B-PHARM COURSE SUBJECTS

FIRST YEAR SEM I

Upon acquiring Knowledge & skill the student would be able to achieve the following:

SEM-I

HUMAN ANATOMY AND PHYSIOLOGY I - BP101T & 107P

Knowledge

1. Explain the relevance and significance of Human Anatomy and Physiology to Pharmaceutical Sciences.
2. Explain basic terminologies used in anatomy and physiology as well as prefixes & suffixes Used to identify body parts and directional terms.
3. Explain the gross morphology, structure and functions of various organs of the human body.
4. Explain the anatomy & physiology of skeletal system.
5. Describe the various homeostatic mechanisms and their imbalances.
6. Identify the various tissues and organs of different systems of human body.

Skill

1. Explain the construction, working, care and handling of various materials, instruments, glassware and equipments required for understanding the practical.
2. Explain the precautions taken by student while doing the practical in the laboratory.
3. Demonstrate the simple laboratory techniques.
4. Clarify significance of bleeding time, clotting time, detection of blood group, haemoglobin Detection, and W.B. C. count, R.B. C. count of blood sample, ESR and blood pressure determination.
5. Identification of different types of bones

PHARMACEUTICAL ANALYSIS I- BP102T & BP108P

Knowledge

1. To understand the basic terms of analytical chemistry and Illuminate relevance & significance of Analytical Chemistry to Pharmaceutical Sciences.
2. To analyze different types of Errors in analysis and To identify the impurities using various Limit tests given in Pharmacopoeia
3. To study basic concepts, types and principles of Various Volumetric

Methods

4. To study basic concepts, principle of Gravimetric method of analysis
5. To understand basic concepts, types and principles of Various Electrochemical methods of analysis.

Skill

1. To develop analytical skills by applying theoretical knowledge of various titrations
2. To understand the calibration of various Instruments
3. To carryout various volumetric and electrochemical titrations using instruments.
4. To identify the pKa of Monobasic, dibasic and tribasic acids
5. To analyse the refractive index, molar refraction and optical rotation using refractometer and polarimeter

PHARMACEUTICS I- BP103T & BP109P

Knowledge

1. Know the history of profession of pharmacy
2. Understand the basics of different dosage forms, pharmaceutical incompatibilities and pharmaceutical calculations
3. Understand the professional way of handling the prescription
4. Preparation of various conventional dosage forms

Skill

1. Skill to learn weighing and measuring
2. Skill to understand basic knowledge
3. Skill to learn formulation
4. Skill to learn labeling and evaluation

PHARMACEUTICAL INORGANIC CHEMISTRY-104T & 110P

Knowledge

1. Knowledge to Impurities in pharmaceutical substances
2. Knowledge of Acids, Bases and Buffers
3. Knowledge Gastrointestinal agents
4. Knowledge to Miscellaneous compounds.
5. Knowledge to Radiopharmaceuticals

Skill

1. Skill for use of Limit tests for ions
2. Skill for Identification test
3. Skill for Test for purity
4. Skill to Preparation of inorganic pharmaceuticals

COMMUNICATIONS SKILL- BP105T & BP111P

Knowledge

1. Gain knowledge & Understand the behavioural needs for a Pharmacist to function effectively in the areas of pharmaceutical operation
2. Knowledge to improve Communication effectively
3. Knowledge for Effectively manage the team as a team player
4. Knowledge to prepare & Develop interview skills
5. Knowledge to Develop Leadership qualities and essentials

Skill

1. Skill to learn modules using English language software
2. Skill to understand basic knowledge
3. Skill to learn pronunciation
4. Skill to learn advanced and implement in communication

REMEDIAL BIOLOGY - BP 106RBT

Knowledge

1. Gain knowledge & Understand the core and basic knowledge associated with Biology and the profession of pharmacy
2. Knowledge to correlate the role of biology in pharmacy
3. Knowledge to effectively plan including time management, resource management, delegation skills and organizational skills
4. To reason the role of living organisms and its correlation with other subjects of pharmacy

REMEDIAL BIOLOGY- BP112RBP

Skill

1. Skill to learn basic techniques
2. Skill to understand basic
3. Skill to handle samples from biological source
4. Skill to handle basic equipment

SEM-II

HUMAN ANATOMY AND PHYSIOLOGY II - BP 201T & 207 P

Knowledge

1. Knowledge and gross morphology, structure and functions of Nervous system in humans
2. Knowledge of digestive system homeostatic mechanisms and their imbalances.
3. Knowledge of respiratory and urinary system homeostatic mechanisms and their imbalances
4. Knowledge and gross morphology structure and functions of endocrine system in humans
5. Knowledge and gross morphology structure and functions of reproductive system and genetics in humans

Skill

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

Pharmaceutical Organic Chemistry -BP202T & BP208P

Knowledge

1. Knowledge to Classification of Organic Compounds Common and IUPAC systems of nomenclature of organic compounds
2. Knowledge of Alkanes, Alkenes and Conjugated dienes
3. Knowledge Preparation and reactions of Alkyl halides Organic Compounds
4. Knowledge to Preparation and reactions Carbonyl compounds (Aldehydes and ketones).
5. Knowledge to study Carboxylic acids and Aliphatic amines Organic Reactions

Skill

1. Skill for Systematic qualitative analysis of unknown organic compounds
2. Skill for Preparation of the derivatives and confirmation of the unknown compound.
3. Skill for Construction of molecular models

BIOCHEMISTRY - BP203 T & BP 209 P

Knowledge

1. Understand basic knowledge of metabolism
2. Acquire knowledge about central dogma of molecular biology
3. Understand the hierarchy of regulation in living cell
4. Gain basic knowledge about the various targets for therapy
5. Significance of balanced diet and its utilization.
6. Understanding various genetic disorders in metabolism

Skill

1. Knowledge to understand basic concept of macromolecule identification
2. Knowledge of enzyme and its kinetics
3. Knowledge for various diagnostic techniques for metabolic disorders.
4. Knowledge of handling basic equipment in biochemistry and biological samples

PATHOPHYSIOLOGY- BP 204T

Knowledge

1. Explain the definition, etiology, pathogenesis, signs, symptoms and complications of the diseases.

COMPUTER APPLICATION IN PHARMACY- BP205 T & BP210P

Knowledge

1. Use the Appropriate method on Number system to solve the given problem.
2. Apply the various tags in Web Technology to design a program.
3. Use the appropriate system and application of computers in pharmacy.
4. Apply the concepts of Bioinformatics in pharmacy.
5. Apply the concepts of computers as a data analysis in preclinical development.

Skill

1. Use the appropriate tags and design web technology program.
2. Design and implement database using MS Access.
3. Generate and print reports on database.
4. Exporting Tables, Queries, Forms and Reports to web pages and XML pages.

ENVIRONMENTAL SCIENCES- BP 206 T

Knowledge

1. Knowledge Create the awareness about environmental problems among learners
2. Impart basic knowledge about the environment and its allied problems
3. Knowledge gain for to develop an attitude of concern for the environment.
4. Through knowledge Motivate learner to participate in environment protection and environment improvement.
5. Knowledge for Acquiring skills to help the concerned individuals in identifying and solving environmental problems
6. Through Strive to attain harmony with Nature.

SECOND YEAR BACHELOR OF PHARMACY SEM III

PHARMACEUTICAL ORGANIC CHEMISTRY II BP301T

Knowledge

BP301T .1K	Write the structure, name and the type of isomerism of the organic compound.
BP301T .2K	Write the reaction, name the reaction and orientation of reactions.
BP301T .3K	Account for reactivity/stability of compounds,

PHYSICAL PHARMACEUTICS-I BP 302T

Knowledge

302.1K	Investigate and apply various laws and theories, equations related to different states of matter
302.2K	Distinguish the principles of complexation/protein binding and to use them for calculations of drug release and stability constant.
302.3K	Demonstrate the use of physicochemical properties of drugs in the formulation development and evaluation of dosage forms

PHARMACEUTICAL MICROBIOLOGY BP 303T

Knowledge

BP 303T.1K	Gain knowledge & Understand methods of identification, cultivation and preservation of various microorganisms
BP 303T.2K	Knowledge to understand the importance and implementation of sterlization in pharmaceutical processing and industry

PHARMACEUTICAL ENGINEERING BP304T

Knowledge

BP304T.1K	To know various unit operations used in Pharmaceutical industries.
BP304T.2K	To understand the material handling techniques.
BP304T.3K	To perform various processes involved in pharmaceutical manufacturing process.
BP304T.4K	To carry out various test to prevent environmental pollution.
BP304T.5K	To appreciate and comprehend significance of plant lay out design for optimum use of resources.

PHARMACEUTICAL ORGANIC CHEMISTRY II BP305P

Skill

BP305P .1S	Laboratory Techniques such as recrystallisation techniques , Steam distillation
BP305P .2S	Determination of oil values
BP305P .3S	Prepare organic compounds

PHYSICAL PHARMACEUTICS-I-PRACTICALBP306P

Skill

306.1S	Operate different pharmaceutical laboratory instruments used in determining various physicochemical properties such as surface tension, viscosity, adsorption and solubility, HLB and partition coefficient.
306.2S	Study effect of various factors on states of matter
306.3S	Study of complexation by different methods

PHARMACEUTICAL MICROBIOLOGY PRACTICALBP307P

Skill

BP307P.1S	Skill to learn basic techniques of aseptic handling and sterilization
BP307P.2S	Skill to understand basics in microbiology
BP307P.3S	Skill to handle microorganisms
BP307P.4S	Skill to learn standardization of pharmaceutical products microbiologically

PHARMACEUTICAL ENGINEERING PRACTICAL BP308P

Skill

BP308P.1S	To know various unit operations used in Pharmaceutical industries.
BP308P.2S	To perform various processes involved in pharmaceutical manufacturing process.
BP308P.3S	To appreciate and comprehend significance of plant lay out design for optimum use of resources.

SECOND YEAR B-PHARM SEM-IV

PHARMACEUTICAL ORGANIC CHEMISTRY II BP401T

Knowledge

BP401T .1K	Understand the methods of preparation and properties of organic compounds.
BP401T .2K	Explain the stereo chemical aspects of organic compounds and stereo chemical reactions
BP401T .3K	Know the medicinal uses and other applications of organic compounds

MEDICINAL CHEMISTRY-I BP402T

Knowledge

BP402T.1K	Know general aspects of the design of the drugs.
BP402T.2K	Knowledge to understand the history, classification, nomenclature and chemistry of drugs with respect to their pharmacological activity.
BP402T.3K	Knowledge of drug metabolic pathways, adverse effects and therapeutic value of drugs.
BP402T.4K	Knowledge of Structure activity relationship of different classes of drugs.
BP402T.5K	Knowledge of chemical synthesis of some drugs.

PHYSICAL PHARMACEUTICS IIBP403T

Knowledge

403.1K	relate various physicochemical properties of drug and excipient molecules in designing dosage forms
403.2K	Distinguish the principles of chemical kinetics and to use them for stability testing and determination of expiry date of formulations
403.3K	Demonstrate the use of physicochemical properties of drugs in the formulation development and evaluation of dosage forms

PHARMACOLOGY I CODEBP 404 T

Knowledge

BP 404 T. 1k	To Understand the pharmacological actions of different categories of drugs
BP 404 T. 2k	To Understand mechanism of drug action, Pharmacokinetic, Pharmacodynamics, Adverse effect, at organ system/sub cellular/macromolecular levels
BP 404 T.3k	Apply the basic pharmacological knowledge in the prevention and treatment of various diseases
BP 404 T.4k	Appreciate correlation of pharmacology with other bio medical sciences

PHARMACOGNOSY I BP405T

Knowledge

BP 405 T.1K	Introduction to the subject Pharmacognosy, crude drugs and quality control aspects of crude drugs
BP 405 T.2K	Cultivation, Collection, Processing and storage of drugs of natural origin & Conservation of medicinal plants
BP 405 T.3K	Introduction to Plant tissue culture
BP 405 T.4K	Introduction to secondary metabolites and anatomy of plant parts from which they are obtained
BP 405 T.5K	Study of biological source, chemical nature and uses of drugs of natural origin

MEDICINAL CHEMISTRYI PRACTICAL BP406P

Skill

BP406P.1S	Skill to make correct use of various equipments and take safety measures while working in Medicinal Chemistry Laboratory.
BP406P.2S	Skill to Synthesize medicinally important compounds and purify them using, TLC & Column Chromatography.
BP406P.3S	Skill to Characterize the synthesized compounds using IR and NMR spectra's
BP406P.4S	Skill to Purify the solvents using fractional and vacuum distillation.
BP406P.5S	Skill to Explain reaction mechanisms involved in synthesis of medicinally important compounds.

PHYSICAL PHARMACEUTICS II BP407P

Skill

BP407P.1S	Study various micromeritic and rheological properties
BP407P.2S	Study effect of various factors on suspensions and colloids
BP407P.3S	Study and determine various kinetic parameters

PHARMACOLOGY I PRACTICALBP408P

Skill

BP 408 P.1S	Understand the in vivo and in vitro experiments, use of software for the study of preclinical experiments.
BP 408 P.2S	Observe the effect of drugs on animals by simulated experiments
BP 408 P.3S	Get knowledge about recent development in pharmacology

PHARMACOGNOSY I PRACTICAL BP 409P

Skill

BP 409 T.1S	Analysis of crude drugs by chemical tests: **(**i)Tragaccanth (ii) Acacia (iii)Agar (iv) Gelatin (v) starch (vi) Honey (vii) Castor oil
BP 409 T.2S	Determination of stomatal number and index
BP 409 T.3S	Determination of vein islet number, vein islet termination and paliside ratio.
BP 409 T.4S	Determination of size of starch grains, calcium oxalate crystals by eye piece micrometer
BP 409 T.5S	Determination of Fibre length and width
BP 409 T.6S	Determination of number of starch grains by Lycopodium spore method
BP 409 T.7S	Determination of Ash value
BP 409 T.8S	Determination of Extractive values of crude drugs
BP 409 T.9S	Determination of moisture content of crude drugs
BP 409 T.10S	Determination of swelling index and foaming

THIRD YEAR SEM V

Medicinal Chemistry II – BP501T

BP501T	At completion of this course it is expected that students will have Knowledge on the structure, chemistry and therapeutic value of drugs.
BP501T.1k	At completion of this course it is expected that students will be able to Understand structure activity relationships of drugs, importance of physicochemical properties and metabolism of drugs.
BP501T.2k	At completion of this course it is expected that students will be able to learn chemical synthesis of important drugs under each class.
BP501T.3k	At completion of this course it is expected that students shall be able to understand the chemistry of drugs with respect to their pharmacological activity
BP501T.4k	At completion of this course it is expected that students understand the drug metabolic pathways and the adverse effects

Industrial Pharmacy-I BP 502T

BP502T	At completion of this course it is expected that students will have Knowledge:
BP502T.1	Knowledge to illustrate various pharmaceutical dosage forms and their manufacturing techniques
BP502T.2	Knowledge to various factors to be considered in development of pharmaceutical dosage forms
BP502T.3	Knowledge to Formulate solid, liquid and semisolid dosage forms and evaluate them for their quality

Pharmacology- IIBP 503 T

BP503T	At completion of this course it is expected that students will have Knowledge:
503.1K	The essential pharmacotherapy and pharmacological features of common and Important drugs used in cardiovascular diseases and respiratory disorders.
503.2K	Various adrenoreceptors and Their Interaction with different CVS drugs and their Pharmacological Actions.
503.3K	Principles and applications of bioassay, Types of bioassay , Bioassay of insulin, oxytocin, vasopressin, ACTH,d-tubocurarine,digitalis, histamine and 5-HT,
503.4K	Harmonal study (Endocrine System)
503.5K	The essential pharmacotherapy and pharmacological features of common and important drugs used in Diuretics and Antidiuretics.

Pharmacognosy and Phytochemistry-II BP504 T

BP504 T	At completion of this course it is expected that students will have Knowledge:
BP504 T.1K	To know the modern extraction techniques, characterization and identification of the herbal drugs and phytoconstituents
BP504 T.2K	To understand the production of Phytoconstituents /herbal formulation.
BP504 T.3K	To understand the metabolic pathways in formation of secondary metabolites and application of biogenetic studies.
BP504 T.4K	To carryout isolation and identification of phytoconstituents

Pharmaceutical jurisprudence- BP505T

BP505T	This course is designed to impart basic knowledge on important legislations related to the profession of pharmacy in India.
BP505T.1k	To acquire knowledge Pharmaceutical legislations and their implications in the development and marketing of pharmaceuticals..
BP505T.2k	Knowledge to get Various Indian pharmaceutical Acts and Laws
BP505T.3k	Knowledge to receive regulatory authorities and agencies governing the manufacture and sale of pharmaceuticals
BP505T.4k	Knowledge to follow The code of ethics during the pharmaceutical practice

Industrial Pharmacy-I -BP506P

BP506P	At completion of this course it is expected that students will be able to
BP506P.1.S	Basic skill of Preformulation studies on paracetamol/ asparin /or any other drug
BP506P.2.S	To learn skill for preparation and of evaluation of paracetamol & Asprin tablets
BP506P.3.S	Skill to learn coating and various techniques of coating of tablets and granules
BP506P.4.S	To learn skill for preparation and evaluation of capsules
BP506P.5.S	Skill to develop method for preparation of injection such as ascorbic acid calcium gluconate etc.
BP506P.6.S	Skill to perform Quality control test of (as per IP) marketed tablets and capsules
BP506P.7.S	skill to understand for preparation of Eyedrops and eye ointments
BP506P.8.S	To advocate Evaluation of Glass containers as per IP

Pharmacology II- BP507P

BP507P	Introduction to in-vitro pharmacology and physiological salt solutions
BP 507 P.1S	All laboratory techniques and animal experiments are demonstrated by simulated experiments by softwares and videos
BP 507 P.2S	Composition of physiological salt solutions and Anti inflammatory, Analgesic ,PA2 value and PD2 Value and Diuretic Activity.
BP 507 P.3S	Performance of isolated experiments using various isolated preparation and the effects of different drugs on the concentration response curves.
BP 507 P.4S	Study the action of various drugs using preclinical models/ computer simulations.

Pharmacognosy and Phytochemistry II- BP508P

BP508P	At completion of this course it is expected that students will be able to
BP 508 P.1 S	Skill to understand basic knowledge of Morphology, histology and powder characteristics & modern techniques such as extraction & detection of crude drugs.
BP 508 P.2 S	Skill to learn the techniques of isolation and identification of phytoconstituents
BP 508 P.3 S	Skill to learn the modern techniques of separations of active plant constituents .
BP 508 P.4 S	Skill to learn the modern purification techniques of active plant constituents .
BP 508 P.5 S	Skill to learn the analysis of crude drugs by chemical tests

THIRD YEAR SEM –VI

INDUSTRIAL PARMACY –II

Knowledge:

1 .Explain disperse systems, its classification, theories of disperse systems, thermodynamic v/s kinetic stability considerations.

2. Explain suspensions, types, formulation development, manufacturing, excipients used, evaluation of suspensions etc.

3 .Describe emulsions, their physico-chemical properties, theory of emulsification, HLB value & phase inversion temperature, Kraft point, cloud point, excipients,

4. formulation & evaluation of emulsions; cracking, coalescence, stability & stress testing.

5. Explain semi-solids, anatomy & physiology of skin, selection of bases; penetration enhancers, formulation development, Percutaneous absorption, flux measurement & evaluation.

6.Describe layout for manufacturing of suspensions, emulsions & semi-solids as per schedule M.

Skills:

1.State the correct use of various equipments in Pharmaceutics laboratory relevant to suspensions, emulsions & semi-solids, prepare BMR.

2.Explain & carry out formulation of Suspensions like Calamine lotion, Milk of Magnesia, Paracetamol Suspension, Antacid Suspension & carry out Evaluation.

3.Formulate emulsions: Liquid paraffin oral Emulsion, Turpentine Liniment, Formulation of Emulsion with HLB Consideration &evaluation.

4.Describe use of ingredients in formulation and category of formulation.

5.Prepare semisolids: Pain balm, Antifungal ointment/cream, Medicated Gel, Antiacne preparation, Non staining Iodine ointment with Methyl Salicylate & evaluation.

6.Prepare the labels so as to suit the regulatory requirements.

PHARMACEUTICAL ANALYSIS –IV

Knowledge:

1 .Explain principles, instrumentation and applications of various chromatographic, thermal, X ray,Diffraction and radio chemical techniques employed for the analysis of APIs and formulations.

2. Validate various analytical instruments & methods as per ICH/USP guidelines.

Skills:

1.Independently operate and calibrate various analytical instruments for the assay of various APIs and formulations as per Pharmacopoeial standards.

2.Independently process, interpret the data obtained through experimentation and report the results as per regulatory requirements.

3.Independently validate UV-VIS Spectrophotometric assay method as per ICH guidelines.

4.Take appropriate safety measures while handling instruments, chemicals and apparatus.

MEDICINAL CHEMISTRY-II

Knowledge:

1.Know general aspects of drug metabolism, the drug design aspects on the basis of drug metabolism and metabolism of therapeutically important drugs.

2.Know the general aspects of design of the drugs, history, classification, nomenclature, structure activity relationship (SAR), mechanism of action, therapeutic uses, adverse effects and recent developments in the CNS active drugs and drugs acting on blood.

Skills:

1.Make correct use of various equipments and take safety measures while working in Medicinal Chemistry Laboratory.

2. Synthesize medicinally important compounds and purify them using recrystallization techniques.

3. Synthesize medicinally important compounds by microwave assisted synthesis.

4. Characterize the synthesized compounds using IR and NMR spectra's.

5 .Purify the solvents using fractional and vacuum distillation.

6. Explain reaction mechanisms involved in synthesis of medicinally important compounds.

PHARMACOLOGY- III

Knowledge:

1. The pharmacology and pharmacotherapy of various general and local anesthetics.

2. The appropriate drug therapy and management of patients with specific CNS disorders.

3. The indications, mechanism of action, adverse effects and contraindications for the major classes of drugs used in the treatment of Parkinson's Disease, Migraine and Alzheimer's disease.

4. Pharmacological features of different classes of NSAIDs.

5 .The essential pharmacotherapy of Rheumatoid Arthritis, Osteoarthritis and Gout.

Skills:

1.The basic principles of bioassay, types of bioassay along with advantages and disadvantages.

2. Performance of isolated experiments using various isolated preparation and the effect of different drugs on the concentration response curves.

3. Study the preclinical screening of various drugs.

NATURAL PRODUCT CHEMISTRY

Knowledge:

1 .Understand & explain tools & techniques used in study of biosynthetic pathways in plants.

2. Explain source, chemistry & applications of drugs from marine origin. He/she should be able to compare & contrast marine & terrestrial sources of medicinal materials.

3. Explain difficulties in elucidation of biosynthetic pathways in plant & explain approaches used with their merits & demerits.

4. Understand & explain underlying reasons as why natural products are appropriate material in discovering new drugs & also explain their contribution in modern drug discovery.

5.Explain source, extraction, processing, chemistry & applications of natural products used in pharmaceutical & allied industry such as coloring, sweetening agents & polymers.

6. Compare & contrast nutraceuticals & functional foods & understand & explain their significance.

7. Explain & classify natural products used as dietary supplements.

8.Understand & explain significance of natural pesticides & explain source, chemistry & applications.

9.Explain source, extraction, processing, chemistry & applications of natural products used in pharmaceutical & allied industry such as bioavailability & skin permeation agents; wound healing agents, biofuels.

Skill:

1.Extract & subsequently conduct experiments to derive various physical constants required in characterization of natural products.

2.Charge, elute & gather pure material using column chromatography.

3.Record UV/IR spectrum of given sample & interpret them.

4.Able to perform the evaluation of isolated phytoconstituents by chemical, chromatographic and spectral means.

5. Listen carefully, raise logical query, draw information, understand rationale during field visits & prepare brief report for evaluation.

BIO-ORGANIC CHEMISTRY AND DRUG DESIGN

Knowledge:

1. Explain the significance of Bioorganic Chemistry and establish its relevance in drug design and discovery.
2 .Describe various approaches in rational drug design.
3. Explain various drug targets and their biochemical features, physiological &pathophysiological roles and their significance in drug design.
4 . Explain pro-drug concept in drug design.

PHARMACEUTICAL BIOTECHNOLOGY

Knowledge:

- Define Biotechnology & its state its scope in pharmacy
- Know the basics of biotechnology techniques and the various systems used.
- Know the method of genetic engineering for production of rDNA products
- including monoclonal antibodies.
- Know the information about the application of genetic engineering in animals.
- Have a knowhow of enzymes and their uses by immobilization.
- Illustrate use of Fermenter for production of fermentation products an information about their purification by downstream process.
- State the application of Fermenter process in production of vitamins and antibiotics

FINAL YEAR SEM VII

STERILE PRODUCTS

Knowledge:

1. Describe the General requirements, routes of administration, significance of tonicity adjustment and sterility and Pre-formulation of sterile products
2. Describe various packaging materials used, types, choice of containers, official quality Control tests and methods of evaluation.
3. Describe the GMP and design and layout of Parenteral Production Facility, environmental control zones, heating ventilation air conditioning (HVAC), HEPA filter and laminar area flow systems.
4. Explain Classification and formulation of SVP, types and selection of vehicles and added substance, processing, manufacturing and Quality control of SVPs along with Special types of SVPs and Pilot plant scale up.
5. Explain Large Volume Parenterals (LVPs),Types, concept of formulation, influence of physiological factors, processing, manufacturing and Quality control of LVPs, along with Parenteral Nutrition, intravenous admixture and Peritoneal dialysis fluid and Pilot plant scale up.
6. Explain General requirements, formulation, types and evaluation of ophthalmic products.
7. Describe Blood Products and Surgical Dressings

Skills:

1. Formulation development and Pharmacopoeial evaluation and labeling of SVPs, LVPs, and ophthalmic preparations
2. Expertise in sealing of ampoules
3. Describe use of ingredients in formulation and category of formulation
4. Pharmacopoeial evaluation of packaging materials
5. Importance and validation of aseptic area
6. Evaluation of marketed preparations

7 Significance and Accelerated stability testing of marketed samples.

PHARMACEUTICAL ANALYSIS –V

Knowledge:

1. Understand principles, instrumentation of Infra red (FTIR, NIR) Raman, Gas Chromatography, Flash Chromatography, Super critical fluid chromatography Atomic Emission spectroscopy, and their applications in Pharmaceutical industry.
2. Know about electron microscopy.

Skills:

1. Independently operate and calibrate various analytical instruments for the Separation/isolation and assay of various APIs and formulations as per Pharmacopoeial standards.
2. Independently process, interpret the data obtained through experimentation and report the results as per regulatory requirements.
3. Take appropriate safety measures while handling instruments, chemicals and apparatus.

MEDICINAL CHEMISTRY-III

Knowledge:

1. Know general aspects of the design & development of drugs
2. history, classification, nomenclature, structure activity relationship (SAR), mechanism of action, adverse effects, therapeutic uses and recent developments in therapeutic categories such as NSAIDs, steroidal anti-inflammatory drugs, narcotic & non-narcotic analgesics, antipyretics, autacoids and drugs acting on respiratory & GI tract..

Skills:

1. Make correct use of various equipments & take safety measures while working in medicinal chemistry laboratory.
2. Develop skills involved in thin layer chromatography techniques and purification of synthesized compounds by column chromatography.
3. Synthesize, recrystallize and understand reaction mechanisms involved in synthesis of medicinally important organic compounds.
4. To interpret the spectral characterizations made by IR and 1H-NMRs of synthesized compounds.

PHARMACOLOGY-IV

Knowledge

1. Get in-depth knowledge about pharmacology and pharmacotherapy of drugs used in infectious diseases, cardiovascular disorders etc.
2. Understand the involvement of oxidative stress and role of antioxidants along with some safety issues in pharmacology.

Skill:

1. Understand the importance of isolated preparation, mechanism of action of drugs on isolated tissues, expertise in performing bioassay of drugs.
2. Analyze the rational and irrational fixed dose combinations based on various parameters.
3. Understand the prescription pattern and rational use of drugs by performing case study or doing hospital visit.

NATURAL DRUG TECHNOLOGY

Knowledge:

1. Understand & explain various difficulties in standardization of herbal material, new approaches evolved, and steps in development of plant monograph.
2. Understand & explain need & significance of plant material authentication, new Approaches used with their merits & demerits.
3. Comprehend & explain various factors affect on level of secondary metabolites, how these can be minimized to ensure quality in raw material, effect of post harvesting manipulations, and changes during storage etc& methods to control these modification. Explain various guidelines issued by WHO in relation with cultivation, collection, storage etc.
4. Understand & explain concept of health & pathogenesis, philosophical basis, diagnosis & treatment aspects of Ayurveda, Unani, Siddha &Homoepatic system of medicine;
5. Understand & explain method of preparation of Ayurvedic dosage forms; significance of novel drug delivery of natural products; herbs used in cosmetic preparation & methods of their formulations.
6. Compare & contrast nutraceuticals & functional foods & understand & explain their significance. Explain & classify natural products used as dietary supplements.
7. Understand & explain significance of natural pesticides & explain source, chemistry &

applications.

8. Explain source, extraction, processing, chemistry & applications of natural products used in pharmaceutical & allied industry such as bioavailability & skin permeation agents; wound healing agents, biofuels.

Skill:

1. Prepare, label & evaluate herbal/TSM formulations
2. Evaluate marketed cosmetic & nutraceutical formulations
3. Conduct preformulation parameters & understand underlying rationale
4. Conduct in vitro assays for correlation with biological efficacy
5. Able to handle various equipments as per SOPs & learn various demonstrations (of experiments).
6. Listen carefully, raise logical query, draw information, understand rationale during field visits & prepare brief report for evaluation.

BIO-PHARMACEUTICS & PHARMACOKINETICS

Knowledge

Understanding the concept of biopharmaceutics and its applications in formulation development.

- Studying pharmacokinetic processes and their relevance in efficacy of dosage form.
- Learning the concepts of bioavailability and bioequivalence studies.
- Learning various compartmental models and non compartmental analysis methods.
- Understanding concept and mechanisms of dissolution and in vitro in vivo correlation.

PHARMACEUTICAL JURISPRUDENCE

Knowledge

1) To understand .Basic principles, purpose and dimensions of the laws
2) To understand the significance and relevance of Pharmaceutical laws in India

3) Important rules and regulations and procedures made to execute the laws

4) To discuss the purpose of the Board

5) To explain the definitions in the Act;

6) To describe the qualifications for membership and the make-up of the Board

7) To explain the rule-making authority of the Board;

8) To discuss the responsibilities of the Board;

9) To discuss inspections by the Board or its representative;

10) To learn the various laws governing the manufacturing, sale, research & usage of drugs

11)To understand significance of Schedule M and Schedule Y related Manufacturing & clinical trials

12) Identify potential fraud and abuse legal issues of narcotic & psychotropic substance.

13) To study quality & prices of essential medicine

14) Learner knowledge about Patents, procedure for patent application and IPR.

15) To understand the regulatory system for safety and effectiveness of medicine and quality of product

FINAL YEAR SEM VIII

ADVANCED DRUG DELIVERY SYSTEM

Knowledge:

1. Describe the Fundamental Concept of Modified Drug Release and Pre requisites of drug candidates, along with various approaches and classification
2. Describe Polymers with respect to introduction to polymers, classification, types, selection, application and examples.
3. Describe. Introduction, formulation, merits, demerits, application and evaluation of Novel Drug Delivery Systems
4. Explain Therapeutic Aerosols along with typical formulations from, metered dose, intranasal and topical applications,
5. Explain concept of microencapsulation, merits, demerits and application, Types of Microencapsulation and Evaluation of microcapsules
6. Explain Basic concept of optimization

Skills:

1. Formulation development and evaluation of sustained release, transdermal, gastro retentive formulations
2. Micro encapsulation techniques
3. Evaluation of marketed preparations
4. Optimization studies using 23 factorial design

COSMETIC SCIENCE

Knowledge:

- Understand the concepts of cosmetics, anatomy of skin v/s hair, general excipients used in cosmetics.
- Explain formulation of cosmetics for skin, manufacturing, equipments &evaluation of creams like cold cream, vanishing cream etc. & powder cosmetics.
- Explain formulation of cosmetics for hair, manufacturing & evaluation of hair shampoos, tonics etc.
- Describe formulation of cosmetics for eyes, manufacturing & evaluation of eye mascara, shadow etc.
- Understand formulation of manicure products like nail lacquer, remover etc.
- Learn formulation, manufacture & evaluation of baby cosmetics like baby oils, powders etc.
- Explain the concept of cosmeceuticals, history, difference between cosmetics & cosmeceuticals & cosmeceutical agents.

Skills:

- State the correct use of various equipments in Pharmaceutics laboratory relevant to cosmetics.
- Perform formulation, evaluation and labelling of cosmetics like moisturising cream, vanishing cream etc.
- Perform formulation, evaluation of eye cosmetics, nail lacquer & shampoo.
- Perform formulation, evaluation & labelling of shaving cream, after shave & baby products.
- Describe use of ingredients in formulation and category of formulation.
- Prepare labels as per regulatory requirements.

PHARMACEUTICAL ANALYSIS-VI

Knowledge:

1. Understand principles, instrumentation of NMR and ESR spectroscopy, HPLC and their applications in Pharmaceutical research, quality control of APIs & formulations.
2. Understand the basic principle, instrumentation of Mass Spectrometry.

Skills:

1. Independently operate and calibrate various analytical instruments for the assay of various APIs and formulations as per Pharmacopoeial standards.
2. Independently process, interpret the data obtained through experimentation and report the results as per regulatory requirements.
3. Take appropriate safety measures while handling instruments, chemicals and apparatus.

MEDICINAL CHEMISTRY-IV

Knowledge:

1. Know general aspects of the design & development of drugs.2
2. Know history, classification, nomenclature, structure activity relationship (SAR), mechanism of action, adverse effects, therapeutic uses and recent developments in categories such as chemotherapeutic agents, antibiotics, hormones & anti-fertility agents.

Skills:

1. Make correct use of various equipments & take safety measures while working in medicinal chemistry laboratory.
2. Understand and develop skills in various demonstrated experiments such as High Vacuum distillation, recrystallization and pH based amino acid separation.
3. Develop skills involved in thin layer chromatography techniques and purification of synthesized compounds by column chromatography.
4. Synthesize, recrystallize and understand reaction mechanisms involved in synthesis of medicinally important organic compounds.
5. Interpret the spectral characterizations made by IR and 1H-NMRs of synthesized compounds.

PHARMACOLOGY-V

Knowledge:

1. Understand various methods of drug-drug interaction inside the body.
2. Understand the mechanism of adverse drug reactions and pharmacovigilance.
3. Get knowledge about recent development in pharmacology

Skill:

1. Understand the in vivo and in vitro experiments, use of software for the study of preclinical experiments.
2. Brief idea about statistics, its applications and how to solve problems using various statistical tests.

NATURAL PRODUCTS: COMMERCE, INDUSTRY & REGULATIONS

Knowledge:

1. Understand & realize the significance of natural products in daily life. He/she should be able to classify different segments in market, demand & supply position; export & import potential; position of Indian herbal drug industry in global contest; government organizations& policies for promotion; their regulation in India & other countries, various regulatory guidelines, ethical issues etc.
2. Realize the market potential of natural products & explore entrepreneurship skills to grab these opportunities.
3. Understand & explain safe use of natural products, possible toxicities &interaction, toxicities in most venerable group (elderly patients), need &significance of pharmacovigilance systems; WHO guidelines in this regard.

QUALITY ASSURANCE TECHNIQUES

Knowledge:

Describe the significance of quality in pharmaceutical manufacturing

- Explain Current Good Manufacturing Practices
- Describe various aspects of documentation, SOPs and records
- Elaborate on the role of validation in assurance of quality in pharmaceutical industry
- Explain about quality by design
- Explain about ICH guidelines in stability testing and QMS