

## Program name

### 1. Bachelor in Pharmacy (B.Pharm)

#### 2. Course structure

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 course of study for B. Pharm includes Semester Wise Theory & Practical as given 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>	<b>32/34\$/36#</b>	<b>4</b>	<b>27/29\$/30#</b>	

**Table-II: Course of study for semester II**

Course Code	Name of the course	No. of hours	Tutorial	Credit points
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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>		<b>32</b>	<b>4</b>	<b>29</b>

**Table-III: Course of study for semester III**

<b>Course code</b>	<b>Name of the course</b>	<b>No. of hours</b>	<b>Tutorial</b>	<b>Credit points</b>
BP301T	Pharmaceutical Organic Chemistry II – Theory	3	1	4
BP302T	Physical Pharmaceutics I – Theory	3	1	4
BP303T	Pharmaceutical Microbiology – Theory	3	1	4
BP304T	Pharmaceutical Engineering – Theory	3	1	4
BP305P	Pharmaceutical Organic Chemistry II – Practical	4	-	2

BP306P	Physical Pharmaceutics I – Practical	4	-	2
BP307P	Pharmaceutical Microbiology – Practical	4	-	2
BP 308P	Pharmaceutical Engineering – Practical	4	-	2
<b>Total</b>	<b>28</b>	<b>4</b>	<b>24</b>	

**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>	<b>31</b>	<b>5</b>	<b>28</b>	

**Table-V: Course of study for semester V**

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

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

**Table-VIII: Course of study for semester VIII**

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

Table-IX: Semester wise credits distribution Semester	Credit Points
I	27/29\$/30#
II	29
III	26
IV	28
V	26
VI	26
VII	24
VIII	22
Extracurricular/ Co curricular activities	01*
<b>Total credit points for the program</b>	<b>209/211\$/212#</b>

\*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.

### **3. Program outcomes**

Pharmaceutical Sciences is a dynamic and interdisciplinary field that aims to integrate fundamental principles of physical and organic chemistry, engineering, biochemistry, and biology to understand how to optimize delivery of drugs to the body and translate this integrated understanding into new and improved therapies against human disease. The program outcomes (PO) of B. Pharmacy have been well illustrated in the curriculum designed by University as per Pharmacy Council of India guidelines. The curriculum and profession of pharmacy is very dynamic and progressive. This does not restricted to just mere passing the university examination but to produce trained qualified pharmacist who could work in areas of modern pharmaceutical industry, in community, clinical, biotechnology, bioinformatics, biomedical and hospital pharmacies. The course input is for the development of Professional Identity, technical knowledge, planning abilities, professional Communication, Problem analysis/ cognitive ability, entrepreneurship / Leadership skill, Pharmaceutical Ethics, pharmaceutical regulation, social liability, sense of Environment sustainability.

### **4. Program Specific Outcomes (PSO's)**

**PSO 1:** Detail understanding of theoretical and practical knowledge of all core and allied subjects of pharmaceutical sciences, which consist of dosage form design, routes of administration of various drugs, their mechanism of action, chemical moiety involved, doses of drugs, patient treatment, patient counseling, drug dispensing, hospital administration, drug manufacturing, QA/QC and regulation etc.

**PSO2:** Highlight the concepts and operative components of pharmacovigilance, clinical pharmacy, hospital pharmacy, community pharmacy, pharmaceutical care, pharmacovigilance, pharmacoconomics, clinical research, clinical pharmacokinetics and other related areas for the benefit of academicians, hospital/community pharmacists and industry, emphasizing the consequences of the use of medications.

**PSO3:** Rigorous core course-work in biopharmaceutics, drug transport, pharmacokinetics & pharmacodynamics, drug delivery systems, cell and molecular biology, synthetic and macromolecular chemistry, chemical and biomedical engineering, materials science, physiology and pharmacology.

### **5. Course outcomes (CO) for subjects from I to VIII semester**

## **I Semester**

### **BP101T. HUMAN ANATOMY AND PHYSIOLOGY-I (Theory) , BP107P. HUMAN ANATOMY AND PHYSIOLOGY (Practical)**

CO1- Explain the gross morphology, structure and functions of various organs of the humanbody.

CO2- Describe the various homeostatic mechanisms and their imbalances.

CO3- Identify the various tissues and organs of different systems of human body.

CO4- Perform the various experiments related to special senses and nervous system.

CO5- Appreciate coordinated working pattern of different organs of each system.

### **BP102T. PHARMACEUTICAL ANALYSIS (Theory), BP108P. PHARMACEUTICAL**

#### **ANALYSIS (Practical)**

CO1- Understand the principles of volumetric and electro chemical analysis.

CO2- Carryout various volumetric and electrochemical titrations.

CO3- Develop analytical skill.

### **BP103T. PHARMACEUTICS- I (Theory) , BP109P. PHARMACEUTICSI (Practical)**

CO1- Know the history of profession of pharmacy.

CO2- Understand the basics of different dosage forms, pharmaceutical incompatibilities andpharmaceutical calculations.

CO3- Understand the professional way of handling the prescription.

CO4- Preparation of various conventional dosage forms.

### **BP104T. PHARMACEUTICAL INORGANIC CHEMISTRY (Theory),**

**BP11**

#### **0P.PHARMACEUTICAL INORGANIC CHEMISTRY (Practical)**

CO1- Know the sources of impurities and methods to determine the impurities in

inorganic drugs and pharmaceuticals.

CO2- Understand the medicinal and pharmaceutical importance of inorganic compounds

Course.

**BP105T.COMMUNICATION SKILLS (Theory),  
BP111P.COMMUNICATION**

**SKILLS (Practical)**

CO1- Understand the behavioural needs for a pharmacist to function effectively in the areas of pharmaceutical operation.

CO2- Communicate effectively (Verbal and Non-Verbal).

CO3- Effectively manage the team as a team player.

CO4- Develop interview skills.

CO5- Develop Leadership qualities and essentials.

**BP 106RBT.REMEDIAL BIOLOGY (Theory), BP112RBP.REMEDIAL  
BIOLOGY**

**(Practical)**

CO1- Know the classification and salient features of five kingdoms of life.

CO2- Understand the basic components of anatomy & physiology of plant.

CO3- know understand the basic components of anatomy & physiology animal with special reference to human.

**BP 106RMT.REMEDIAL MATHEMATICS (Theory)**

CO1- Know the theory and their application in Pharmacy.

CO2- Solve the different types of problems by applying theory.

CO3- Appreciate the important application of mathematics in Pharmacy.

**II Semester**

**BP 201T. HUMAN ANATOMY AND PHYSIOLOGY-II (Theory), BP 207 P. HUMANANATOMY  
AND PHYSIOLOGY (Practical)**

CO1- Explain the gross morphology, structure and functions of various organs of the human body.

CO2- Describe the various homeostatic mechanisms and their imbalances.

CO3- Identify the various tissues and organs of different systems of human body.

CO4- Perform the haematological tests like blood cell counts, haemoglobin estimation, bleeding/clotting time etc and also record blood pressure, heart rate, pulse and respiratory volume.

CO5- Appreciate coordinated working pattern of different organs of each system 6. Appreciate the interlinked mechanisms in the maintenance of normal functioning (homeostasis) of human body.

**BP202T. PHARMACEUTICAL ORGANIC CHEMISTRY –I (Theory) , BP208P. PHARMACEUTICAL ORGANIC CHEMISTRY -I (Practical)**

CO1- Write the structure, name and the type of isomerism of the organic compound.

CO2- Write the reaction, name the reaction and orientation of reactions.

CO3- Account for reactivity/stability of compounds.

CO4- Identify/confirm the identification of organic compound.

**BP203 T. BIOCHEMISTRY (Theory), BP 209 P. BIOCHEMISTRY (Practical)**

CO1- Understand the catalytic role of enzymes, importance of enzyme inhibitors in design of new drugs, therapeutic and diagnostic applications of enzymes.

CO2- Understand the metabolism of nutrient molecules in physiological and pathological conditions.

CO3- Understand the genetic organization of mammalian genome and functions of DNA in the synthesis of RNAs and proteins.

**BP 204T.PATHOPHYSIOLOGY (THEORY)**

CO1- Describe the etiology and pathogenesis of the selected disease states.

CO2- Name the signs and symptoms of the diseases.

CO3- Mention the complications of the diseases.

**BP205 T. COMPUTER APPLICATIONS IN PHARMACY (Theory),**

**BP21**

**0P.COMPUTER APPLICATIONS IN PHARMACY (Practical)**

CO1- Know the various types of application of computers in pharmacy.

CO2- Know the various types of databases 3. know the various applications of databases in pharmacy.

**BP 206 T. ENVIRONMENTAL SCIENCES (Theory)**

CO1- Create the awareness about environmental problems among learners.

CO2- Impart basic knowledge about the environment and its allied problems.

CO3- Develop an attitude of concern for the environment.

CO4- Motivate learner to participate in environment protection and environment improvement.

CO5- Acquire skills to help the concerned individuals in identifying and solving environmental problems.

CO6- Strive to attain harmony with Nature.

**III Semester**

**BP301T. PHARMACEUTICAL ORGANIC CHEMISTRY –II (Theory) , BP305P.**

**PHARMACEUTICAL ORGANIC CHEMISTRY -II (Practical)**

CO1- Write the structure, name and the type of isomerism of the organic.

CO2- Write the reaction, name the reaction and orientation of reactions.

CO3- Account for reactivity/stability of compound.

CO4- Prepare organic compounds.

**BP302T. PHYSICAL PHARMACEUTICS-I (Theory), BP306P.  
PHYSICAL**

**PHARMACEUTICS – I (Practical)**

CO1- Understand various physicochemical properties of drug molecules in the designing

the dosage forms.

CO2- Know the principles of chemical kinetics & to use them for stability testing and determination of expiry date of formulations.

CO3- Demonstrate use of physicochemical properties in the formulation development and evaluation of dosage forms.

**BP 303 T. PHARMACEUTICAL MICROBIOLOGY (Theory),  
BP307P.PHARMACEUTICAL MICROBIOLOGY (Practical)**

CO1- Understand methods of identification, cultivation and preservation of various microorganisms.

CO2- To understand the importance and implementation of sterilization in pharmaceutical processing and industry.

CO3- Learn sterility testing of pharmaceutical products.

CO4- Carried out microbiological standardization of Pharmaceuticals.

CO5- Understand the cell culture technology and its applications in pharmaceutical industries.

**BP 304 T. PHARMACEUTICAL ENGINEERING (Theory), BP308P  
-PHARMACEUTICAL ENGINEERING (Practical)**

CO1- To know various unit operations used in pharmaceutical industries.

CO2- To understand the material handling techniques.

CO3- To perform various processes involved in pharmaceutical manufacturing process.

CO4- To carry out various test to prevent environmental pollution.

CO5- To appreciate and comprehend significance of plant lay out design for optimum use of resources.

CO6- To appreciate the various preventive methods used for corrosion control in pharmaceutical industries.

## IV Semester

### **BP401T. PHARMACEUTICAL ORGANIC CHEMISTRY –III (Theory),**

- CO1- Understand the methods of preparation and properties of organic compounds.
- CO2- Explain the stereo chemical aspects of organic compounds and stereo chemical reactions.
- CO3- Know the medicinal uses and other applications of organic compounds.

### **BP402T. MEDICINAL CHEMISTRY – I (Theory) , BP406P. MEDICINAL CHEMISTRY – I (Practical)**

- CO1- Understand the chemistry of drugs with respect to their pharmacological activity.
- CO2- Understand the drug metabolic pathways, adverse effect and therapeutic value of drugs.
- CO3- Know the Structural Activity Relationship (SAR) of different class of drugs.
- CO4- Write the chemical synthesis of some drugs.

### **BP 403 T. PHYSICAL PHARMACEUTICS-II (Theory) , BP 407P. PHYSICAL PHARMACEUTICS- II (Practical)**

- CO1- Understand various physicochemical properties of drug molecules in the designing the dosage forms.
- CO2- Know the principles of chemical kinetics & to use them for stability testing and determination of expiry date of formulations.
- CO3- Demonstrate use of physicochemical properties in the formulation development and evaluation of dosage forms.

### **BP 404 T. PHARMACOLOGY-I (Theory), BP 408 P. PHARMACOLOGY-I (Practical)**

- CO1- Understand the pharmacological actions of different categories of drugs.
- CO2- Explain the mechanism of drug action at organ system/sub cellular/ macromolecular levels.

CO3- Apply the basic pharmacological knowledge in the prevention and treatment of various diseases.

CO4- Observe the effect of drugs on animals by simulated experiments.

CO5- Appreciate correlation of pharmacology with other bio medical sciences.

**BP 405 T. PHARMACOGNOSY AND PHYTOCHEMISTRY I (Theory), BP408 P. PHARMACOGNOSY AND PHYTOCHEMISTRY I (Practical)**

CO1- To know the techniques in the cultivation and production of crude drugs.

CO2- To know the crude drugs, their uses and chemical nature.

CO3- Know the evaluation techniques for the herbal drugs.

CO4- To carry out the microscopic and morphological evaluation of crude drugs.

**V Semester**

**BP501T. MEDICINAL CHEMISTRY – II**

**(Theory)**

CO1- Understand the chemistry of drugs with respect to their pharmacological activity.

CO2- Understand the drug metabolic pathways, adverse effect and therapeutic value of drugs.

CO3- Know the Structural Activity Relationship of different class of drugs.

CO4- Study the chemical synthesis of selected drugs.

**BP 502 T. Industrial Pharmacy I (Theory), BP 506 P. Industrial Pharmacy I (Practical)**

CO1- Know the various pharmaceutical dosage forms and their manufacturing techniques.

CO2- Know various considerations in development of pharmaceutical dosage forms.

CO3- Formulate solid, liquid and semisolid dosage forms and evaluate them for their quality.

**BP 503T. PHARMACOLOGY-II (Theory) , BP 507 P. PHARMACOLOGY-**

## **II**

### **(Practical)**

CO1- Understand the mechanism of drug action and its relevance in the treatment of different diseases.

CO2- Demonstrate isolation of different organs/tissues from the laboratory animals by simulated experiments.

CO3- Demonstrate the various receptor actions using isolated tissue preparation.

CO4- Appreciate correlation of pharmacology with related medical science.

### **BP504 T. PHARMACOGNOSY AND PHYTOCHEMISTRY II (Theory), BP 508 P.**

### **PHARMACOGNOSY AND PHYTOCHEMISTRY II (Practical)**

CO1- To know the modern extraction techniques, characterization and identification of the herbal drugs and phytoconstituents.

CO2- To understand the preparation and development of herbal formulation.

CO3- To understand the herbal drug interactions 4. to carry out isolation and identification of phytoconstituents.

### **BP 505 T. PHARMACEUTICAL JURISPRUDENCE (Theory)**

CO1- The Pharmaceutical legislations and their implications in the development and marketing of pharmaceuticals.

CO2- Various Indian pharmaceutical Acts and Laws.

CO3- The regulatory authorities and agencies governing the manufacture and sale of pharmaceuticals.

CO4- The code of ethics during the pharmaceutical practice.

## **VI Semester**

### **BP601T. MEDICINAL CHEMISTRY – III (Theory) , BP607P. MEDICINAL**

### **CHEMISTRY- III (Practical)**

CO1- Understand the importance of drug design and different techniques of drug design.

CO2- Understand the chemistry of drugs with respect to their biological activity.

CO3- Know the metabolism, adverse effects and therapeutic value of drugs.

CO4- Know the importance of SAR of drugs.

**BP602 T. PHARMACOLOGY-III (Theory), BP 608 P. PHARMACOLOGY-III**

**(Practical)**

CO1- Understand the mechanism of drug action and its relevance in the treatment of different infectious diseases.

CO2- Comprehend the principles of toxicology and treatment of various poisonings and.

CO3- Appreciate correlation of pharmacology with related medical sciences.

**BP603 T. HERBAL DRUG TECHNOLOGY (Theory), BP 609 P. HERBAL DRUG**

**TECHNOLOGY (Practical)**

CO1- Understand raw material as source of herbal drugs from cultivation to herbal drug product.

CO2- Know the WHO and ICH guidelines for evaluation of herbal drugs.

CO3- Know the herbal cosmetics, natural sweeteners, and nutraceuticals.

CO4- Appreciate patenting of herbal drugs, GMP.

**BP 604 T. BIOPHARMACEUTICS AND PHARMACOKINETICS (Theory)**

CO1- Understand the basic concepts in biopharmaceutics and pharmacokinetics and their significance. 2. Use of plasma drug concentration-time data to calculate the pharmacokinetic parameters to describe the kinetics of drug absorption, distribution, metabolism, excretion, elimination.

CO2- To understand the concepts of bioavailability and bioequivalence of drug products and their significance.

CO3- **Understand** various pharmacokinetic parameters, their significance & applications.

**BP 605 T. PHARMACEUTICAL BIOTECHNOLOGY (Theory)**

CO1- Understanding the importance of Immobilized enzymes in Pharmaceutical Industries.

CO2- Genetic engineering applications in relation to production of pharmaceuticals.

CO3- Importance of Monoclonal antibodies in Industries.

CO4- Appreciate the use of microorganisms in fermentation technology.

**BP606TPHARMACEUTICAL QUALITY ASSURANCE (Theory)**

CO1- Understand the cGMP aspects in a pharmaceutical industry.

CO2- Appreciate the importance of documentation.

CO3- Understand the scope of quality certifications applicable to pharmaceutical industries.

CO4- Understand the responsibilities of QA & QC departments.

**VII Semester**

**BP701T. INSTRUMENTAL METHODS OF ANALYSIS (Theory) ,  
BP705P.INSTRUMENTAL METHODS OF ANALYSIS (Practical)**

CO1- Understand the interaction of matter with electromagnetic radiations and its applications indrug analysis.

CO2- Understand the chromatographic separation and analysis of drugs.

CO3- Perform quantitative & qualitative ana lysis of drugs using various analytical instruments.

**BP702 T. INDUSTRIAL PHARMACYII  
(Theory)**

CO1- Know the process of pilot plant and scale up of pharmaceutical dosage forms.

CO2- Understand the process of technology transfer from lab scale to commercial batch.

CO3- Know different Laws and Acts that regulate pharmaceutical industry.

CO4- Understand the approval process and regulatory requirements for drug product.

**BP 703T. PHARMACY PRACTICE (Theory)**

CO1- Know various drug distribution methods in a hospital.

CO2- Appreciate the pharmacy stores management and inventory control.

CO3- Monitor drug therapy of patient through medication chart review and clinical

review.

CO4- Obtain medication history interview and counsel the patients.

CO5- Identify drug related problems

CO6- Detect and assess adverse drug reactions.

CO7- Interpret selected laboratory results (as monitoring parameters in therapeutics) of specific disease states.

CO8- Know pharmaceutical care services.

CO9- Do patient counselling in community pharmacy.

CO10- Appreciate the concept of rational drug therapy.

#### **BP 704T: NOVEL DRUG DELIVERY SYSTEMS (Theory)**

CO1- To understand various approaches for development of novel drug delivery systems.

CO2- To understand the criteria for selection of drugs and polymers for the development of Novel drug delivery systems, their formulation and evaluation.

### **VIII Semester**

#### **BP801T. BIOSTATISTICS AND RESEARCH METHODOLOGY (Theory)**

CO1- Know the operation of M.S. Excel, SPSS, R and MINITAB ®, DoE (Design of Experiment)

CO2- Know the various statistical techniques to solve statistical problems

CO3- Appreciate statistical techniques in solving the problems.

#### **BP 802T SOCIAL AND PREVENTIVE PHARMACY (Theory)**

CO1- Acquire high consciousness/realization of current issues related to health and pharmaceutical problems within the country and worldwide.

CO2- Have a critical way of thinking based on current healthcare development.

CO3- Evaluate alternative ways of solving problems related to health and pharmaceutical issues.

#### **BP803ET. PHARMA MARKETING MANAGEMENT (Theory)**

The course aims to provide an understanding of marketing concepts and techniques and

their applications in the pharmaceutical industry.

#### **BP804 ET: PHARMACEUTICAL REGULATORY SCIENCE (Theory)**

CO1- Know about the process of drug discovery and development.

CO2- Know the regulatory authorities and agencies governing the manufacture and sale of pharmaceuticals.

CO3- Know the regulatory approval process and their registration in Indian and international markets

#### **BP 805T: PHARMACOVIGILANCE (Theory)**

At completion of this paper, it is expected that students will be able to (know, do, and appreciate):

Appreciate the historical development and describe the national and international scenario of pharmacovigilance.

- Describe the drug disease classification, coding and terminologies used in pharmacovigilance.
- Detect and manage the adverse drug reactions.
- Learn the vaccine safety surveillance, pharmacogenomics, ICH guidelines and CIOMS.
- Assess the methods to generate safety data during post approval phases of the drug.

#### **BP 806 ET. QUALITY CONTROL AND STANDARDIZATION OF HERBALS**

**(Theory)**

CO1- Know WHO guidelines for quality control of herbal drugs.

CO2- Know Quality assurance in herbal drug industry.

CO3- Know the regulatory approval process and their registration in Indian and international markets.

CO4- Appreciate EU and ICH guidelines for quality control of herbal drugs.

#### **BP 807 ET. COMPUTER AIDED DRUG DESIGN (Theory)**

- CO1- Design and discovery of lead molecules.
- CO2- The role of drug design in drug discovery process.
- CO3- The concept of QSAR and docking.
- CO4- Various strategies to develop new drug like molecules.

**BP808ET: CELL AND MOLECULAR BIOLOGY (Elective subject)**

- Summarize cellular functioning and composition.
- Describe the chemical foundations of cell biology.
- Summarize the DNA properties of cell biology.
- Describe protein structure and function.
- Describe cellular membrane structure and function.
- Describe basic molecular genetic mechanisms.
- Summarize the Cell Cycle.

**BP809ET. COSMETIC SCIENCE(Theory)**

**BP810 ET. PHARMACOLOGICAL SCREENING METHODS**

- Appreciate the applications of various commonly used laboratory animals.
- Appreciate and demonstrate the various screening methods used in preclinical research.
- Appreciate and demonstrate the importance of biostatistics and research methodology.
- Design and execute a research hypothesis independently.

**BP811 ET. ADVANCED INSTRUMENTATION TECHNIQUES**

- CO1- Understand the advanced instruments used and its applications in drug analysis.
- CO2- Understand the chromatographic separation and analysis of drugs.
- CO3- Understand the calibration of various analytical instruments.
- CO4- Know analysis of drugs using various analytical instruments.

## **BP 812 ET. DIETARY SUPPLEMENTS AND NUTRACEUTICALS**

CO1- Understand the need of supplements by the different group of people to maintain healthy life.

CO2- Understand the outcome of deficiencies in dietary supplements.

CO3- Appreciate the components in dietary supplements and the application.

CO4- Appreciate the regulatory and commercial aspects of dietary supplements including health claims.