy and Physiology -II (Theory)	3	1	-	4	Theory (100 Marks)	CA	10	10	50
							Sessional-1	15	15	
							Sessional-2	15		
							ESE		75	

**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 and feedback 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:

- CLO1. Explain<sup>2</sup>** the gross morphology, structure, physiology and functions of various organs and systems of the human body.
- CLO2. Describe<sup>2</sup>** various homeostatic mechanisms and their imbalances.
- CLO3. Draw<sup>5</sup>** anatomical structures of various organs and flow diagrams of physiological and homeostasis mechanisms of body systems.
- CLO4. Illustrate<sup>3</sup>** various body fluids, enzymes and hormones, their compositions, functions and disorders associated with it
- CLO5. Summarize<sup>1</sup>** the reproduction, genetics and inheritance.

**Course Content:**

UNIT	Description	Hrs
<b>I</b>	<b>Nervous system:</b> Organization of nervous system, neuron, neuroglia, classification and properties of nerve fibre, electrophysiology, action potential, nerve impulse, receptors, synapse, neurotransmitters. <b>Central nervous system:</b> 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)	10
<b>II</b>	<b>Digestive system:</b> 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. <b>Energetics:</b> Formation and role of ATP, Creatinine Phosphate and BMR.	06
<b>III</b>	<b>Respiratory system:</b> Anatomy of respiratory system with special reference to anatomy of lungs, mechanism of respiration, regulation of respiration	10



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.

**IV 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. 10

**V 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. 09

**Introduction to genetics:** Chromosomes, genes and DNA, protein synthesis, genetic pattern of inheritance

### Recommended Books (Latest Editions)

1. Guyton AC, Hall JE. **Textbook of medical physiology**. Philadelphia: Elsevier Saunders.
2. Tortora GJ, Derrickson BH. **Principles of Anatomy and Physiology**. Singapore: John Wiley & Sons (Asia) Pte Ltd
3. Waugh A. Grant A. **Ross and Wilson's Anatomy and physiology in health and illness**. New York: Churchill Livingstone (Elsevier).
4. Tandon OP, Tripathi Y, Editors. **Best and Taylor's Physiological basis of medical practice**. New Delhi: Wolters Kluwer Helth (India), Lippincott Williams and Wilkins,Co
5. Sembulingam K, Sembulingam P. **Essentials of medical physiology**. New Delhi: Jaypee Brothers Medical Publishers (P) Ltd,

### Reference Books (Latest Editions)

1. Guyton AC, Hall JE. **Textbook of medical physiology**. Philadelphia: Elsevier Saunders.
2. Tandon OP, Tripathi Y, Editors. **Best and Taylor's Physiological basis of medical practice**. New Delhi: Wolters Kluwer Helth (India), Lippincott Williams and Wilkins,Co
3. John NA, editor. **CC Chatterrje's Human Physiology (Vol 1 and 2)**. New Delhi. CBS Publishers and Distributors Pvt Ltd.

### Recommended Journals:

1. **Physiological reviews**. Americal Physiological Society publication.
2. **The Journal of Physiology**. The physiological society. London
3. **Indian journal of physiology and pharmacology**. Official publication of Association of Physiologists and Pharmacologists of India



**BP207P. HUMAN ANATOMY AND PHYSIOLOGY-II (Practical)**

**4 Hours/week**

Course Code	Course Title	L	T	P	C	Component	Exam	WT		Passing Min. (%)
BP207P	Human Anatomy and Physiology –II (Practical)	-	-	4	2	Practical (50 Marks)	CA	05	05	50
							Sessional-1	10	10	
							Sessional-2	10		
							ESE		35	

**Scope:**

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.

**Objectives:**

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

- CLO1. Illustrate<sup>3</sup>** the gross morphology structure and functions of various organs and systems of the human body using specimen, models, charts etc.
- CLO2. Draw<sup>5</sup>** anatomical structures of various organs and flow diagrams of physiological and homeostasis mechanisms of body systems.
- CLO3. Demonstrate<sup>3</sup>** neurological, sensory, reflex activities and feedback mechanisms.
- CLO4. Measure<sup>6</sup>** body temperature, lung function, basal mass index, total blood cells, differential WBC.
- CLO5. Interpret<sup>6</sup>** permanent slides of vital organs and gonads, family planning devices and pregnancy diagnosis test.

No.	Description
1.	To study the integumentary and special senses using specimen, models, etc.,
2.	To study the nervous system using specimen, models, etc.
3.	To study the endocrine system using specimen, models, etc
4.	To demonstrate the general neurological examination
5.	To demonstrate the function of olfactory nerve
6.	To examine the different types of taste
7.	To demonstrate the visual activity
8.	To demonstrate the reflex activity
9.	Recording of body temperature
10.	To demonstrate positive and negative feedback mechanism





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11. Determination of tidal volume and vital capacity

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  12. Study of digestive, respiratory, cardiovascular systems, urinary and reproductive systems with the help of models, charts and specimens

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  13. Recording of basal mass index

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  14. Study of familyplanning devices and pregnancy diagnosis test

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  15. Demonstration of total blood count by cell analyser

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  16. Permanent slides of vital organs and gonads.

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  17. Differential WBC count

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**Recommended Books (Latest Editions)**

1. Tortora GJ, Derrickson BH. **Principles of Anatomy and Physiology**. Singapore: John Wiley & Sons (Asia) Pte Ltd
2. Waugh A. Grant A. **Ross and Wilson's Anatomy and physiology in health and illness**. New York: Churchill Livingstone (Elsevier).
3. Singh I. **Textbook of human histology**. New Delhi: Jaypee Brothers Medical Publishers Pvt Ltd.
4. Varshney VP, Bedi M, editors. Ghai's **Textbook of practical physiology**. New Delhi: Jaypee brothers medical publishers (P) Ltd.
5. Sri Nageswari K, Sharma R. **Practical workbook of human physiology**. New Delhi: Jaypee brothers medical publishers (P) Ltd.

**Reference Books (Latest Editions)**

4. Guyton AC, Hall JE. **Textbook of medical physiology**. Philadelphia: Elsevier Saunders.
5. Tandon OP, Tripathi Y, Editors. **Best and Taylor's Physiological basis of medical practice**. New Delhi: Wolters Kluwer Helth (India), Lippincott Williams and Wilkins,Co
6. John NA, editor. **CC Chatterrje's Human Physiology (Vol 1 and 2)**. New Delhi. CBS Publishers and Distributors Pvt Ltd.

**BP202T. PHARMACEUTICAL ORGANIC CHEMISTRY-I (Theory)****45 Hours**

Course Code	Course Title	L	T	P	C	Component	Exam	WT		Passing Min. (%)
BP202T	Pharmaceutical Organic Chemistry- I (Theory)	3	1	-	4	Theory (100 Marks)	CA	10	10	50
							Sessional-1	15	15	
							Sessional-2	15		
							ESE		75	

**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

**CLO1. Classify<sup>4</sup>** organic compound.

**CLO2. Determine<sup>5</sup>** IUPAC name and structural isomerism of organic compounds.

**CLO3. Illustrate<sup>3</sup>** the structures and reactions of organic compounds and factors affecting these reactions and effect of substitution.

**CLO4. Describe<sup>2</sup>** uses, stability and qualitative test of organic compounds.

**CLO5. Illustrate<sup>3</sup>** the various reactions and characteristics of carbonyl compounds, carboxylic acid and aliphatic amines.

**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	Description	Hrs
<b>I</b>	<b>Classification, nomenclature and isomerism:</b> 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	07
<b>II</b>	<b>Alkanes*, Alkenes* and Conjugated dienes*:</b> SP <sup>3</sup> hybridization in alkanes, halogenation of alkanes, uses of paraffins. Stabilities of alkenes, SP <sup>2</sup> hybridization in alkenes <b>E1 and E2 reactions</b> – kinetics, order of reactivity of alkyl halides, rearrangement of carbocations, Saytzeffs orientation and evidences. E1 versus E2 reactions, Factors affecting E1 and E2 reactions. Ozonolysis, electrophilic addition reactions of alkenes, Markownikoff's orientation, free radical	10



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	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	
<b>III</b>	<b>Alkyl halides*</b> : SN1 and SN2 reactions - kinetics, order of reactivity of alkyl halides, stereochemistry and rearrangement of carbocations. SN1 versus SN2 reactions, Factors affecting SN1 and SN2 reactions Structure and uses of ethyl chloride, Chloroform, trichloroethylene, tetrachloroethylene, dichloromethane, tetrachloromethane and iodoform. <b>Alcohols*</b> - Qualitative tests, Structure and uses of Ethyl alcohol, Methyl alcohol, chlorobutanol, Cetosteryl alcohol, Benzyl alcohol, Glycerol, Propylene glycol	10
<b>IV</b>	<b>Carbonyl compounds* (Aldehydes and ketones)</b> : 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.	10
<b>V</b>	<b>Carboxylic acids*</b> : 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 <b>Aliphatic amines*</b> - Basicity, effect of substituent on Basicity. Qualitative test, Structure and uses of Ethanolamine, Ethylenediamine, Amphetamine	08

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**Recommended Books (Latest Editions)**

1. Morrison RT, Boyd RN, Bhattacharjee SK. **Organic Chemistry**. New Delhi: Dorling Kindersley (India) Pvt Ltd Licensees of Pearson Education.
2. Finar IL. **Organic Chemistry Volume-I**. Noida: Pearson Education
3. Bahl A, Bahl BS. **Textbook of organic chemistry**. New Delhi: S. Chand Publishing.
4. Soni PL, Chawla HM. **Text book of organic Chemistry**. New Delhi: Sultan Chand and Sons Pvt Ltd.

**BP208P. PHARMACEUTICAL ORGANIC CHEMISTRY-I (Practical)****4 Hours / week**

Course Code	Course Title	L	T	P	C	Component	Exam	WT		Passing Min. (%)
BP208P	Pharmaceutical Organic Chemistry- I (Practical)	-	-	4	2	Theory (50 Marks)	CA	05	05	50
							Sessional-1	10	10	
							Sessional-2	10		
							ESE		35	

**Scope:**

This subject is complimentary to theory and deals with practical aspects of simple organic compounds, structural isomerism, intermediates forming in reactions, important physical properties, reactions and 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

**CLO1. Analyse<sup>4</sup>** quality of organic compounds by preliminary physicochemical test.

**CLO2. Determine<sup>5</sup>** elements and function groups present in organic compounds.

**CLO3. Prepare<sup>6</sup>** and confirm the derivatives of organic compounds.

**CLO4. Identify<sup>4</sup>** organic compound using physicochemical test.

**CLO5. Construct<sup>5</sup>** molecular models.

No.	Description
1.	<b>Systematic qualitative analysis of unknown organic compounds like</b> 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 tests 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.
2.	Preparation of suitable solid derivatives from organic compounds representative of each functional group
3.	Construction of molecular models



**Recommended Books (Latest Editions)**

1. Mann FG, Saunders BC. **Practical Organic Chemistry**. Noida: Pearson Education
2. Furniss BS, Hannaford AJ, Smith Peter WG, Tatchell AR. **Vogel's text book of Practical Organic Chemistry**. Noida: Pearson Education
3. Vishnoi NK. **Advanced Practical organic chemistry**. New Delhi: Vikas Publishing House Pvt. Ltd.
4. Engel RG, Pavia DL, Lampman GM, Kriz GS. **Introduction to Organic Laboratory techniques**. Brooks/Cole Publishing.

**BP203T. BIOCHEMISTRY (Theory)****45 Hours**

Course Code	Course Title	L	T	P	C	Component	Exam	WT		Passing Min. (%)
BP203T	Biochemistry (Theory)	3	1	-	4	Theory (100 Marks)	CA	10	10	50
							Sessional-1	15	15	
							Sessional-2	15		
							ESE		75	

**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 shall able to

- CLO1. Describe<sup>2</sup>** biomolecules, bioenergetics and energy rich compounds.
- CLO2. Illustrate<sup>3</sup>** metabolism of nutrient molecules viz carbohydrates lipids and aminoacids in physiological and pathological conditions.
- CLO3. Summarize<sup>5</sup>** the genetic organization of mammalian genome and functions of DNA in the synthesis of RNAs and proteins
- CLO4. Explain<sup>2</sup>** the catalytic role of enzymes, importance of enzyme inhibitors in designof new drugs, therapeutic and diagnostic applications of enzymes.

**Course Content**

UNIT	Description	Hrs
<b>I</b>	<p><b>Biomolecules:</b> Introduction, classification, chemical nature and biological role of carbohydrate, lipids, nucleic acids, amino acids and proteins.</p> <p><b>Bioenergetics:</b> Concept of free energy, endergonic and exergonic reaction, Relationship between free energy, enthalpy and entropy; Redox potential.</p> <p><b>Energy rich compounds:</b> classification, biological significances of ATP and cyclic AMP</p>	08
<b>II</b>	<p><b>Carbohydrate metabolism:</b> 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</p>	10



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	<b>Biological oxidation:</b> Electron transport chain (ETC) and its mechanism. Oxidative phosphorylation & its mechanism and substrate phosphorylation Inhibitors ETC and oxidative phosphorylation/Uncouplers level	
<b>III</b>	<b>Lipid metabolism:</b> $\beta$ -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. <b>Amino acid metabolism:</b> General reactions of amino acid metabolism: Transamination, deamination & decarboxylation, urea cycle and its disorders. Catabolism of phenylalanine and tyrosine and their metabolic disorders (Phenylketonuria, albinism, alpeptonuria, tyrosinemia). Synthesis and significance of biological substances; 5-HT, melatonin, dopamine, noradrenaline, adrenaline. catabolism of heme; hyperbilirubinemia and jaundice	10
<b>IV</b>	<b>Nucleic acid metabolism and genetic information transfer:</b> 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	10
<b>V</b>	<b>Enzymes:</b> 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	07

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#### **Recommended Books (Latest Editions)**

1. Nelson DL, Cox MM. **Lehninger Principles of Biochemistry**. New York: W. H. Freeman and Company, England: Macmillan Higher Education.
2. Murry R, Bender DA, Botham KM, Kennelly PJ., Rodwell VW, Anthony Weil P. **Harper's Illustrated Biochemistry**. New York: McGraw-Hill Education/Lange Textbooks .
3. Berg JM, Tymoczko JL, Stryer L, Gatto GJ. **Biochemistry**. New York: W. H. Freeman.
4. Satyanarayan U, Chakrapani U. **Biochemistry**. Kolkatta: Books and Allied (P) Ltd.
5. Rama Rao AVSS. **Textbook of Biochemistry**. New Delhi: UBS Publishers' Distributors Pvt. Ltd.
6. Deb AC. **Fundamentals of Biochemistry**. Calcatta: New Central Book Agency.
7. Conn EE, Stumpf PK, Bruening G. **Outlines of Biochemistry**. New York: John Wiley and Sons

**BP209P. BIOCHEMISTRY (Practical)****4 Hours / Week**

Course Code	Course Title	L	T	P	C	Component	Exam	WT		Passing Min. (%)
BP209P	Biochemistry (Practical)	-	-	4	2	Practical (50 Marks)	CA	05	05	50
							Sessional-1	10	10	
							Sessional-2	10		
							ESE		35	

**Scope:**

Practical Biochemistry deals with complete understanding and estimation of nutrients, biomolecules and its metabolite, enzyme levels in physiological and pathological conditions and factors affecting on it. The scope of the subject is providing biochemical facts and the principles to understand metabolism of nutrient molecules in physiological and pathological conditions.

**Objectives:**

Upon completion of course student shall able to

**CLO1. Determine<sup>5</sup>** the presence and concentration of various normal and abnormal constituents in biological fluids.

**CLO2. Identify<sup>4</sup>** proteins and carbohydrates using biochemical tests.

**CLO3. Analyze<sup>4</sup>** the concentration enzyme and effect of various parameters on its levels.

**CLO4. Measure<sup>6</sup>** physicochemical and chemical properties of prepared chemical and biochemical solutions.

No.	Description
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 constituent
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. Gupta RC, Bhargava S, **Practical Biochemistry**. New Delhi: CBS Publishers & Distributors.
2. Plummer DT. **Introduction of Practical Biochemistry**. New York: McGraw-Hill Education.
3. Rajagopal G, Ramakrishnan S. **Practical Biochemistry for Medical students**. Hyderabad: Orient BlackSwan.
4. Varley H. **Practical Clinical Biochemistry**. New Delhi: CBS Publishers & Distributors.
5. Nelson DL, Cox MM. **Lehninger Principles of Biochemistry**. New York: W. H. Freeman and Company, England: Macmillan Higher Education.
6. Murry R, Bender DA, Botham KM, Kennelly PJ, Rodwell VW, Anthony Weil P. **Harper's Illustrated Biochemistry**. New York: McGraw-Hill Education/Lange Textbooks



**BP204T. PATHOPHYSIOLOGY (THEORY)**

**45Hours**

Course Code	Course Title	L	T	P	C	Component	Exam	WT		Passing Min. (%)
BP204T	Pathophysiology (Theory)	3	1	-	4	Theory (100 Marks)	CA	10	10	50
							Sessional-1	15	15	
							Sessional-2	15		
							ESE		75	

**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 –

- CLO1. Illustrate<sup>3</sup>** the basic principles of cell injury, inflammation, feedback mechanism and homeostasis.
- CLO2. Describe<sup>2</sup>** the etiology and pathogenesis of the selected disease states
- CLO3. Name<sup>1</sup>** the signs and symptoms of the various diseases.
- CLO4. Illustrate<sup>3</sup>** the complications of the diseases.
- CLO5. Draw<sup>5</sup>** diagrams, flow charts, cycles explaining pathogenesis and mechanisms of diseases.

**Course content**

UNIT	Description	Hrs
<b>I</b>	<b>Basic principles of cell injury and adaptation:</b> 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  <b>Basic mechanism involved in the process of inflammation and repair:</b> 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	10
<b>II</b>	<b>Cardiovascular System:</b> Hypertension, congestive heart failure, ischemic heart disease (angina, myocardial infarction, atherosclerosis and arteriosclerosis)	10



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	<b>Respiratory system:</b> Asthma, chronic obstructive airways diseases.	
	<b>Renal system:</b> Acute and chronic renal failure	
<b>III</b>	<b>Haematological Diseases:</b> Iron deficiency, megaloblastic anemia (Vit B12 and folic acid), sickle cell anemia, thalasemia, hereditary acquired anemia, hemophilia <b>Endocrine system:</b> Diabetes, thyroid diseases, disorders of sex hormones <b>Nervous system:</b> Epilepsy, Parkinson's disease, stroke, psychiatric disorders: depression, schizophrenia and Alzheimer's disease. <b>Gastrointestinal system:</b> Peptic ulcer	10
<b>IV</b>	<b>Inflammatory bowel diseases, jaundice, hepatitis (A,B,C,D,E,F) alcoholic liver disease.</b> <b>Disease of bones and joints:</b> Rheumatoid arthritis, osteoporosis and gout <b>Principles of cancer:</b> classification, etiology and pathogenesis of cancer.	08
<b>V</b>	<b>Infectious diseases:</b> Meningitis, Typhoid, Leprosy, Tuberculosis, Urinary tract infections <b>Sexually transmitted diseases:</b> AIDS, Syphilis, Gonorrhoea	07

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#### **Recommended Books (Latest Editions)**

1. Kumar V, Abas AK., Aster JC. **Robbins & Cotran Pathologic basis of disease.** South Asia edition; India; Elsevier.
2. Harsh Mohan. **Text book of Pathology.** India: Jaypee Brothers Medical Publishers (P) Ltd.
3. Laurence B, Bruce C, Bjorn K. **Goodman Gilman's The Pharmacological Basis of Therapeutics.** New York; McGraw-Hill
4. Tandon OP, Tripathi Y, Editors. **Best and Taylor's Physiological basis of medical practice.** New Delhi: Wolters Kluwer Helth (India), Lippincott Williams and Wilkins, Co
5. Ralston SH, Penman ID, Strachan MWJ, Hobson R, Editor. **Davidson's Principles and Practice of Medicine.** 23<sup>rd</sup> edition; London; ELBS/Churchill Livingstone/Elsevier
6. Guyton AC, Hall JE. **Textbook of medical physiology.** Philadelphia: Elsevier Saunders.
7. DiPiro JT, Talbert RL, Yee GC, Matzke GR, Wells BG, Posey LM. **Pharmacotherapy: A Pathophysiological Approach.** 10<sup>th</sup> edition; London; McGraw-Hill Medical;
8. Walker R, Whittlesea C, editors. **Clinical Pharmacy and Therapeutics.** 5<sup>th</sup> edition; New York: Churchill Livingstone publication/ Elsevier.

#### **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.

**BP205T. COMPUTER APPLICATIONS IN PHARMACY (Theory)****30 Hrs (2 Hrs/Week)**

Course Code	Course Title	L	T	P	C	Component	Exam	WT		Passing Min. (%)
BP205T	Computer Applications in Pharmacy (Theory) *	3	-	-	3	Theory (75 Marks)	CA	10	10	50
							Sessional-1	15	15	
							Sessional-2	15		
							ESE		50	

**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

- CLO1. Illustrate<sup>3</sup>** the number system and concepts of information system and softwares.
- CLO2. Describe<sup>2</sup>** various systems of computer applications and web technologies
- CLO3. Explain<sup>2</sup>** various types of databases and applications of computer in pharmacy
- CLO4. Illustrate<sup>3</sup>** bioinformatics and utilization of various databasis in preclinical development.

**Course content**

UNIT	Description	Hrs
<b>I</b>	<b>Number system:</b> 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  <b>Concept of Information Systems and Software :</b> Information gathering, requirement and feasibility analysis, data flow diagrams, process specifications, input/output design, process life cycle, planning and managing the project	06
<b>II</b>	<b>Web technologies:</b> Introduction to HTML, XML, CSS and Programming languages, introduction to web servers and Server Products. Introduction to databases, MYSQL, MS ACCESS, Pharmacy Drug database	06
<b>III</b>	<b>Application of computers in Pharmacy –</b> 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,	06



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Pharma Information System

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**IV Bioinformatics:** Introduction, Objective of bioinformatics, bioinformatics Databases, concept of bioinformatics, impact of bioinformatics in vaccine discovery 06

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**V Computers as data analysis in Preclinical development:** Chromatographic data analysis (CDS), Laboratory Information Management System (LIMS) and Text Information Management System (TIMS) 06

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**Recommended books (Latest edition):**

1. Fassett WE, Christensen DB, editors, Campbell WH, Koup JR, Malone PM. **Computer Application in Pharmacy** Philadelphia, PA : Lea & Febiger.
2. Ekins S, editor. **Computer Application in Pharmaceutical Research and Development.** New Jersey: Wiley-Interscience, A John Willey and Sons, INC., Publication.
3. Rastogi SC, Mendiratta N, Rastogi P. **Bioinformatics Concept, Skills and Applications.** New Delhi: CBS Publishers and Distributors.
4. **Microsoft office Access -2003**, Application Development Using VBA, SQL Server, AP and Infopath –Cary N. Prague – Wiley Dreamtech India (P) Ltd., 4435/7, Ansari Road, Daryagani, New Delhi – 110002



**BP210P. COMPUTER APPLICATIONS IN PHARMACY (Practical)**

Course Code	Course Title	L	T	P	C	Component	Exam	WT		Passing Min. (%)
BP210P	Computer Applications in Pharmacy (Practical)*	-	-	2	1	Practical (25 Marks)	CA	05	05	50
							Sessional-1	05	05	
							Sessional-2	05		
							ESE		15	

**Scope:**

This subject deals with the practical aspects of 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

**CLO1. Design<sup>6</sup>** questionnaire, forms and documents of pharmaceutical importance using suitable computer program.

**CLO2. Create<sup>6</sup>** web page and databases using relevant computer programs.

**CLO3. Demonstrate<sup>4</sup>** medical coding and modeling of chemical structure.

**CLO4. Generate<sup>5</sup>** labels, reports and patient database.

No.	Description
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
13.	Medical coding
14.	Modeling of chemical structures



**Recommended books (Latest edition):**

5. Fassett WE, Christensen DB, editors, Campbell WH, Koup JR, Malone PM. **Computer Application in Pharmacy** Philadelphia, PA : Lea & Febiger.
6. Ekins S, editor. **Computer Application in Pharmaceutical Research and Development.** New Jersey: Wiley-Interscience, A John Willey and Sons, INC., Publication.
7. Rastogi SC, Mendiratta N, Rastogi P. **Bioinformatics Concept, Skills and Applications.** New Delhi: CBS Publishers and Distributors.
8. **Microsoft office Access -2003**, Application Development Using VBA, SQL Server, AP and Infopath –Cary N.Prague – Wiley Dreamtech India (P) Ltd., 4435/7, Ansari Road, Daryagani, New Delhi – 110002



**BP206T. ENVIRONMENTAL SCIENCES (Theory)**

**30 hours**

Course Code	Course Title	L	T	P	C	Component	Exam	WT		Passing Min. (%)
BP206T	Environmental sciences (Theory)*	3	-	-	3	Theory (75 Marks)	CA	10	10	50
							Sessional-1	15	15	
							Sessional-2	15		
							ESE		50	

**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:

- CLO1. Illustrate<sup>3</sup>** the natural resources and its importance.
- CLO2. Describe<sup>2</sup>** the ecosystems, its importances and environmental pollutions.
- CLO3. Develop<sup>6</sup>** an attitude of concern for the environment.
- CLO4. Convince<sup>5</sup>** learner to participate in environment protection and environment improvement.
- CLO5. Develop<sup>6</sup>** skills to help the concerned individuals in identifying and solving environmental problems.

**Course content**

UNIT	Description	Hrs
<b>I</b>	The multidisciplinary nature of environmental studies. Natural resources, Renewable and non-renewable resources: Natural resources and associated problems 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	10
<b>II</b>	<b>Ecosystems:</b> 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)	10
<b>III</b>	<b>Environmental Pollution:</b> Air pollution; Water pollution; Soil pollution	10





**Recommended Books (Latest edition):**

1. Sing YK. **Environmental Science**. Bangalore: New Age International Pvt,
2. Agarwal KC. **Environmental Biology**. Bikaner: Nidi Publ. Ltd..
3. Erach B, **The Biodiversity of India**. Ahmedabad : Mapin Publishing Pvt. Ltd.
4. Brunner RC. **Hazardous Waste Incineration**. McGraw Hill Inc.
5. Clark RS. **Marine Pollution**. Oxford University Press
6. Cunningham WP, Cooper TH, Gorhani E, Hepworth MT. **Environmental Encyclopedia**. Mumbai: Jaico Publ. House
7. De A.K., **Environmental Chemistry**. New delhi: New Age International
8. <https://www.cseindia.org/> Down of Earth, Centre for Science and Environment

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