Fist Year B.Pharmacy Semester I

Course Code: BPH_C_101_T

Course Name : General Chemistry

Course Summary:

General chemistry theory course is designed to provide knowledge about structure of various molecules or ions based on chemical bonding concept, kinetic concept and reaction mechanisms, various form of catalyst and application of it in various reactions, and role of inorganic reagents as medical compounds.

The basic fields of general chemistry are included in the course: structure of atoms, periodicity of chemical elements properties, theory of chemical bonding, stereochemistry of molecules, principles of chemical equilibrium. These principles are applied in the description of reactivity and fundamental properties of inorganic substances. The descriptive part of inorganic chemistry is, unlike the conventional treatment (chemistry of elements), approached as a chemistry of inorganic phases. The main families of substances are discussed such as gaseous and liquid molecular compounds, ions in aqueous solutions and their salts, coordination complexes, metals and intermetallic compounds, solid oxides and inorganic polymers, carbides, nitrides and further solid compounds of metals.

Also covers the brief introduction of monographs of basic inorganic compounds which covers the Gastrointestinal Agents, Topical Agents, Complexing and chelating agents used in therapy, poisons and antidotes, Sclerosing agents, expectorants, emetics, Inorganic Radio Pharmaceuticals, Major Intra & Extracellular Electrolytes, Essential and Trace Elements.

Course Code: BPH_C_102_T

Course Name : Dispensing and Community Pharmacy

Course Summary:

This course gives detail knowledge about the concept of drug versus dosage forms, basic calculations relating to the practice of dispensing, prescriptions and their types and their compounding and the role of a community pharmacy in healthcare. This course gives knowledge about definition and identification of the various dosage form. They learn problems related to pharmaceutical calculations. This course enlighten on knowledge about different type of prescriptions. It also give strength students about identification and different steps involved in compounding and dispensing formulations. It also give knowledge about physical and chemical incompatibilities among different active ingredients and formulations. This course also gives knowledge about community pharmacy.

Course Name: Anatomy, Physiology and Pathophysiology – I

Course Code: BPH_C_103_T

Course Description:

In this subject students are learning outline and categorize the various body structural levels (cells, tissues, organs, and systems) and recall the structure, composition and functions of plasma membrane and methods of movement of substances across plasma membrane. They learn anatomy, physiology of lymphatic system, recall & interpret the types of hypersensitivity reactions, and make use of the knowledge of the pathophysiology of AIDS and autoimmune diseases. In this subject students learn the composition and functions of blood, explain the process of hemostasis and blood coagulation as well as recall & apply the knowledge of pathophysiology of common haematological disorders. Student learn the mechanisms of inflammation and repair. Students also learn the anatomy of skeletal, cardiac and smooth muscle, explain the transmission at the neuromuscular junction and energy metabolism in the muscle as well as the mechanism of skeletal muscle contraction and demonstrate various types of skeletal muscle contractions.

Course Name: **Biochemistry I (CBCS)**

Course Code: BPH_C_104_T

Course Summary:

Biochemistry-I theory course is concerned with biochemical component likes carbohydrates, proteins, lipids, nucleic acid and vitamines. The concept of free energy and its biological significance are included. Adequate inputs are provided on introduction to carbohydrates, proteins, and lipids along with their classification, structure and uses. It also provides details regarding vitamins as co-enzymes and their significance and metals as co-enzymes and their significance. It helps students to understand biochemical roles of all the vitamins with details of the mechanisms of their functions (riboflavin, thiamine, pyridoxal, nicotinamide, biotin, folic acid, ascorbic acid, pantothenic acid, cyanocobolamine, inositol, vitamins A, D, E, K). Students learn about classification, structure of carbohydrates, proteins, and lipid. They acquire knowledge on digestion of food and absorption of food (carbohydrates, lipids and protein) and understand concepts of anabolism and catabolism.

Course Name: Communication skills – Theory

Course Code: BPH_C_105_T

Course Summary:

Communication skills theory course is designed to provide communication skill knowledge for connecting different kind of people and also to withstand in all fields. This course helps the young pharmacy student to interact effectively with doctors, nurses, dentists, physiotherapists and other health workers. From this course the student will achieve the soft skills set to work cohesively with the team as a team player and will add value to the pharmaceutical business. The communication barriers can be eliminated by this course from which they can make their communication effective. With good communication skill the students can communicate effectively and help of communication style information student get shape to their communication habit with stylish way. Stress management and time management will help the students to counter stress at workplace and time management. Writing skill help to show their thinking powered and listing skill give edge to understand aspect more clearly. Interview skill, group discussion and presentation skill knowledge help the student for industry working as well as community. Focus is given to acquire the knowledge about the Communication and their presentation in the community aspect of drug

and their dosage form. Upon completion of the subject student able to understand the behavioural needs for a Pharmacist to function effectively in the areas of pharmaceutical operation. They able to communicate effectively (Verbal and Non Verbal) in all areas. Students able to Effectively manage the team from it's surrounding and emerges as a team player. Students will learn how to face the interview with skilfully. They able to inculcate and understand the useful Leadership qualities and essentials. Technical communication would help the student to communicate in different organisation. Students become familiar with ICT tools necessary for technical communication. Students also learn the ethical code of conduct of profession.

Course Name: General Chemistry lab (CBCS)

Course Code: BPH_C_106_L

Course Summary:

General chemistry practical course is designed to provide knowledge about limit test of inorganic mixtures, various pharmacopoeial tests for the detection of inorganic impurities, preparation of pharmaceutical compounds. It also includes semimicro analysis of inorganic compounds This course give knowledge about how to analyze inorganic mixtures qualitatively by semi-micro methods. This course also enlighten students about identification of different inorganic impurities in inorganic medicinal agents by performing Pharmacopoeial test. Also gives knowledge about preparation of inorganic pharmaceuticals.

Course code: BPH_C_107_L

Course summary : Dispensing and Community Pharmacy Lab

Course Description

In this course how to read prescriptions, identify commonly used Latin terms in Pharmacy practice. They learn to Calculate the quantities of active ingredients and excipients required for compounding the required quantity of formulation (expansion and reduction of formula) Students will learn to compound, label and dispense extemporaneous formulations They also learn to understand patient counselling and patient education methods.

Course Name: Anatomy, Physiology & Pathophysiology Lab

Course Code: BPH_C_108_L

Course Summary

In this course students learn to Carry out/Perform RBC count, WBC count, Differential Leukocyte count, ESR, PCV, Bleeding time, clotting time and interpret the results and correlate with clinical conditions and record/measure blood pressure. They also learn to Identify and locate the bones in human skeleton. Students also able to Identify and describe the various body tissues and organs based on the structure and organisation of cells. Students are make aware about common diagnostic and biochemical tests performed in various clinical conditions and make use of it in diagnosis and prognosis of the disease.

Fist Year B.Pharmacy Semester II

Course Name: Anatomy, Physiology and Pathophysiology – II

Course Code: BPH_C_201_T

Course Summary:

The students learns in this course about the types of and mechanisms of cellular injuries and cellular adaptation. They able to compare and contrast between benign and malignant tumours, Classify malignant tumours and explain the etiology and pathogenesis of cancer.

Course include detail about the biological effects of radiations. Course also contain detail study of anatomy and physiology of the respiratory system, endocrine system, nervous system and the sensory organs. Students also learn the aetiology, pathogenesis, signs, and symptoms of common diseases/disorders of respiratory system, endocrine system and nervous system

Course Name: Biochemistry II (CBCS)

Course Code: BPH_C_202_T

Course Summary:

Biochemistry-II theory course is concerned with Carbohydrate metabolism, Lipid metabolism and Nucleic Acid Metabolism. It also provides details regarding various metabolism with respect to their structures of intermediates, enzymes and cofactors, energy yield/requirements and regulation along with examples of drugs modulating various metabolism. Biosynthesis of RNA and DNA, DNA repair mechanism and recombinant DNA processes are part of the course. Solid phase DNA synthesis and solid phase peptide synthesis are also focused. The students should able to (1) explain the biochemical role of carbohydrates, proteins, lipids and metabolic pathway of nutrients, (2) describe the electron transport mechanisms and role of cofactors involved in it, (3) explain the metabolism of nucleotides, their clinical relevance, and (4) understand the concepts of DNA replication, transcription and translation.

Course code: BPH_C_203_T –

Course Name : Pharmacognosy I (4 Hr/Wk)

Course summary

In this course Student learn about the Alternative and complementary systems of medicine, classify drugs of natural origin. students will learn about Primary and secondary plant metabolites their biosynthesis, evaluation and therapeutic application. Student understand the morphological and Microscopic features of medicinal plants. Student will be able to elaborate commercial production, collection, preparation, storage and factors affecting cultivation of medicinal plants. Student able to learn about chemistry, source, preparation, evaluation of carbohydrate containing crude drugs and their commercial utility as Pharmaceutical Aids and Medicines. Student also study about the source, composition, preparation and applications of fibers, minerals, important protein and enzymes of natural origin.

Course Name : Hospital Pharmacy and Drug Store Management

Course code: BPH_C_204_T

Course Summary:

Students will learn in this course about the difference in the functions, layout, legal requirements, organization, drug procurement, storage and dispensing of medicines in a retail versus hospital pharmacy setting. They also learn about the importance of documentation in the functioning of a pharmacy. They understand the importance of a hospital level formulation and compounding of parenterals. Also they will understand the importance and functioning of the hospital sterile supply services department. They able to understand about dangers/detection/reporting of fraudulent pharmacy practices. They also learn about the concept of Rational Drug Therapy.

Course Name : Environmental Science

Course code: BPH_C_205_T

Course Summary:

Student will learn about the importance of environmental science and environmental studies also able to the importance of key to the future of mankind. They will also learn about continuing problems of pollution, loss of forget, solid waste disposal, degradation of environment, issues like economic productivity and national security. This course enlighten on Global warming, the depletion of ozone layer and loss of biodiversity have made everyone aware of environmental issues. This course give knowledge of basics of Environmental sciences like need and purpose of study the subject, Ecology, food chain and ecological pyramids, sustainable development Also provide Outline, Environmental Legislation, role of different ministries and environment control boards. This course enlighten about classification and comparison different sources of energies. This course gives strength to relate technology to control pollution and economic benefits thereof, infer, the concept of green building, carbon credit and disaster management Realize the environment related moral responsibilities and identify Legal (environmental) aspects for becoming entrepreneur in future

Course Name : Pharmacognosy Lab I

Course code: BPH_C_206_L

Course Summary:

In this course students will learn about major parts of plants for their morphological features and microscopic characters including histology, powder characteristics. students will learn and acquire knowledge of microscopic characters of the crude drugs in ascertaining genuinely of powdered formulations. They also learn to extract and perform qualitative chemical tests belonging to various classes of phytoconstituents viz. Anthraquinone Glycosides, Cardiac Glycosides, Flavonoids, Cyanogenetic Glycosides, Alkaloids, Triterpenoid and Steroidal Glycosides, Saponins, Tannins. They will study about analytical procedures in quantitative determination of total Aldehyde content / Phenol content / total alkaloids from crude drugs. They will learn different technique of principles involved and carry out extraction of active constituents They also able to learn to identify crude drugs

based on the morphological characters and quote some formulations available in market with their therapeutic utility

Course Name: Biochemistry lab I (CBCS)

Course Code: BPH_C_207_L

Course Summary:

Pharmaceutical biochemistry laboratory course concentrates on qualitative tests for carbohydrates and confirmatory tests by osazone formation as well as qualitative test and simple color reactions for amino acids and proteins. The focus is also given to precipitation reactions of proteins and chromatographic separation of amino acids**.** Quantitative estimation of glucose (Willstaters and Lane & Eynon's methods) and quantitative estimation of proteins by Biuret method and Folin method are studied.

The students learn about qualitative analysis of carbohydrates, proteins, Quantitative estimation of properties of lipids – acid value, iodine value, saponification value and also quantitative estimation of RNA and DNA.

Course Name: Computer Lab

Course Code: BPH_C_208_L

Course Summary

In this course students will learn about the components of a PC course is one of the descriptive for the different operating systems. Students will learn about simple programs using BASIC and C programming languages. Course also will teach them to apply knowledge gained for use of computers in pharmacy

Second Year B.Pharmacy Semester III

Course Name : Organic Chemistry I

Course code: BPH_C_301_T

Course Summary

Students will learn this course about the system of naming organic compounds generally encountered in Pharmacy profession . The structural features of organic compounds with respect to 2D and 3D features, resonance forms, tautomerism, conjugation, and aromaticity. They will also learn the properties of compounds as dictated by their structures especially the functional groups. Course will give knowledge of concepts of reaction kinetics, first/second/zero order rates and equilibrium phenomenon.

Course Name: Physical Pharmacy I

Course code: BPH_C_302_T

Course Summary

aspect and state of matter for different substance. Dissolution provide the idea about the quality standard of dosage form while diffusion provide the dosage form action in body to student. Complexation provide the idea about the different analysis test and use of it in poising . Colligative properties information gives idea about the extent of ionisation of drug and to get it's mol. wt. to the student and idea about to make isotonic as well. The course ensures the ability to be a resemblance the concepts of the quality control and quality analysis of drug and it's dosage forms.. Focus is given to acquire the knowledge about the physical aspect of drug and their dosage form Upon completion of the subject student shall be able to: 1. Understand the various physicochemical properties of drug molecule for designing the dosage form of drug 2.Use knowledge of principal of thermodynamic for developing various routes of administration of drug 3.Understand and explain important pharmacy-related physical principles such as states of matter, diffusion dissolution , solutions of non-electrolytes , solubility, isotonic solutions 4. Narrate the principles of chemical kinetics & to use them for stability testing and determination of expiry date of formulations 5. Exhibit use of physicochemical properties in the formulation development and evaluation of dosage forms

Course Name: Anatomy,Physiology & Pathophysiology III

Course code: BPH_C_303_T

Course Summary

This course will provide the knowledge of anatomy and physiology of reproductive, cardiovascular, urinary and gastrointestinal system. It also explain about pathophysiology of common diseases associated with reproductive, cardiovascular, urinary and gastrointestinal system. Comprehend the etiology, pathogenesis, signs and symptoms of common diseases of the reproductive system, cardiovascular system, urinary system and digestive system It also help students to acquire knowledge of state the relevance of various body fluid compartments, electrolyte distribution and acid-base balance.

Course Name: Pharmaceutical Analysis I

Course code: BPH_C_304_T

Course Summary

Pharmaceutical analysis theory course involves the principles and applications of volumetric analysis along with computation of analytical results. The concepts of error, precision, accuracy, and specificity, detection of limit, linearity, ruggedness, and standard deviation are evaluated. The principles and applications of oxidation-reduction, complexometric, argentometric, iodometry, and nonaqeous titrations are included. The theory, principles and applications of gravimetric is analysed. Electro analytical techniques likes Polarography, Amperometry, Pulse polarography,Coulometry and High Frequency titration and Electrogravimetry are studied.Technique, apparatus and principle of Oxygen flask combustion method, Nitrite titrations, Kjeldahl method were included.

Course Name: Pharmaceutical Engineering

Course code: BPH_C_305_T

Course Summary:

To provide learner with basic understanding of unit operations and related aspects involved in pharmaceutical industry. Unit operations including Crystallization, flow of fluid, evaporation, distillation and other processes will be addressed. This course give relevant information about unit operations in a pharmaceutical manufacturing plant and select appropriate equipment types for various manufacturing operations. It also give knowledge to the students so that they can identify typical problems associated with pharmaceutical manufacturing and suggest means of overcoming these.

This course include design and select appropriate primary and secondary packaging and associated equipment. This course impart the knowledge of design a pharmaceutical production plant with a particular emphasis on containment and handling.

Course Name: Organic Chemistry Lab I

Course code: BPH_C_306_L

Course Description:

Students will learn aspects of occupational safety and hazards of working in a chemistry laboratory. They also learn the method for determination of some common and useful physical properties of organic compounds. They will acquire the knowledge of the method for determination of some common functional groups present in organic compounds. Students learn to characterize/ Identify/Spot monofunctional or bifunctional organic compounds by physical constant, elemental analysis and functional group analysis.

Course Name: Physical Pharmacy Lab I

Course code: BPH_C_307_L

Course Description:

The course will give the knowledge of the methods for the determination of different physical parameters underlying pre-formulation testing, formulation development and finished product testing of drug delivery systems. Students will also carry out various physical tests involved in characterization of drugs. They will also learn to evaluate physical parameters involved in pre-formulation and formulation evaluation

Course Name: Pharmaceutical Analysis Lab I

Course code: BPH_C_308_L

Course Description:

Students will learn in this course about pharmacopoeial methods of analysis, procedures for conducting different titrimetric analysis like acid-base titrations, complexometric titrations, etc. They will also acquire the knowledge of gravimetric methods of analysis. They will able to learn practice of calibration and proper handling of volumetric apparatus, electronic analytical balance and safety measures in the laboratory. They able to perform and record, calculate and interpret data obtained for experiments related to volumetric, gravimetric and solvent extraction methods of analysis.

Second Year B.Pharmacy Semester IV

Course Name: Organic Chemistry II

Course code: BPH_C_401_T

Course Summary:

Students will learn about the synthetic methods for the introduction of different functional groups in a molecule and different methods for interconversion of some functional groups using synthetic methods. They also learn the different nucleophilic reactions of carbonyl compounds and different electrophilic reactions of alkenes. They will acquire the knowledge of nucleophilic and electrophilic reactions of aromatic compounds.

Course Name: Physical Pharmacy II

Course code: BPH_C_402_T

Course Summary:

Students able to learn in this course about basic concepts of chemical kinetics, drug diffusion and dissolution, biopharmaceutics, complexation, coarse and colloidal dispersions, which in turn, will help the in design, development and evaluation of dosage forms. They can
Identify order of reactions, pathways of drug degradation and types of drug complexes They will learn Fick's laws of diffusion, mechanism of drug dissolution and absorption. Acquire knowledge of drug complexes, protein binding and their applications

Course Name: Pharmaceutics I

Course code: BPH_C_403_T

Course Summary:

Students get knowledge of introduction to Pharmaceutics and preliminary knowledge that is required in the field of formulation they will also learn about development and details of Monophasic liquids, Powders and Biological preparations. This course will describe the
status of Pharma Industry in India and elaborate on the different official compendia, the various types of dosage forms, routes of administration and describe the alternate systems of medicine.This will give knowledge of concepts and need for GMP & QA and preformulation, packaging of pharmaceuticals. This course will give knowledge of the various biological products, viz. sutures & ligatures, blood products and plasma volume expanders.

Course Name: Pharmacology I

Course code: BPH_C_404_T

Course Summary:

This course will give knowledge about general principles of Pharmacology, drug actions, routes of drug administration, pharmacodynamics and pharmacokinetics.

They also acquire the knowledge on the effect of drugs on the human body and the mechanisms by which they produce biological/therapeutic/toxic effects and knowledge about the pharmacology of drugs acting via receptors of Autonomic nervous system.

It will educate on the pharmacology of drugs used for cardiovascular disorders and pharmacology of diuretic drugs. This course also include pharmacokinetic and pharmacodynamic principles along with various routes of administration with advantages and disadvantages. Understand the factors modifying drug action. They will learn to classify receptors and elucidate their role in drug/neurotransmitter/hormone action. Understand the mechanisms of drug action. Course will explain autonomic transmission and discuss the pharmacology of drugs acting on ANS and rationalize their therapeutic applications .

Course Name: Microbiology

Course code: BPH_C_405_T

Course Summary:

Course include the scope, history of microbiology and applications in pharma industry, classification of microorganisms and Learn different microscopy techniques and principles of different staining techniques. It will give the knowledge of structural organization and multiplication of bacteria, viruses, algae, protozoa, and fungi, Nutritional requirements of bacteria and study diseases related to them ; different media used for bacterial culture; growth curve and different methods to quantify bacterial growth . Course will also give information about physical and chemical control of microorganisms, different methods of sterilization, validation of sterilization methods Student will learn Microbiological standardization of Pharmaceuticals: Bioassay, Microbial limit tests, Sterility testing of pharmaceutical products and preservation of pharmaceutical products. It will provide the knowledge of use different microscopic techniques, staining techniques, and differential media for the identification of some common disease causing microorganisms.

Course Name: Mathematics and Statistics

Course code: BPH_C_406_T

Course Summary:

This course include the basic principles of calculus, differentiation and integration, and determinants and matrices and their application in several other specialized pharmacy subjects. This course also provide information about statistics and statistical methods in data analysis and results interpretation and as an extension in experimental design. They will know about theoretical concepts of topics and their application in Pharmacy

Course Name: Physical Pharmacy Lab II

Course code: BPH_C_407_L

Course Summary:

This course include methods to evaluate shelf life and physical stability of products and teach the characterization methods and protocols for determination of physical parameters. Student will learn about reaction rate constant, order of a reaction for different reactions. They will learn about shelf life by carrying out accelerated stability studies. Course also include physical parameters such as stability constants, molecular weight, and critical micellar concentration

Course Name: Pharmaceutics Lab I

Course code: BPH_C_408_L

Course Summary:

Course include the preparation of typical monophasic liquid and powder formulations and carry out their Q.C. tests, and acquaint them with some biological preparations available in market. They will learn in this course how to prepare monophasic liquid systems and powder systems, justify the components and method of preparation. They acquire the knowledge about the properties of the developed dosage forms and biological products, comment on the quality.

Course Name: Pharmacology Lab I

Course code: BPH_C_409_L

Course Summary:

This course will give training in basic laboratory techniques like tissue (cock ileum) mounting and in vitro experimentation. This course also give information to plotting of dose

response curve of acetylcholine in presence of antagonist and agonist. It also demonstrate the effect of various drugs on isolated organ (frog heart) using interactive audiovisuals.

This course train student to Perform in vitro experiment on cock ileum (tissue) to evaluate effect of drug (Ach) and its dose on response (contraction) to comprehend and infer drug effects on receptors and its outcomes. They will learn to state the principles behind plotting dose-response of drugs/agonist/antagonist and its applications. Define pA2 value and calculate pA2 value of antagonist. They will acquire the knowledge of the mechanisms of action of neurotransmitters, drugs and ions on isolated frog heart. Also give knowledge of animal handling techniques and understanding of ethical guidelines governing animal experimentation.

Third Year B.Pharmacy Semester V

Course Name: Organic Chemistry III

Course code: BPH_C_501_T

Course Summary:

Organic Chemistry - III theory course is designed to provide knowledge about heterocyclic chemistry and Biomolecules. The course is designed to study five member, six members, and fused heterocyclic ring with one or two heteroatoms. Emphasis is given on nomenclature, resonance, tatutomerism, electrophilic aromatic substitution, synthesis of heteroaromatic ring and different reactions associated with heteroaromatic ring. The student gets the knowledge about different biomolecules like steroid, peptides, DNA and Polymer. In steroids students learn to draw chair conformation of steroid ring, stereochemistry, types of steroid hormones, reactions of steroid ring A & B. In peptide students learn synthesis of amino acid, structural determination of peptides, what is isoelectric point and solution phase and solid phase (Merrifield) peptide synthesis. In Polymer student learn about the types of polymer and its characterization

Course Name: Pharmaceutics II

Course code: BPH_C_502_T

Course Summary:

This course is a study of pharmaceutical dosage forms and considerations in their manufacture. Topics include study of formulation, manufacturing and processing problems in tablets, capsules, aerosols, and other dosage forms. Upon completion, students should be able to describe the characteristics of the major dosage forms and explain how these characteristics affect the effectiveness of the drug.

Course Name: Pharmaceutical Biotechnology

Course code: BPH_C_503_T

Course Summary:

Pharmaceutical Biotechnology is intended to provide the student with a working knowledge of the preparation, stability and formulation of different protein and peptide drugs such as antisense agents, transgenic therapeutics and gene therapy. Current FDA approved biotechnology drugs such as human insulin, growth hormones and interferons will be

discussed. This course imparts a comprehension of basic skills necessary for employing biotechnology principles. The knowledge gained in this course would be used to understand and evaluate the different pharmaceutical parameters of the current and future biotechnology related products on the market. Students will also be exposed to methods in producing commercial products using fermentation biotechnology. Techniques such as DNA probes and monoclonal antibodies, which facilitate faster diagnosis of disease, and therapies that effect quicker recovery illness will shorten hospital stays. Biotechnology will change the profile of the major causes of death and disability in our society.

Course Name: Pharmacology II

Course code: BPH_C_504_T

Course Summary:

This course include Basic knowledge of receptors and their physiological role in the human body. Course give knowledge about concepts of immunology and endocrinology. basic knowledge about blood and blood components. They will study of drugs used in treatment of Bacterial, fungal, viral and microbial infections, cancer, HIV, endocrine and hematological disorders.

Course Name: Choice Based Course I, **Nutraceuticals and Dietary Supplements**

Course code: BPH_E_512_T

Course Summary:

This course will help student to understand the concept of nutraceuticals and dietary supplements along with the classification with respect to health benefits, chemical nature and mechanism of action. It also expose the information about the health benefits of various classes of phytochemicals along with their salient chemical features, pharmacokinetics, doses and marketed preparations. It provide the knowledge about the formulation challenges of nutraceuticals and health supplements and the importance of the safety and stability of nutraceutical formulations. It will impart to aware of the regulatory aspects of nutraceuticals in India and major countries and labelling and regulatory aspects for manufacture and sale of nutraceutical products.

Course Name: Choice Based Course II , **Cosmeticology**

Course code: BPH_E_512_T

Course Summary:

It provide the knowledge of cosmeticology with respect to the types of formulations, evaluation and regulatory aspects. It also impart knowledge about the various raw materials for cosmetics, understand the toxicological aspects and toxicity testing for cosmetics. It will provide the knowledge about the various cosmetics products w.r.t. raw materials, large scale manufacturing and functional and physicochemical evaluation, the regulatory guidelines and sensorial assessment for cosmetics.

Course Name: Organic Chemistry Lab II

Course code: BPH_C_505_L

Course Summary:

This course will give information about the basic techniques of separation of compound mixtures. It also focus on the procedure for identification of organic compounds. This course will help students to acquire the methods for recrystallization of compounds

Course Name: Pharmaceutics Lab II

Course code: BPH_C_506_L

Course Summary:

This course will focus on the practical aspects of preparation and evaluation of biphasic suspensions and emulsions, semisolid ointments and creams, suppositories and aerosols formulations for pharmaceutical and cosmetic applications.

Course Name: Experimental Techniques in Microbiology and Biotechnology Lab

Course code: BPH_C_507_L

Course Summary:

This course will give knowledge of some of the common techniques used in microbiological work and biotechnology experiments like Characterization and identification of bacteria using various staining techniques (morphological study), colony characterization, serological and biochemical characteristics. It will also analyze quality of raw material, food and water and assessment of extent of microbial contamination using counting technique and Evaluate sterility of products .Course also give the knowledge about bioassay of antibiotic and test antibiotic sensitivity of few antibiotics.

Third Year B.Pharmacy Semester VI

Course Name: Pharmaceutical Chemistry I

Course code: BPH_C_601_T

Course Summary:

This course give the knowledge about pharmacodynamic attributes like drug targets, drug-receptor binding, proteins as drug targets, receptors and enzyme as drug targets, nucleic acids as drug targets and metabolism of drugs. It also enlighten on how physicochemical properties / QSAR play role to design and optimize the structure of leads. This course will give detail knowledge about the Drug Metabolism, types of Phase I and Phase II Reactions by taking suitable drug examples. This course acquire the knowledge about structure including stereochemistry, chemical name, SAR, metabolism, mechanism of action and selected synthesis of anti-infective agents like antibiotics, sulfonamides and fluoroquinolonesThis course will also give knowledge about the structure including stereochemistry, chemical name, SAR, metabolism, mechanism of action and selected synthesis of antiparasitic agents like antimalarials, antitubercular, anthelmintics, amoebiasis, giardiasis, trichomoniasis, pneumocystis, trypanosomiasis, leishmaniasis and fungi.

Course Name: Pharmaceutics III

Course code: BPH_C_602_T

Course Summary:

This course will give knowledge about various aspects of formulation development, large scale manufacturing and evaluation of solid oral dosage forms. Also give information about the important aspects of stability, quality control and quality assurance. This course will give in detail knowledge about various solid oral dosage forms and their manufacturing techniques, various considerations in development of pharmaceutical dosage forms including stability. Various formulations studied under this course namely tablet in respect to formulation, evaluation , coating etc. It also give information about Capsule formulation.

Course Name: Pharmaceutical Analysis II

Course code: BPH_C_603_T

Course Summary:

This course give detailed about working principle, instrumentation and applications of instrumental techniques useful for obtaining qualitative and quantitative information of an analyte and apply statistics for data analysis. This course will give knowledge of instrumentation, application and limitations in instrumental techniques involving molecular as well as atomic absorption and emission techniques such as UV-Visible, Fluorescence, Infra-Red, Raman, Atomic absorption spectroscopy and Atomic emission spectroscopy.

This course give fundamentals, working principle and applications of X-ray diffraction technique, potentiometric titrations and thermal methods of analysis like TG, DSC and DTA.

This course will give information about the concepts and quality control aspects related to radiopharmaceuticals. It also input the knowledge of calculate and interpret the results for spectral analysis and statistical data analysis.

Course Name: Pharmacognosy II

Course code: BPH_C_604_T

Course Summary:

This course will impart the knowledge of extraction of phytoconstitutents, concept of adulteration and substitution than utility of natural products as excipients utilized in pharmaceutical preparations. It also provide detailed information about applications of plant tissue culture techniques for production of secondary metabolites and edible vaccines

It will relate to the chemistry, sources, cultivation and collection of crude drugs containing phytoconstituents like volatile oils, resins and tannins. It also give the knowledge of biosynthesis of volatile oil constituents belonging to the classes of monoterpenoids and phenylpropanoids It also enlighten the students about chemistry of phytoconstituents belonging to the classes of iridoids, sesquiterpenes, diterpenes, tetraterpenes and sulphur containing compounds along with sources and utility of representative examples of crude drugs in therapeutics.

Course Name: Choice Based Course III **, Biopharmaceutics and Pharmacokinetics**

Course code: BPH_E_609_T

Course Summary:

This course presents the basic concepts and principles of pharmacokinetics. The necessary mathematical expressions needed to characterize the absorption, distribution, metabolism, and excretion of drugs will be discussed with respect to routes of administration. Parameters that influence pharmacokinetic and therapeutic outcomes of the most common drug regimens will be emphasized. Additionally, the principles of therapeutic drug monitoring and dosing will be explained.

Course Name: Choice Based Course IV **, Pharmaceutical Excipients-**

Course code: BPH_E_613_T

Course Summary:

This course will give information and knowledge about types, functions, applications and regulatory aspects of excipients used in development Pharmaceutical dosage forms. In this course student will learn about Define, classify and elaborate on regulatory aspects of Pharmaceutical excipients. It also impart the knowledge of characterization and interactions of excipients with APIs and packaging materials including novel excipients in Pharmaceuticals. It also Impart the knowledge about the role of polymers as excipients

Course Name: Pharmaceutical Chemistry Lab I

Course code: BPH_C_605_L

Course Summary:

This course will give knowledge about traditional methods of synthesis to be followed for each of the Unit Operations in addition to specific methods as indicated.Synthesis include reactions like acetylation, halogenations, esterification, oxidation, reduction, nitration and along with that synthesis of some compounds like p-nitroacetanilide, benzimidazole. Aspirin, by using new techniques like green chemistry, DST monograph, microwave procedure.

Course Name: Pharmaceutics Lab III

Course code: BPH_C_606_L

Course Summary:

It provide knowledge about the practical course dealing with the various aspects of formulation and evaluation of solid oral dosage forms. It also provides knowledge of the

important aspects of accelerated stability testing and shelf life calculations. It also impart the knowledge about solid dosage forms, tablet coating process and accelerated stability testing and shelf life calculations.

Course Name: Pharmaceutical Analysis Lab II
Course code: BPH_C_607_L
Course Summary:

This course provide the knowledge about operate the instruments, understand its instrumentation, prepare solutions with accurate concentrations, measure the readings, calculate and interpret the results obtained. It also provide the knowledge of record the absorbance and calculate concentration of analyte in formulation or as an API by use of A(1%, 1cm), single point and double point standardisation by UV spectrophotometer, it also provide the knowledge of operating a pH meter, measure equivalence point by potentiometric titration, calculate pKa and normality for a given acid or mixture of acids. It also give information about FTIR spectroscopy, interpret the IR spectra to identify the functional groups of an analyte, and understand the working of a flame photometer.

Final Year B.Pharmacy Semester VII

Course Name: Pharmaceutical Chemistry II

Course code: BPH_C_701_T

Course Summary:

This course will provide the knowledge about structure including stereochemistry, chemical name, SAR, metabolism, mechanism of action and selected synthesis of anticancer agent, antiviral agents, cardiovascular drugs like antianginal agents, antiarrhythmic agents, diuretics, drug affecting the RAS pathway, vasodilators, antihyperlipidemic agents drugs, antihistaminics, hypoglycemic agents and insulin analogs.

Course Name: Pharmacognosy III

Course code: BPH_C_702_T

Course Summary:

In this course student will learn about the chemistry, sources, cultivation and collection of crude drugs containing phytoconstituents like steroidal, triterpenoidal, anthraquinone, flavonoid glycosides and alkaloids. It also include to provide knowledge biosynthesis of alkaloids obtained from different amino acids. It impart the knowledge on glycoproteins with the representative examples and their utility in diagnosis or therapeutics.It also include the knowledge about regulatory requirements for manufacture and sale of Ayurvedic, Siddha and Unani (ASU) Medicines and Phytopharmaceuticals, monographs of herbal drugs

This course give information about formulation aspects and challenges of Herbal formulations, standardization and interactions of drugs of natural origin. This course give knowledge about spectroscopic techniques in characterization of phytoconstituents of both aliphatic and aromatic nature.

Course Name: Pharmaceutical Analysis III

Course code: BPH_C_703_T

Course Summary:

This course give the knowledge of the principles of spectroscopy for multicomponent analysis and describe working principle, instrumentation and applications of chromatographic and characterization techniques. It provide the information about various methods used for multicomponent analysis of drugs by UV spectroscopy. This course summarize

chromatographic and hyphenated techniques used for the separation, identification and quantification of analytes.It also impart the knowledge regarding the working of proton ^{1}H NMR spectroscopy and mass spectrometry

Course Name: Pharmacology III

Course code: BPH_C_704_T

Course Summary:

This course will provide the knowledge of different drugs acting on central nervous system and its associated diseases. It also impart the knowledge about pharmacology of anti-inflammatory drugs.It also impart knowledge on pharmacology of drugs used in inflammatory disorders like asthma and gout, autacoids and drugs impacting autacoids actions. It also impart the knowledge about drugs used in GIT associated disorders. Student will learn principles of toxicity with briefing on common toxicants.

Course Name: Pharmaceutical Jurisprudence

Course code: BPH_C_705_T

Course Summary:

This course give the knowledge on important legislations related to the profession of Pharmacy. It also give knowledge about Interpret Pharmaceutical Legislation. It also help students to understand pricing of drugs & pharmaceuticals It also provide the knowledge about summarize offences & penalties concerned with laws for drugs and pharmaceuticals. It also imparting the gain an insight into Drug Regulatory Affairs

Course Name: Choice Based Course V , **Preformulation Studies**

Course code: BPH_E_711_T

Course Summary:

This course gives a knowledge about physicochemical properties of a drug candidate in design and development of an effective, stable, acceptable and safe formulation. This course also includes physicochemical principles relevant to pharmaceutical dosage forms.This course give information about solubility, stability and compatibility of drug substances with different Excipients. It also enlighten the role of preformulation studies in drug discovery, drug and product development.

Course Name: Pharmacognosy Lab II

Course code: BPH_C_706_L

Course Summary:

This course gives knowledge about crude drugs representative to major parts of plants for their morphological features and microscopic characters including histology, powder characteristics.This course gives knowledge of microscopic characters of the crude drugs in ascertaining genuinely of powdered formulations. It also imparts knowledge of extract and perform qualitative chemical tests belonging to various classes of phytoconstituents viz. Anthraquinone Glycosides, Cardiac Glycosides, Flavonoids, Cyanogenetic Glycosides, Alkaloids, Triterpenoid and Steroidal Glycosides, Saponins, Tannins. It also knowledge of analytical procedures in quantitative determination of total Aldehyde content / Phenol content / total alkaloids from crude drugs. This course also impart knowledge and understand principles involved and carry out extraction of active constituents. This also gives knowledge to identify crude drugs based on the morphological characters and quote some formulations available in market with their therapeutic utility.

Course Name: Pharmaceutical Analysis Lab III

Course code: BPH_C_707_L

Course Summary:

This course give the student knowledge to operate the instruments, understand their functioning, prepare solutions accurately, conduct analysis using appropriate instrument, calculate, report and interpret the results of analysis. It also impart knowledge to student to Record, calculate and interpret data obtained by UV spectrophotometric analysis for pK_a determination and concentration determination by multicomponent analysis techniques. In this course students able to learn ICH guidelines to validate an analytical method by UV spectroscopy and interpret results obtained. Students will learn to develop and optimize mobile phase composition for qualitative analysis by TLC and interpret qualitative analysis data by TLC and paper chromatography. It also impart knowledge about outline working and application of column chromatography, HPLC and GC.

Course Name: Pharmacology Lab II 2

Course code: BPH_C_708_L

Course Summary:

This course gives knowledge about training on performing Bioassay of acetylcholine and atropine using cock ileum. It also emphasis on demonstration of oxytocin bioassay and behavioural experiments using interactive CDs. This will also give information on Regulatory and toxicity guidelines. This will also include bioassay, list the types, methods and applications of bioassay and perform *in vitro* bioassay using cock ileum and record, calculate and interpret unknown concentration of agonist/antagonist/drug. This course give immense knowledge about observation of preclinical models which provide evidences on drug/lead pharmacological activity. How to relate to and apply the ethical, regulatory and toxicity guidelines/rules (ICH, OECD, CPCSEA, Schedule Y) in drug/lead testing using preclinical animals.

Final Year B.Pharmacy Semester VII

Course Name: Pharmaceutical Chemistry III

Course code: BPH_C_801_T –

Course Summary:

This course include the study of structure including stereochemistry, chemical name, SAR, metabolism, mechanism of action and selected synthesis of CNS active drugs like sedatives/hypnotics, anticonvulsants, antidepressants, anxiolytics and antipsychotics, ANS active drugs like adrenergic and cholinergic agents, testosterons and adrenocorticoids

This subject will give knowledge in the thurst areas of CNS, ANS active drugs, analgesic agents and male female hormones.

Course Name: Pharmaceutics IV

Course code: BPH_C_802_T –

Course Summary:

This course provide detailed insights into formulation and technology of sterile products including parenterals and ophthalmic dosage form, to orient students about oral sustained and controlled release systems, to introduce important pharmacokinetics models and parameters and to familiarize students with the concept of Pilot plant, Validation, cGMP etc. as important quality management systems in the pharmaceutical industry.

This course give the knowledge of sterile technology in designing safe and effective injectables and ophthalmic products It also enlighten the rationale for oral SR/CR products, principles of design, development and evaluation of SR formulations. It also explain about the concepts of validation and pilot plant scale up for large scale manufacturing operations . This course will inculcate knowledge about the concept of biopharmaceutics and significance of various pharmacokinetic parameters

Course Name: Pharmaceutical Chemistry Lab II

Course code: BPH_C_803_L

Course Summary:

This course introduce the students about various hands-on experimental organic synthetic techniques including column chromatography and thin layer chromatography. This course also enlighten on characterization of intermediates and final products by TLC and IR.This course also reviewing on important topics such as cyclization, reduction, rearrangement, condensation reactions. Moreover this course also explain concepts of green chemistry ,

study the source, disposal and prevention of chemical waste. This course also empower the students be able to design and perform various unit operations of organic synthetic reactions Characterize reaction intermediates and final products.

Course Name: Pharmaceutics Lab IV

Course code: BPH_C_804_L

Course Summary:

This course gives students a knowledge of the practical aspects of formulation, manufacturing and quality control tests of parenteral and ophthalmic products. This course develop the intricacies of formulation and development of parenterals and ophthalmic products. This course will also provide knowledge to students about quality control and documentation of a manufacturing process. It also include the pharmacopoeial tests for these products and their packaging materials. This course will explain the concept of dissolution testing as an important quality control tool and relate to its importance from regulatory point of view. It also enlighten on pharmacokinetic principles of oral routes of administration. This course also gives oral and written communication skills and ability to plan the experimentation with proper time management.