KLE College of Pharmacy, Bengaluru-560 010

Vision:

To create ethical, morally responsible and technically competent Pharmacists.

Mission:

- M1: •To enable our students to become full-fledged and accomplished Pharmacists
- M2: •To help our students to acquire and disseminate professional knowledge through the fullest commitment for lifelong service
- M3: •To groom our students to be quality contributors to the healthcare system of the society
- M4: •**To mould our students into compassionate citizens with high ethical and moral values**

Program Educational Objectives (PEOs)

PEO1: The Pharmacy graduates will have adequate knowledge pertaining to profession of Pharmacy, Pharmaceutical sciences and Manufacturing practices.

PEO2: Pharmacy graduates will have the necessary skill to plan and execute experiments and troubleshoot problems related to drugs and formulations.

PEO3: The Pharmacists will become lifelong learners capable of keeping pace with advances in technology and assume leadership roles to facilitate improvement in public health.

PROGRAM OUTCOMES

1. **Pharmacy Knowledge:** Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.

2. **Planning Abilities:** Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.

3. **Problem analysis:** Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate and apply information systematically and shall make defensible decisions.

4. **Modern tool usage:** Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.

5. **Leadership skills:** Understand and consider the human reaction to change, motivation issues, leadership and team-building when planning changes required for fulfillment of practice, professional and societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and well-being.

6. **Professional Identity:** Understand, analyze and communicate the value of their professional roles in society (e.g. health care professionals, promoters of health, educators, managers, employers, employees).

7. **Pharmaceutical Ethics:** Honour personal values and apply ethical principles in professional and social contexts. Demonstrate behavior that recognizes cultural and personal variability in values, communication and lifestyles. Use ethical frameworks; apply ethical principles while making decisions and take responsibility for the outcomes associated with the decisions.

8. **Communication:** Communicate effectively with the pharmacy community and with society at large, such as, being able to comprehend and write effective reports, make effective presentations and documentation, and give and receive clear instructions.

9. **The Pharmacist and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety and legal issues and the consequent responsibilities relevant to the professional pharmacy practice.

10. **Environment and sustainability:** Understand the impact of the professional pharmacy solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

11. **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self-assess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis.

B. PHARM RS2 COURSE OUTCOMES

PROGRAMME: B. PHARM I SEMESTER (RS2)
SUBJECT: COMMUNICATION SKILLS & SPOKEN ENGLISH (THEORY)
COURSE CODE: 3.1.5
By the end of the course, students will be able to-

3.1.5T.1	To communicate effectively without grammar mistake.
3.1.5T.2	To develop the ability to speak English by developing vocabulary, and understanding phonetics.
3.1.5T.3	To read and understand articles, magazines, journals related to pharmacy.
3.1.5T.4	To develop the ability to write letter, essay, reports, curriculum vitae etc. in English.
3.1.5T.5	To develop the ability to listen and understand media, audio, video, speeches and the likes.

PROGRAMME: B. PHARM I SEMESTER (RS2)
SUBJECT:HUMAN ANATOMY AND PHYSIOLOGY-I (THEORY)
COURSE CODE: 3.1.2T
By the end of the course, students will be able to-

3.1.2T.1	Define and explain the scope of anatomy and physiology, body planes, various terminologies and describe the structure of a cell, its components and various transport mechanisms.
3.1.2T.2	Explain various primary tissues, its subtypes and characteristics.
3.1.2T.3	Describe the organization, structure and functions of skeletal muscle, skeletal system and its physiology, NMJ, joints, movements and associated disorders.
3.1.2T.4	Explain haemopoietic system, lymphatic system, associated organs and common disorders.
3.1.2T.5	Describe the structure, physiology and function of respiratory, digestive system and special sense organs.

PROGRAMME: B. PHARM I SEMESTER (RS2)
SUBJECT: PHARMACEUTICAL INORGANIC CHEMISTRY (THEORY)
COURSE CODE (3.1.4T)
By the end of the course, students will be able to-

3.1.4T.1	Understand the various methods of expressing concentration, preparation and standardization of various volumetric solutions.
3.1.4T.2	Identify sources of impurities and official methods for quality control of Pharmaceuticals as per pharmacopoeial standards for the qualitative and quantitative estimations.
3.1.4T.3	Discuss medicinal and pharmaceutical importance of inorganic compounds such as medicinal gases, GIT, topical, dental and miscellaneous agents and their analysis.

PROGRAMME: B. PHARM I SEMESTER (RS2)
SUBJECT: PHARMACEUTICAL INORGANIC CHEMISTRY (PRACTICAL)
COURSE CODE: (3.1.4P)

By the end of the course, students will be able to-

3.1.4P.1	Demonstrate the assay and preparation of various solutions used in pharmaceutical industry.
3.1.4P.2	Carry out limit test as per pharmacopoeia.
3.1.4P.3	Perform and evaluate the test for identity and purity.
3.1.4P.4	Gain knowledge about the preparation of inorganic compounds.

PROGRAMME: B. PHARM I SEMESTER (RS2)
SUBJECT: PHARMACEUTICAL ORGANIC CHEMISTRY I (THEORY)
COURSE CODE (3.1.3T)

By the end of the course, students will be able to-

3.1.3T.1	Understand the molecular structure, nomenclature rules, and concept of isomerism for organic compounds.
3.1.3T.2	Know about the structure and reactions involving reactive intermediates like, free radicals, nucleophiles and electrophiles along with their mechanism and kinetics.
3.1.3T.3	Explain the theory of resonance and aromaticity along with reactions of aromatic compounds, such as, electrophilic substitution reaction taking benzene as prototype.
3.1.3T.4	Know in detail, about the, property, structure and reactions of carbonyl compounds, including the name reactions.

PROGRAMME: B. PHARM I SEMESTER (RS2)
SUBJECT: PHARMACEUTICAL ORGANIC CHEMISTRY I
COURSE CODE: (3.1.3P)

By the end of the course, students will be able to-

3.1.3P.1	Perform the techniques used to purify and determine the physical constant value of an organic compound.
3.1.3P.2	Carryout the reactions used to analyze, an unknown mono-functional organic compounds.
3.1.3P.3	Set a chemical reaction involving functional group conversion to prepare derivatives of an unknown mono functional organic compounds.

PROGRAMME: B. PHARM I SEMESTER (RS2)
SUBJECT: REMEDIAL BIOLOGY (THEORY)
COURSE CODE: 3.1.1T

At the end of the course, students will be able to

3.1.1T.1	Define and describe plant cell structure, its non-living inclusions, cell division, types of tissues, morphology and histology and their functions.
3.1.1T.2	Explain the plant taxonomy with its classification and study of the some families with special reference to medicinally important plants.
3.1.1T.3	Characterise the animal cell with its structure, non-living inclusions and explain the animal cell division, types of tissues and their functions.
3.1.1T.4	Describe the comparative anatomy of different vertebrates.
3.1.1T.5	Describe Gastro intestinal, nervous, cardiovascular, genitourinary, Musculo-skeletal and respiratory system of frog.
3.1.1T.6	Explain the fundamentals of parasitology and life cycles of some animal parasites that cause human disease.

PROGRAMME: B. PHARM I SEMESTER (RS2)
SUBJECT: REMEDIAL BIOLOGY (PRACTICALS)
COURSE CODE: 3.1.1P

At the end of the course, students will be able to

3.1.1P.1	Use / operate microscope.
3.1.1P.2	Describe the morphology of various parts of the plant – like stem, root, bark, wood etc., including the modified roots and stems.
3.1.1P.3	Identify the slides (for morphological features) of lower plants and animals mentioned in the theory.
3.1.1P.4	Identify and describe the life cycle of lower plants and animals.

PROGRAMME: B. PHARM I SEMESTER (RS2)
SUBJECT: REMEDIAL MATHEMATICS (THEORY)
COURSE CODE: 3.1.1T

On completion of the course students will be able to:

3.1.1T.1	Evaluate and demonstrate the partial fraction, logarithms, functions and limits and continuity.
3.1.1T.2	Explain matrices and determination.
3.1.1T.3	Explain simple equations using graphs.
3.1.1T.4	Evaluate relationship and functions; fundamentals of trigonometry and geometry.
3.1.1T.5	Analyze sequences and binomial series.
3.1.1T.6	Evaluate calculus and integral calculus.

PROGRAMME: B. PHARM II SEMESTER (RS2)
SUBJECT: CONSTITION OF INDIA (THEORY)
COURSE CODE: (3.2.5T)

At the end of the course, the student will be able to:

3.2.5.1	Discuss about the fundamental rights and fundamental duties of the constitution.
3.2.5.2	Summarize the various concepts of legislation in India.
3.2.5.3	Examine the roles and responsibilities of council of members, public service commission and judiciary.
3.2.5.4	Describe the historic background of Indian independence and its constitution.

PROGRAMME: B. PHARM II SEMESTER (RS2)
SUBJECT: HUMAN ANATOMY & PHYSIOLOGY-II (THEORY)
COURSE OUTCOMES: (3.2.3T)

At the end of the course, student will be able to

3.2.3T.1	Explain the anatomy and physiology of Cardiovascular system, ECG, BP, Cardiac output its regulation and significance.
3.2.3T.2	Describe the organization, structure, physiology of Central nervous system, Autonomic nervous system, Somatic nervous system, various spinal nerves and cranial nerves.
3.2.3T.3	Explain the anatomy and physiology of various endocrine glands and disorders associated with these glands.
3.2.3T.4	Describe the urinary system with respect to structure, function of kidney, urine formation, RAS, renal clearance test.
3.2.3T.5	Explain the structure and function of male and female reproduction system.

PROGRAMME: B. PHARM II SEMESTER (RS2)
SUBJECT: HUMAN ANATOMY AND PHYSIOLOGY-II (THEORY)
COURSE CODE: (3.2.3P)

At the end of the course, student will be able to

3.2.2P.1	Describe the principle, preparation methods and importance of labeling in various liquid dosage forms.
3.2.3P.1	Define the compound microscope, its parts and applications.
3.2.3P.2	Describe, differentiate/distinguish/identify various types of tissues, histological features, bones and system models.
3.2.3P.3	Explain/perform simple hematological experiments like RBC count, WBC count, DLC, Bleeding and clotting time, Hemoglobin concentration, blood grouping and ESR.
3.2.3P.4	Explain and Perform recording of Heart rate, pulse rate and Blood Pressure, Tidal volume, Vital capacity and special senses.
3.2.3P.5	Identify and interpret/describe various family planning devices and skeletal muscle preparations.

PROGRAMME: B. PHARM II SEMESTER (RS2)
SUBJECT: PHARMACEUTICS (THEORY)
COURSE CODE: (3.2.2T)

By the end of the course, students will be able to-

3.2.2T.1	Discuss role of Pharmacy as a distinct profession in India and summarize the importance of Pharmacopoeias.
3.2.2T	Discuss the concept of posology, prescription and pharmaceutical calculations.
3.2.2T.3	Describe different types of processes and importance of galenicals in pharmacy.
3.2.2T	Define, classify and discuss in detail different dosage forms with suitable examples.
3.2.2T.5	Explain different types of incompatibilities and methods to overcome the same with suitable examples.

PROGRAMME: B. PHARM II SEMESTER (RS2)
SUBJECT: PHARMACEUTICS (PRACTICAL)
COURSE CODE: (3.2.2P)

Upon completion of the course the students will be able to:

3.2.2P.2	Discuss the principle involved in the preparation of biphasic dosage forms and identification of emulsion types.
3.2.2P.3	Demonstrate simple maceration process and Examine Herapathite reaction and measures to overcome it.
3.2.2P.4	Formulate different powders and granules.
3.2.2P.5	Prepare, label and discuss the principles of ointments and suppositories.

PROGRAMME: B. PHARM II SEMESTER (RS2)
SUBJECT: PHARMACOGNOSY-I (THEORY)
COURSE CODE: (3.2.4T)

By the end of course, students will be able to-

3.2.4T.1	create awareness regarding importance of Pharmacognosy and sources of crude drugs.
3.2.4T.2	develop knowledge regarding classification, cultivation, collection, pest control and storage of crude drugs.
3.2.4T.3	enhance knowledge of source, active constituents, analysis and uses of crude drugs containing primary metabolites.
3.2.4T.4	define, apply the pharmacognostical importance of secondary metabolites and plant fibers as surgical dressings.

PROGRAMME: B. PHARM II SEMESTER (RS2)
SUBJECT: PHARMACEUTICAL ORGANIC CHEMISTRY II (THEORY)
COURSE CODE: (3.2.1T)

By the end of the course, students will be able to-

3.2.1T.1	Understand the concept of stereochemistry of organic reactions.
3.2.1T.2	Explain the property, structure, reactions and uses of bio-molecules, including, biopolymers.
3.2.1T.3	Know about the properties, preparations and applications of reagents in organic synthesis.
3.2.1T.4	Understand about the concept of heterocyclic compounds, their properties, synthesis and applications in medicinal chemistry.
3.2.1T.5	Know about chemistry of poly-nuclear compounds and their medicinal applications.

PROGRAMME: B. PHARM II SEMESTER (RS2)
SUBJECT: PHARMACEUTICAL ORGANIC CHEMISTRY II (PRACTICAL)
COURSE CODE: (3.2.1T)

By the end of the course, students will be able to-

3.2.1P.1	Understand and perform the reactions involved in quantitative determination of functional groups in an organic compound.
3.2.1P.2	Prepare, purify and analyze the synthesized organic compounds by employing techniques like, re-crystallization, physical constant determination, TLC, UV and FTIR spectral study.
3.2.1P.3	Know about the stereochemistry and generation of 3D models for few organic compounds, saturated and unsaturated using model kit.

B. PHARM III SEMESTER (RS2)
SUBJECT: COMPUTER SCIENCE THEORY
COURSE CODE: (3.3.5T)

By the end of the course, students will be able to:

3.3.5T.1	Discuss about computers (I/O devices), binary conversion, applications of computers in pharmacy.
3.3.5T.2	Describe Concept of common languages in computers, algorithm flow chart, solution of problems based on biostatistics and other simple problems of pharmaceutical interest.
3.3.5T.3	Explain MS Word, MS Excel, MS Power Point.
3.3.5T.4	Describe E-mail and internet.
3.3.5T.5	Explain Concept of ISIS, RASMOL, CHEMSKETCH.

B. PHARM III SEMESTER (RS2)
SUBJECT: PHARMACEUTICAL ANALYSIS (THEORY)
COURSE CODE: (3.3.3T)

By the end of the course, students will be able to:

3.3.3T.1	Apply statistical methods for evaluation of lab data.
3.3.3T.2	Predict the sources of error and select appropriate method for minimization of errors.
3.3.3T.3	Describe the principles of volumetric analysis like non-aqueous titrations, redox titrations and complexometric titrations.
3.3.3T.4	Explain the principle, instrumentation and applications of chromatographic and electrochemical techniques.

B. PHARM III SEMESTER (RS2)
SUBJECT: PHARMACEUTICAL ANALYSIS (PRACTICALS)
COURSE CODE: (3.3.3P)

By the end of the course, students will be able to:

3.3.3P.1	Implement fundamental methodology to prepare and standardize volumetric solutions.
3.3.3P.2	Develop practical skills for the analysis of drugs and pharmaceutical products using volumetric, chromatographic and electrochemical methods.
3.3.3P.3	Plan and select suitable analytical techniques for the estimation of different category of drugs.
3.3.3P.4	Gather, interpret, evaluate, and communicate data correctly in writing and orally.

B. PHARM III SEMESTER (RS2)
SUBJECT: PHARMACEUTICAL MICROBIOLOGY (THEORY)
COURSE CODE: (3.3.1T)
Course outcome: After completion of course students are able to

3.3.1T.1	Describe contributions of scientists in the science of microbiology and distinguish diverse microorganisms present in environment.
3.3.1T.2	Discuss cultivation, isolation, identification and preservation techniques of microorganisms.
3.3.1T.3	Explain and compare various techniques of destruction of microorganism; using chemical agents and sterilization methods.
3.3.1T.4	Explain vital role of microorganisms in, validation of sterilization, sterility testing of sterile pharmaceutical formulations, evaluation of antimicrobial agents and microbiological assays of antibiotics and vitamins.
3.3.1T.5	Describe role of microorganisms in building host immunity, in preparation of vaccines and in serological diagnostic tests.

B. PHARM III SEMESTER (RS2)
SUBJECT: PHARMACEUTICAL MICROBIOLOGY (PRACTICAL)
COURSE CODE: (3.3.1P)
Students are able to apply theoretical knowledge to

3.3.2T.1	Define, classify and explain the properties, chemistry and methods of isolation of volatile oils, Resins, Tannins and Glycosides.
3.3.2T.2	Enhance the pharmacognostical knowledge of crude drugs belonging to Volatile Oils, Resins, Tannins and Glycosides.
3.3.2T.3	Define and explain various methods of extraction, isolation and purification of crude drugs.
3.3.2T.4	Compile phytochemical screening tests for natural compounds.

B. PHARM III SEMESTER (RS2)
SUBJECT: PHARMACOGNOSY-II (THEORY)
COURSE CODE: (3.3.2T)
Upon the completion of the course the students will be able to:

3.3.1P.1	Execute and handle the tools and equipments used for demonstrating microbiological techniques.
3.3.1P.2	Identify and distinguish microorganisms by microscopic techniques.
3.3.1P.3	Illustrate and analyze various techniques associated with handing of microorganisms, cultivation and isolation of microorganisms.
3.3.1P.4	Plan and evaluate sterilization techniques, sterility testing of sterile products, antimicrobial agents and microbiological assay.

B. PHARM III SEMESTER (RS2)
SUBJECT: PHARMACOGNOSY-II (PRACTICAL)
COURSE CODE: (3.3.2P)

Upon the completion of the course the students will be able to:

3.3.2P.1	Evaluate crude drugs based on descriptive morphology.
3.3.2P.2	Evaluate crude drugs microscopically by performing their transverse sections.
3.3.2P.3	Analyze the chemical constituents present in unorganized drugs.
3.3.2P.4	Analyze fats and oils by determining acid value, saponification value, ester value and iodine value.

B. PHARM III SEMESTER (RS2)
SUBJECT: PHYSICAL PHARMACEUTICS-I (THEORY)
COURSE CODE: (3.3.4T)

By the end of the course, students will be able to-

3.3.4T.1	Describe the physicochemical properties of drug molecules, pH, buffer equation and their applications.
3.3.4T.2	Discuss the concepts of solubility, solubility phenomenon and factors influencing solubility.
3.3.4T.3	Explain law of distribution, limitation and its application.
3.3.4T.4	Assess drug stability in designing stable and effective dosage form and calculate rate constants of reactions by various methods.
3.3.4T.5	Explain the role of surfactants, interfacial phenomenon and surface tension, adsorption and methods for calculation of interfacial tension.

B. PHARM IV SEMESTER (RS2)
SUBJECT: APPLIED BIOCHEMISTRY (THEORY)
COURSE CODE: (3.4.2T)

By the end of the course, students will be able to-

3.4.2T.1	Apply the knowledge of chemistry and define the role and scope of biochemistry in pharmaceutical field.
3.4.2T.2	Recall the biochemical organization of the cell, transport process and also describe enzymes and isoenzymes in the field of clinical diagnosis and its significance in human body.
3.4.2T.3	Explain the metabolism of carbohydrate, lipid, and protein and analyze associated disorders in their pathways.
3.4.2T.4	Discuss the biosynthetic pathways of amino acids, purines, pyrimidine, DNA and RNA.
3.4.2T.5	Evaluate the various organ function test for clinical biochemistry.

B. PHARM IV SEMESTER (RS2)
SUBJECT:APPLIED BIOCHEMISTRY (PRACTICAL)
COURSE CODE: (3.4.2P)

By the end of the course, students will be able to-

3.4.2P.1	Evaluate critically through the use of experimental technique, the concepts of preparation, separation and titration.
3.4.2P.2	Demonstrate an understanding of how the principles of biochemistry are involved in the estimation of various biomolecules
3.4.2P.3	Identify the various biomolecules such as carbohydrates, proteins etc.

B. PHARM IV SEMESTER (RS2)
SUBJECT:PATHOPHYSIOLOGY (THEORY)
COURSE CODE: (3.4.4T)

At the end of the course, student will be able to:

3.4.4T.1	Explain cell injury, cellular adaptation (due to various physiological / pathological conditions), inflammation – the basic pathological processes in the pathogenesis of a disease / disorder.
3.4.4T.2	Describe the etiology and pathogenesis of disease primarily affecting CVS, Cerebrovascular system, CNS, mood and behaviour, metabolism, gut, infectious diseases and cancer.
3.4.4T.3	List out signs and symptoms of diseases / disorder (above mentioned), and complications associated.
3.4.4T.4	Define and compile consequences of air pollution, tobacco consumption, and exposure to radiation, obesity and PEM.

B. PHARM IV SEMESTER (RS2)
SUBJECT:PHARMACEUTICAL ENGINEERING (THEORY)
COURSE CODE: (3.4.3T)

Upon the completion of the course the students will be able to:

3.4.3T.1	Describe and analyze the concept of heat and mass transfer involved in unit operations such as drying, evaporation and crystallization.
3.4.3T.2	Explain and implement knowledge of separation techniques in unit operations like filtration, centrifugation and size separation.
3.4.3T.3	Explain the concept of size reduction and mixing operations with their significance in manufacturing process.
3.4.3T.4	Discuss the basic concepts of humidification, dehumidification and refrigeration operations.
3.4.3T.5	Discuss Industrial plant layout facilities, industrial hazards and safety measures.

B. PHARM IV SEMESTER (RS2)
SUBJECT:PHARMACEUTICAL ENGINEERING (PRACTICAL)
COURSE CODE: (3.4.3P)

Upon the completion of the course the students will be able to:

3.4.3P.1	Analyze and interpret drying rate curves for given samples and illustrate the experiment on steam distillation.
3.4.3P.2	Determine the factors affecting the rate of evaporation and filtration techniques.
3.4.3P.3	Evaluate the mixing efficiency of solid-solid, solid-liquid and liquid –liquid by different methods.
3.4.3P.4	Perform size reduction using ball mill and assess the size distribution of particles by sieve analysis.
3.4.3P.5	Implement and incorporate preparation of crystals by different methods and compare their size and yield.

B. PHARM IV SEMESTER (RS2)
SUBJECT:PHARMACOGNOSY & PHYTOCHEMISTRY (THEORY)
COURSE CODE: (3.4.5T)

Upon the completion of the course the students will be able to:

3.4.5T.1	Elucidate the basic biosynthetic pathways and specific pathways for few glycosides and alkaloids.
3.4.5T.2	Define, Explain the chemistry, properties and method of isolation of Alkaloids and Marine drugs and classify them.
3.4.5T.3	Compile the present status of Marine bioactive agents.
3.4.5T.4	Comprehend and describe the principles, instrumentation and application of various Chromatographic methods used in identification of phytoconstituents.
3.4.5T.5	Enhance the knowledge of Biological source, Family, Morphology, Chemical constituents, uses, substitutes and adulterants of various alkaloidal crude drugs.

B. PHARM IV SEMESTER (RS2)
SUBJECT:PHYSICAL PHARMACEUTICS-II (THEORY)
COURSE CODE: (3.4.1T)

By the end of the course, students will be able to-

3.4.1T.1	Define; analyze the fundamental and derived Properties of powder.
3.4.1T.2	Discuss the theory and the factors influencing the stability of Pharmaceutical dispersions.
3.4.1T.3	Describe the flow behavior of fluids and concept of Complexation.
3.4.1T.4	Explain the theory and factors influencing Diffusion and Dissolution.

B. PHARM IV SEMESTER (RS2)
SUBJECT:PHYSICAL PHARMACEUTICS-II (PRACTICAL)
COURSE CODE: (3.4.1P)

By the end of the course, students will be able to-

3.4.1P.1	Determine Partition coefficient of binary system and HLB value of Surfactants.
3.4.1P.2	Deduce the rate constant for order of reactions and stability constant of complexes.
3.4.1P.3	Analyze various fundamental and derived Properties of powder.
3.4.1P.4	Preparation and evaluation of coarse dispersions.
3.4.1P.5	Determine the surface tension and viscosity of liquids.

B. PHARM V SEMESTER (RS2)
SUBJECT: PHARMACEUTICAL BIOTECHNOLOGY (THEORY)
COURSE CODE: (3.5.3T)
By the end of course, students will be able to-

3.5.3T.1	Incorporate knowledge about tools of biotechnology useful in pharmaceutical sciences.
3.5.3T.2	Develop knowledge of genetics and its applications.
3.5.3T.3	Analyze the importance of manufacturing of biologicals and biopharmaceuticals.
3.5.3T.4	Explain the theoretical knowledge of tissue culture.

B. PHARM V SEMESTER (RS2)
SUBJECT: HOSPITAL AND COMMUNITY PHARMACY (THEORY)
COURSE CODE: (3.5.1T)
By the end of course, students will be able to-

3.5.1T.1	Explain the role of hospital pharmacy department and its relationship with other departments and staff in the hospital.
3.5.1T.2	Define drug committee formulary, infection control committee, research ethics committee and explain their guidelines and functions.
3.5.1T.3	Describe about the staff, materials and financial requirement for hospital pharmacy and also write about the policy, planning, infrastructure for inpatient, outpatient, casualty, operation theatre and ICU.
3.5.1T.4	Describe purchasing and warehousing in hospital pharmacy and also explain various drug distribution methods, sterile and non sterile manufacturing, total parenteral nutrition, radiopharmaceuticals, labelling and quality control.
3.5.1T.5	Write the role of community pharmacy and its relationship to other healthcare providers and describe the rational use of common OTC medication and primary healthcare in community pharmacy.
3.5.1T.6	Explain community pharmacy management and write the code of ethics for community pharmacist. Define pharmacoepidemiology and pharmacoeconomics with their applications.

B. PHARM V SEMESTER (RS2)
SUBJECT: HOSPITAL AND COMMUNITY PHARMACY (PRACTICAL)

COURSE CODE: (3.5.1 P)
Upon completion of the course, student will be able to:

3.5.1P.1	Analyse and compare the given prescriptions of two community pharmacies and audit the OTC sales over 24 hrs period in a community pharmacy.
3.5.1P.2	Describe the role of community pharmacist in health education, family planning, first aid, smoking cessation and screening programme.
3.5.1P.3	Evaluate the critical study of two community pharmacies in large hospital and summarise the code of ethics for community pharmacy.
3.5.1P.4	Describe and evaluate the layout and workflow pattern in the dispensary and examine drug distribution used in the local hospital and report it.
3.5.1P.5	Prepare the inventory for the drugs and surgical list by using ABC analysis and VED analysis. Analyse and report store management in teaching/district hospital.
3.5.1P.6	Prepare drug information leaflet on antihypertensive, antimicrobial, antiemetic, antiepileptic and anti diabetic drugs.

B. PHARM V SEMESTER (RS2)
SUBJECT: MEDICINAL CHEMISTRY-I (3.5.4T)
COURSE CODE: (3.5.4 T)
By the end of the course, students will be able to-

3.5.4T.1	Recognize the physico-chemical aspects of drug molecule on biological activity and its stereochemical features.
3.5.4T.2	Recall the basic principles of medicinal chemistry, develop a brief software concept on QSAR and create the concept on fundamentals on CADD and Molecular modelling
3.5.4T.3	Discuss the various diagnostic agents in therapy and employ the fundamental principles of cholinergic and adrenergic system of drugs.
3.5.4T.4	Provide the basic knowledge of medicinal chemistry through identification of the chemistry of different drugs and synthesis of various classes such as analgesics and anti-inflammatory, antihistaminics, eicosanoids and local anesthetics.
3.5.4T.5	Describe the mechanism of action, use and mode of application of the selected drugs on the basis of their structure.

B. PHARM V SEMESTER (RS2)
SUBJECT: PHARMACOLOGY-I (THEORY)
COURSE CODE: (3.5.5 T)
At the end of the course, student will be able to

3.5.1T.1	Define pharmacology, its branches and discuss various sources of drugs, dosage forms and routes of drug administration with specific advantages and disadvantages.
3.5.1T.2	Understand basic principles of pharmacokinetics and pharmacodynamics of drug molecules.
3.5.1T.3	Describe principles of drug discovery and phases of development of new drugs.
3.5.1T.4	Analyze the pharmacology of different categories of drugs affecting major organ systems.
3.5.1T.5	Assess adverse effects (following drug use) and (potential / probable) drug interactions

B. PHARM V SEMESTER (RS2)
SUBJECT: PHARMACEUTICAL TECHNOLOGY-I (THEORY)
COURSE CODE: (3.5.2T)
Course outcomes: By the end of the course, students will be able to-

3.5.2T.1	Discuss theory or concept involved in the formulations of tablets, capsules, liquid, semisolid dosage forms.
3.5.2T.2	Describe pre-formulation studies and various dosage forms such as tablets, capsules, ointments, etc.
3.5.2T.3	Analyze critically every aspects of manufacturing practices.
3.5.2T.4	Gain knowledge about any new technology or equipment used in formulating various dosage forms such as tablets, capsules, ointments, etc.
3.6.5T.5	Evaluate the various dosages forms such as tablets, capsules, suspensions, etc.

B. PHARM V SEMESTER (RS2)
SUBJECT: PHARMACEUTICAL TECHNOLOGY-I (PRACTICALS)
COURSE CODE: (3.5.2P)
Course outcomes: By the end of the course, students will be able to-

3.5.2P.1	Evaluate pre-formulation and manufacturing issues which will have impact on development of dosage forms and performance attributes.
3.5.2P.2	Identify any formulation and equipments specific need. Incorporate and implement these needs in developing dosage forms
3.5.2P.3	Assess the manufacturing feasibility of tablets, capsules, suspensions, ointments, etc.
3.5.2P.4	Implement computation tools in manufacturing practices.
3.5.2P.5	Resolve potential pre-formulation and manufacturing issues associated with various dosage forms such as tablets, capsules, ointments, gels, suspensions, etc.

B. PHARM VI SEMESTER (RS2)
SUBJECT: ENVIRONMENTAL STUDIES (THEORY)
COURSE CODE: (3.6.5 T)
Upon the completion of the course the students will be able to:

3.6.5T.1	Write the definition ,scope, importance, naturalresources of environmental studies and describe utilization, exploitation and associated problems of forests.List out water,mineral,food,energy and land resources with its use for sustainable lifestyle.
3.6.5T.2	Write the introduction, type features and functions of different ecosystems and discuss biodiversity and its conservation. Explain environmental pollutions such as air, water, soil, noise and nuclear pollutions with their causes and control measures.
3.6.5T.3	Summarize air (prevention and control of pollution) Act 1987, water prevention and control of pollution Act 1974. Explain about hazardous wastes, hazardous chemicals, hazardous microorganisms and biomedical wastes.
3.6.5T.4	Explain the use, over exploitation, deforestation of forest resources and use and overutilization of water resources.
3.6.5T.5	Summarise the use, exploitation,environmental effect of extracting and using mineral resources. Explain the involvement of food resources,energy resources and role of an individual in conservation of natural resources.

B. PHARM VI SEMESTER (RS2)
SUBJECT:PHARMACEUTICAL JURISPRUDENCE AND ETHICS (THEORY)
COURSE CODE: (3.6.4.T)
Upon the completion of the course the students will be able to:

3.6.4T.1	Gain the basic knowledge about Pharmaceutical laws in India and role of ethics in the Pharmacy Profession, rules regarding pharmacy registration and Education Regulations in the country.
3.6.4T.2	Implement the rules and regulations of Drug Price Control Order and Pharmaceutical Policy 2002 in manufacture, sale and import of drugs.
3.6.4T.3	Describe and discuss the Rules and Regulations of Excise Duties Act & Narcotic and Psychotropic Substances Act.
3.6.4T.4	Explain the rules and regulations framed and amendments made under Drugs & Magic Remedies Act, Animals Act, Factories Act and create awareness about prescription and non prescription products available in the market.

B. PHARM VI SEMESTER (RS2)
SUBJECT: PHARMACOLOGY II (THEORY)
COURSE CODE: (3.6.1.T)
At the end of the course, student will be able to

3.6.1T.1	Describe the Pharmacology of hormonal agonists and antagonists, immunosuppressants and immunostimulants and its therapeutic uses
3.6.1T.2	Describe the general principles of chemotherapy of infectious diseases and cancer and pharmacology of important classes of antimicrobial agents.
3.6.1T.3	Explain the physiology and pathological roles of Autocoids, peptides / proteins, Nitric oxide, vitamins and minerals and compile its therapeutic potential.
3.6.1T.4	Explain pharmacology of various classes of drugs acting on GIT and list out its clinical indications
3.6.1T.5	Describe the basic concept of Chronobiology and identify its potential influence in the therapeutics of diseases.
3.6.1T.6	Define poison and acute poisoning, describe the guidelines for treatment of acute poisoning and specifically with heavy metals, insecticides, drugs like opioids and other addictive substances, including the incidence of poisoning and signs and symptoms of acute and chronic poisoning
3.6.1T.7	Explain OECD guidelines in the study of basic and special toxicity studies.

B. PHARM VI SEMESTER (RS2)
SUBJECT:PHARMACOLOGY II PRACTICALS
COURSE CODE: (3.6.1P)
At the end of the course, student will be able to

3.6.1P.1	Identify and understand the construction / working and uses of instruments / accessories / laboratory animals and their importance in experimental Pharmacology.
3.6.1P.2	Understand different routes of drug administration, surgical techniques, bleeding and IV injection, rendering the lab animals unconscious using General Anaesthetics and chemical euthanasia.
3.6.1P.3	Perform computer simulated experiments, tabulate and interpret the results covering experiments to demonstrate enzyme induction / inhibition, analgesic activity, anti-inflammatory activity, locomotor activity and bioassays.
3.6.1P.4	Understand the significance of statistics in experimental pharmacology and to perform simple fundamental statistics.
3.6.1P.5	Understand and interpret abnormalities of ECG recordings.

B. PHARM VI SEMESTER (RS2)
SUBJECT:PHARMACEUTICAL TECHNOLOGY-II (THEORY)
COURSE CODE: (3.6.2T)
Course outcomes: By the end of the course, students will be able to-

3.6.2T.1	Develop the basic knowledge of sterile and non-sterile dosages forms, cosmetics, blood products and surgical products
3.6.2T.2	Plan and explain the concept involved in the development of various pharmaceutical dosage forms
3.6.2T.3	Analyze the critical parameters which need to be considered in development of pharmaceutical dosage forms. Influence of various pharmaceutical additives on drug product performance
3.6.2T.4	Apply novel manufacturing techniques and acquire knowledge about advanced manufacturing equipments
3.6.2T.5	Evaluate the various pharmaceutical dosage forms for assessing their quality and performance

B. PHARM VI SEMESTER (RS2)
SUBJECT:PHARMACEUTICAL TECHNOLOGY-II (PRACTICALS)
COURSE CODE: (3.6.2P)
Course outcomes: By the end of the course, students will be able to-

3.6.2P.1	Make familiar with the concept of industrial pharmacy in the development of various pharmaceutical dosage forms in manufacturing practices
3.6.2P.2	Planning the formula in advance and implement it effectively in the preparation of sterile and non-sterile pharmaceutical products and blood products
3.6.2P.3	Evaluate the various factors need to consider in the design and development of pharmaceutical dosage form
3.6.2P.4	Use of novel computation tools or software for statistical analysis of experimental data obtained
3.6.2P.5	Determine the quality of pharmaceutical products by subjecting to various official and non-official tests

B. PHARM VII SEMESTER (RS2)
SUBJECT: BIOPHARMACEUTICS AND PHARMACOKINETICS (THEORY)
COURSE CODE: (3.7.4T)
After completion of course students are ableto

3.7.4T.1	Define role of biopharmaceutics and pharmacokinetics in drug development and clinical settings and describe process of drug absorption, distribution, elimination and excretion.
3.7.4T.2	Explain physicochemical, physiological and pathological factors affecting fate of drug in the body.
3.7.4T.3	Discuss and analyze bioavailability and bioequivalence of drugs, and explain its regulatory requirements.
3.7.4T.4	Incorporatebasic knowledge for the development of pharmacokinetic models and discuss various types of kinetic models for the measurement of pharmacokinetic parameters.
3.7.4T.5	Discuss need of clinical trials and integrate *in vitro* and *in vivo* data in the development of single and multiple dosage regimens for clinical purpose.

B. PHARM VII SEMESTER (RS2)
SUBJECT: INSTRUMENTAL METHODS OF ANALYSIS (THEORY)
COURSE CODE: (3.7.1T)
By the end of the course, students will be able to:

3.7.1T.1	Explain the principle and instrumentation of different spectroscopic techniques like UV-Visible spectroscopy, Spectrofluorimetry, Atomic absorption spectroscopy, Flame Photometry and apply the same in the quantitative analysis of drugs and pharmaceuticals.
3.7.1T.2	Describe the principle and instrumentation of IR spectroscopy, NMR spectroscopy and Mass spectrometry and apply the same in identification of substances and qualitative analysis of drugs and pharmaceuticals.
3.7.1T.3	Discuss advanced chromatographic techniques like HPLC and GC and apply them in estimations of pharmaceuticals.

B. PHARM VII SEMESTER (RS2)
SUBJECT: INSTRUMENTAL METHODS OF ANALYSIS (PRACTICALS)
COURSE CODE: (3.7.1P)
By the end of the course, students will be able to:

3.7.1P.1	Operate common laboratory instruments used for analysis of drugs and pharmaceuticals.
3.7.1P.2	Develop practical skills to analyze drugs and pharmaceutical products using various spectroscopic techniques.
3.7.1P.3	Develop various methodologies for assay of drugs and pharmaceuticals with the skills and knowledge gained.
3.7.1P.4	Plan and select suitable analytical techniques for the estimation of different category of drugs.
3.7.1P.5	Gather, interpret, evaluate, and communicate data correctly in writing and orally.

B. PHARM VII SEMESTER (RS2)
SUBJECT: INDUSTRIAL PHARMACOGNOSY (3.7.2T)
COURSE CODE: (3.7.2T)

By the end of course, students will be able to-

3.7.2T.1	Familiarize, overview the medicinal plants currently in use in the market and explain herbs used as health foods.
3.7.2T.2	Explain the concept of value addition to herbal medicine in terms of quality standards and standardization of herbal drugs.
3.7.2T.3	Establish the knowledge of conservation techniques and detailed study of traditional and cosmetic use of medicinal plants.
3.7.2T.4	Improve the knowledge of regulatory aspects of WTO and patents related to natural products.

B. PHARM VII SEMESTER (RS2)
SUBJECT: INDUSTRIAL PHARMACOGNOSY (3.7.2P)
COURSE CODE: (3.7.2P)

By the end of course, students will be able to-

3.7.2P.1	Isolate and estimate phytoconstituents.
3.7.2P.2	Prepare herbal cosmetics.
3.7.2P.3	Evaluate crude drugs.
3.7.2P.4	Prepare herbarium and document the information.

B. PHARM VII SEMESTER (RS2)
SUBJECT: MEDICINAL CHEMISTRY-II (3.7.3T)
COURSE CODE: (3.7.3T)

By the end of the course, students will be able to-

3.7.3T.1	Explain the Structure Activity Relationship, mechanism of action, synthesis and use of drugs acting on CNS-General Anaesthetics, Hypnotic and Sedatives, Anticonvulsants and Stimulants.
3.7.3T.2	To acquire knowledge about the structure, mechanism of action and uses of hypoglycemic agents, Thyroid and antithyroid agents, diuretics and steroidal drugs
3.7.3T.3	Discuss the chemistry of drugs acting on cardiovascular system.
3.7.3T.4	To develop and understand current trends in photodynamic therapy.

B. PHARM VII SEMESTER (RS2)
SUBJECT: MEDICINAL CHEMISTRY-II (3.7.3P)
COURSE CODE: (3.7.3P)
By the end of the course, students will be able to-

3.7.3P.1	Plan and carry out monograph analysis of medicinally important compounds
3.7.3P.2	Gain knowledge about the synthesis of medicinally important compounds.
3.7.3P.3	Use modern instrumentation and classical techniques, to design experiments, and to properly record the results of their experiment.

B. PHARM VII SEMESTER (RS2)
SUBJECT: PHARMACEUTICAL MANAGEMENT AND MARKETING (THEORY)
COURSE CODE: (3.7.5T)
Course outcome: By the end of the course, students will be able to-

3.7.5T.1	Discuss pharmaceutical sales and distribution management.
3.7.5T.2	Familiarize information of planning and forecasting.
3.7.5T.3	Discuss management function and organizational behavior
3.7.5T.4	Demonstrate strategic pharmaceutical product management and international marketing.
3.7.5T.5	Demonstrate strategic pharmaceutical product management and international marketing.

B. PHARM VIII SEMESTER (RS2)
SUBJECT: ADVANCED PHARMACEUTICS (THEORY)
COURSE CODE: (3.8.2T)
By the end of the course, students will be able to-

3.8.2T.1	Discuss the importance of quality assurance, manufacturing documentation and validation.
3.8.2T.2	Apply the principle and rationale of various controlled and sustained drug delivery systems.
3.8.2T.3	Express the basic concepts of transdermal and transmucosal drug delivery systems with their therapeutic applications.
3.8.2T.4	Describe the preparation and evaluation techniques of different targeted drug delivery systems emphasizing their applications.
3.8.2T.5	Discuss the types and applications of oral site specific delivery systems.

B. PHARM VIII SEMESTER (RS2)
SUBJECT: ADVANCED PHARMACEUTICS (Practical)
COURSE CODE: (3.8.2T)

By the end of the course, students will be able to-

3.8.2P.1	Prepare and evaluate transdermal and transmucosal drug delivery system.
3.8.2P.2	Evaluate the prepared matrix tablets as well as marketed sustained release tablet.
3.8.2P.3	Formulate and analyze solid dispersions prepared by various methods.
3.8.2P.4	Write standard operating procedure of equipments used in manufacture of Tablets and Parenterals.
3.8.2P.5	Validate the dissolution apparatus and develop the skill of documentation

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B. PHARM VIII SEMESTER (RS2)
SUBJECT: CLINICAL TRIALS AND RESEARCH METHODOLOGY (3.8.5CT)
COURSE CODE: (3.8.5CT)

At the end of the course, student will be able to

3.8.5CT.1	Describe historical perspective and different phases of clinical trials.
3.8.5CT.2	State different ethical issues, features and measures of clinical trials.
3.8.5CT.3	Specify responsibilities of Principle investigators, sponsors, study documents and monitoring of clinical research.
3.8.5CT.4	Depict data analysis, interpretation, reports, publications and critical review.
3.8.5CT.5	Construe reviews, meta-analysis and review of literature.

B. PHARM VIII SEMESTER (RS2)
SUBJECT: MEDICINAL CHEMISTRY-III (THEORY)
COURSE CODE: (3.8.1.T)

By the end of the course, students will be able to-

3.8.1T.1	To understand the chemistry of drugs, its metabolism, adverse effects, therapeutic activity and to acquire knowledge of modern techniques of drug design.
3.8.1T.2	To develop the concept of SAR, MOA and describe synthesis of some important drug classes
3.8.1T.3	Employ the core subject knowledge of local anti infective agents, antimalarials and the drugs acting onurinary tract.
3.8.1T.4	To acquire knowledge in the chemotherapy for cancer, T.B and microbial diseases and also describe the chemistry and structures of some important drugs.
3.8.1T.5	Discover the new updates on antibiotics for lifelong learning.

B. PHARM VIII SEMESTER (RS2)
SUBJECT: MEDICINAL CHEMISTRY-III (3.8.1P)
COURSE CODE: (3.8.1.P)
By the end of the course, students will be able to-

3.8.1P.1	Carry out various assay procedures involving various techniques; also relate the principle to new applications.
3.8.1P.2	Explain the various techniques of preparation and analysis of drug substances
3.8.1P.3	Apply various analytical techniques to drug analysis and control, e.g. Melting point, TLC, spectroscopic methods, etc

B. PHARM VIII SEMESTER (RS2)
SUBJECT: NANOPHARMACEUTICALS / NANOMEDICINE (THEORY)
COURSE CODE: (3.8.5NT)
By the end of the course, students will be able to-

3.8.5NT.1	Recapitulate the history, milestones, concepts, techniques and applications of Nanoscience and Nanotechnology.
3.8.5NT.2	Discuss the preparation, application market & business potential of nanoparticles, nanowires, fullerenes nanotubes, nanocomposites, nanomaterials
3.8.5NT.3	Describe the fundamentals and applications of Nanoparticles in gene therapy, drug delivery, drug targeting, cancer treatment and drug tracking systems.
3.8.5NT.4	Explain the therapeutic action of nanoparticles, nanodevices, targeted, non-targeted delivery and controlled drug release: theranostics.
3.8.5NT.5	Elaborate the production, quality assurance and regulations, Health and safety issues, ethical, social and policy issues involved in production and commercialization of nanomedicine.

B. PHARM VIII SEMESTER (RS2)
SUBJECT: PHARMACEUTICAL MANUFACTURING MANAGEMENT (THEORY)
COURSE CODE: (3.8.5PT))
By the end of the course, students will be able to-

3.8.5T.1	Discuss common practices and development of pharmaceutical industry.
3.8.5T.2	Explain industrial hazards/accidents in work atmosphere and create safety guidelines.
3.8.5T.3	Explain product management and documentation with strategies to develop overall managerial/professional skills in the industry.
3.8.5T.4	Discuss the role of information technology in managing inventories.
3.8.5T.5	Describe the development, implementation of material management and evaluation of employee recruitment, selection and retention plans and processes.

B. PHARM VIII SEMESTER (RS2)
SUBJECT: REGULATORY AFFAIRS (THEORY)
COURSE CODE: ((3.8.4T)
Course outcomes: By the end of the course, students will be able to-

3.8.4T.1	Describe fundamentals of IPR, Patents, GMP, various Regulatory authorities
3.8.4T.2	Discuss the role and responsibilities of Regulatory affairs in protecting public health
3.8.4T.3	Analyze the drug product while applying for Patent, NDA, ANDA, IND, etc
3.8.4T.4	Describe the entire drug approval process by different Drug Regulatory Authorities by employing modern computational tools
3.8.4T.5	Explain the regulatory strategy in controlling the safety and efficacy of pharmaceutical products

B. PHARM VIII SEMESTER (RS2)
SUBJECT: STANDARDIZATION AND QUALITY CONTROL OF HERBAL DRUGS (THEORY)
COURSE CODE: (3.8.5ST)
By the end of course, students will be able to-

3.8.5ST.1	**learn the importance of quality standards and standardization of herbal drugs.**
3.8.5ST.2	enhance the advanced skills for the quality control of herbal raw materials and formulations.
3.8.5ST.3	screen herbal extracts for various pharmacological activities according to needs and new strategies.
3.8.5ST.4	explain the importance of stability studies of phytopharmaceuticals.

B. PHARM VIII SEMESTER (RS2)
SUBJECT: PHARMACOTHERAPEUTICS (THEORY)
COURSE CODE: (3.8.3T)

At the end of the course, student will be able to

3.8.3T.1	Specify basic principles of pharmacotherapy, Concept and various approaches to Individualization o f therapy considering PK and PD and other factors and explain drug regulation and development.
3.8.3T.2	Explain adverse drug reactions, drug toxicity and drug induced diseases
3.8.3T.3	Describe and / define, classify, epidemiology, etiology, clinical manifestations, investigations, diagnosis, complications of disease, drug therapy pharmacotherapy (Desired outcome, overall goal, algorithm, first line treatment, treatment of concomitant conditions , clinical monitoring, patient care and education) and non-pharmacological approaches to the diseases of **Cardiovascular system, Neuropsychiatric and CNS disorders, pulmonary disorders, endocrine disorders and infectious diseases.**
3.8.3T.4	Describe and / define, classify, epidemiology, etiology, clinical manifestations, investigations, diagnosis, complications of disease, drug therapy pharmacotherapy (Desired outcome, overall goal, algorithm, first line treatment, treatment of concomitant conditions, clinical monitoring, patient care and education) and non-pharmacological approaches **to the diseases of joint and musculoskeletal diseases, selective hematological disorders and cancer.**
3.8.3T.5	Describe and / define, classify, epidemiology, etiology, clinical manifestations, investigations, diagnosis, complications of disease, drug therapy pharmacotherapy (Desired outcome, overall goal, algorithm, first line treatment, treatment of concomitant conditions , clinical monitoring, patient care and education) and non-pharmacological approaches to the disease like **ulcer, ulcerative colitis, glaucoma and selective liver diseases and dermatological disorders.**
3.8.3T.6	Composition and uses of enteral nutrition, parenteral nutrition.

B. PHARM RS3 COURSE OUTCOMES

B.PHARM I SEMESTER RS3
SUBJECT:COMMUNICATION SKILLS (THEORY)
COURSE CODE: (BP105T)
By the end of the course, students will be able to:

BP105T.1	Develop behavioral needs for a Pharmacist to function effectively with the other health care professionals.
BP105T.2	Communicate effectively.
BP105T.3	Plan productively and manage the team as a team player.
BP105T.4	Develop interview skills.
BP105T.5	Develop leadership qualities and essentials.

B.PHARM I SEMESTER RS3
SUBJECT: COMMUNICATION SKILLS (PRACTICAL)
COURSE CODE: (BP111P)
By the end of the course, students will be able to:

BP111P.1	To communicate effectively without grammar mistake.
BP111P.2	To develop the ability to speak English by developing vocabulary, understanding phonetics and pronunciations.
BP111P.3	To develop skill in listening comprehension and writing skills.
BP111P.4	To develop interview handling skills and presentation skills.

B.PHARM I SEMESTER RS3
SUBJECT: Human Anatomy and Physiology-I (Theory)
COURSE CODE: (BP101T)
At the end of the course, student will be able to

BP101T.1	Define and explain scope of anatomy and physiology, structural organization of human body,body systems, basic life processes, homeostasis, various anatomical positions and terminologies.
BP101T.2	Explain cellular and tissue level organization of the human body.
BP101T.3	Describe structure and functions cell, methods of cellular transportation, cell division and junctions.
BP101T.4	Explain general principles of cell communication, Inter and intracellular signaling pathways.
BP101T.5	Describe the organization, structure and functions of integument system, Skeletal system, skeletal muscle and its physiology, neuromuscular junction and joints.
BP101T.6	Describe various body fluids, blood and lymphatic system.
BP101T.7	Describe organization, structure, physiology and function of peripheral nervous system, special sense organs, and cardiovascular system and some common disorders associated with the above systems.

B.PHARM I SEMESTER RS3
SUBJECT: HUMAN ANATOMY & PHYSIOLOGY-I (PRACTICAL)
COURSE CODE: (BP107P)
At the end of the course, student will be able to

BP107P.1	Describe, Differentiate / distinguish ; different parts and functions of microscope, various types of tissues and its histological features, identification and functions of bones.
BP107P.2	Explain, handle and operate / perform simple hematology experiments ;like RBC count, WBC count, Bleeding and clotting time , Blood grouping, Hemoglobin concentration and Erythrocyte sediment rate.
BP107P.3	Explain and demonstrate / perform recording of Heart rate, pulse rate and Blood pressure.

B.PHARM I SEMESTER RS3
SUBJECT: PHARMACEUTICAL ANALYSIS (THEORY)
COURSE CODE: (BP102T) (RS3)
By the end of the course, students will be able to-

BP102T.1	Predict sources of error, select appropriate method for minimization of errors, predict sources of impurities and describe the principle of various limit tests.
BP102T.2	Describe the principles of volumetric and gravimetric analysis and will be able to implement the fundamental methodology to prepare different strength solutions.
BP102T.3	Explain the principle, instrumentation and applications of electrochemical techniques like conductometry, potentiometry and polarography.

B.PHARM I SEMESTER RS3
SUBJECT: PHARMACEUTICAL ANALYSIS (PRACTICALS)
COURSE CODE: (BP108P)
By the end of the course, students will be able to:

BP108P.1	Implement fundamental methodology to prepare and standardize volumetric solutions.
BP108P.2	Explain the principle of volumetric analysis, electrochemical techniques and limit tests and develop practical skills for qualitative and quantitative analysis of drugs.
BP108P.3	Plan and select suitable analytical techniques for the estimation of different category of drugs.
BP108P.4	Gather, interpret, evaluate, and communicate data correctly in writing and orally.

B.PHARM I SEMESTER RS3
SUBJECT: PHARMACEUTICS (THEORY)
COURSE CODE: (BP103T

By the end of the course, students will be able to-

BP103T.1	**Discuss role of Pharmacy as a distinct profession in India and summarize the importance ofPharmacopoeias.**
BP103T.2	Discuss the concept of posology, prescription and pharmaceutical calculations.
BP103T.3	Classify dosage forms and express the importance solubility enhancement techniques.
BP103T.4	Discuss in detail various dosage forms including their stability problems and methods to overcome the same.
BP103T.5	Explain types of incompatibilities and methods to overcome them with suitable examples.

B.PHARM I SEMESTER RS3
SUBJECT: Pharmaceutics (PRACTICAL)
COURSE CODE: (BP109P)
Upon the completion of the course the students will be able to:

BP109P.1	**Discuss the principle, preparation methods and importance of labeling in various liquid dosage forms.**
BP109P.2	Discuss the principle involved in the preparation of biphasic dosage forms and identification of emulsion types.
BP109P.3	Prepare different powders, granules and discuss the importance of packing of powders.
BP109P.4	Prepare, label and discuss the principle involved in the preparation of ointments and suppositories.

B.PHARM I SEMESTER RS3
SUBJECT: PHARMACEUTICAL INORGANIC CHEMISTRY (THEORY)
Course CODE: (BP104T)

By the end of the course, students will be able to-

BP104T.1	Identify sources of impurities and official methods for quality control of Pharmaceuticals as per pharmacopoeial standards for qualitative and quantitative estimations.
BP 104T.2	Discuss medicinal and pharmaceutical importance of inorganic compounds such as electrolytes, GIT, topical, dental and miscellaneous agents and their analysis.
BP104T.3	Apply the knowledge of radiopharmaceuticals in diagnosis and therapy.

B.PHARM I SEMESTER RS3
SUBJECT:PHARMACEUTICAL INORGANIC CHEMISTRY (THEORY)
COURSE CODE: (BP110P)

By the end of the course, students will be able to-

BP110P.1	Carry out limit test as per pharmacopoeia.
BP110P.2	Perform and evaluate the test for identity and purity.
BP110P.3	Gain knowledge about the preparation of inorganic compounds.

B.PHARM I SEMESTER RS3
SUBJECT: Remedial Mathematics) (Theory)
Course CODE: (BP106RMT)

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

BP106RMT.1	Evaluate and demonstrate the partial fraction, logarithms, functions and limits and continuity.
BP106RMT.2	Explain matrices and determination.
BP106RMT.3	Analyze calculus and evaluate differentiation.
BP106RMT.4	Analyze analytical geometry and explain its introduction, straight line and integration.
BP106RMT.5	Evaluate differential equation, pharmacokinetic equations and Laplace transform.

B.PHARM I SEMESTER RS3
SUBJECT: REMEDIAL BIOLOGY (THEORY)
COURSE CODE: (BP106RBT)

At the end of the course, student will be able to

BP106 RBT.1	Define living organisms, binomial nomenclature and salient features of five kingdoms of life. Describe the morphology of different parts of flowering plant and general anatomy of parts of mono and dicotyledons.
BP106RBT.2	Explain the different body fluids and anatomy and physiology of cardiovascular system, digestive system and the process of digestion, respiratory system and respiration.
BP106RBT.3	Describe the excretory products and its elimination, nerve control and co ordination and chemical coordination and regulation, human reproduction and the physiology.
BP106RBT.4	Explain cell- as a basic unit of life, its organelles and division, types of tissues, its location and functions.
BP106 RBT.5	Describe the mineral and its nutrition in plants, photosynthesis, and respiration in plants, growth and development.

B.PHARM I SEMESTER RS3

SUBJECT: REMEDIAL BIOLOGY (PRACTICALS)
COURSE CODE: (BP112RBP) At the end of the course, the student will be able to

BP112RBP.1	Demonstrate skill in microscopy.
BP112RBP.2	Identify and describe on cell and its inclusion, various parts of the plant and the microscopic structure of parts of plants.
BP112RBP.3	Identify and describe different types of bone.
BP112RBP.4	Perform experiments to determine blood group, blood pressure and tidal volume.

B.PHARM II SEMESTER RS3
SUBJECT: BIOCHEMISTRY (THEORY)
COURSE CODE: (BP203T)
By the end of the course, students will be able to-

BP203T.1	Understand the molecular levels of the chemical process associated with living cells.
BP203T.2	Recall the biochemical organization of the cell, transport process and also describe enzymes and isoenzymes in the field of clinical diagnosis and its significance in human body.
BP203T.3	Understand the principles of metabolism of nutrient molecules in physiological and pathological conditions
BP203T.4	Emphasize on genetic organization of mammalian genome and functions of DNA

B.PHARM II SEMESTER RS3
SUBJECT: BIOCHEMISTRY (THEORY)
COURSE CODE: [(BP209P) RS3]
By the end of the course, students will be able to-

BP209P.1	Identify the various biomolecules such as carbohydrates, proteins etc
BP209P.2	Demonstrate an understanding of how the principles of biochemistry are involved in the estimation of various biomolecules
BP209P.3	Perform study on enzymatic processes by different methods.

B.PHARM II SEMESTER RS3
SUBJECT: COMPUTER APPLICATIONS IN PHARMACY
COURSE CODE: (BP205T)
By the end of the course, students will be able to:

BP205T.1	Binary number system, Decimal number system, binary conversion, concepts of information systems and software (data flow diagrams, input/output design, planning and managing the project) etc..
BP205T.2	Concept of web technologies (HTML, XML, CSS & programming languages) & introduction to databases, MYSQL, MS ACCESS, Pharmacy Drug databases.
BP205T.3	Application of Computers in Pharmacy.
BP205T.4	Introduction, objectives and concept of Bio-informatics and its impact in Vaccine Discovery.
BP205T.5	Application of Computers as data analysis in Preclinical development: chromatographic data analysis, Laboratory Information Management System (LIMS) & Text Information Management System (TIMS)

B.PHARM II SEMESTER RS3
SUBJECT: COMPUTER APPLICATIONS IN PHARMACY (THEORY)
COURSE CODE: (BP210P)
By the end of the course, students will be able to:

BP210P.1	Designing questionnaire to gather disease information; create a HTML web page to show personal information; Retrieving the information of a drug and its adverse effects using online tools.
BP210P.2	Creating mailing labels using Label Wizard, generating label in MS WORD; Creating a database in MS Access to store patient information; design a form in MS Access to modify the patient record in database.
BP210P.3	Generating report and printing the report from patient database.
BP210P.4	Creating invoice table, drug information storage and retrieval using MS Access; Creating and working with queries in MS Access.
BP210P.5	Exporting tables, queries, forms and reports to web pages and XML pages.

B.PHARM II SEMESTER RS3
SUBJECT: ENVIRONMENTAL SCIENCES (THEORY)
COURSE CODE: BP206T

By the end of the course, students will be able to-

BP206.1	Discuss the multidisciplinary aspects of environmental studies and natural resources.
BP206.2	List out the renewable and non renewable resources and explain the problems associated with them.
BP206.3	Write the introduction, features and functions of different types of ecosystems.
BP206.4	Explain environmental pollutions such as air, water and soil pollutions with their causes and control measures.

B.PHARM II SEMESTER RS3
SUBJECT: Human Anatomy and Physiology-II (Theory)
COURSE CODE: (BP201T)

At the end of the course, student will be able to

BP201T.1	Explain organization, gross morphology, structure and physiology and functions of Nervous system including neurotransmitter and Central Nervous system.
BP201T.2	Explain organization, gross morphology, structures, and functions of digestive system and energetics
BP201T.3	Explain the anatomy and physiology of Respiratory system, artificial respiration and resuscitation methods.
BP201T.4	Explain the anatomy and physiology of Urinary system, Endocrine system, Reproductive system and disorders associated with these systems.
BP201T.5	Define and explain chromosomes, genes, DNA, protein synthesis and genetic pattern of inheritance (phenotype and genotype).

B.PHARM II SEMESTER RS3
SUBJECT: HUMAN ANATOMY AND PHYSIOLOGY II (PRACTICAL)
COURSE CODE: (BP207P)

At the end of the course, student will be able to

BP207P.1	Identify, name / list, describe various systems Viz., integumentary, special sense organs, endocrine glands, digestive system, respiratory system, urinary system, cardiovascular system, nervous system and reproductive system using charts, specimen and models.
BP207P.2	Describe, differentiate, perform and interpret the general neurological examination, olfaction, gustatory sensations, visual acuity, reflex actions, body temperature, tidal volume and vital capacity and BMI.
BP207P.3	Identify and describe histological features of vital organs, gonads, various family planning devices and pregnancy diagnostic tests.
BP207P.4	Demonstrate total blood count by cell analyzer, positive and negative feedback mechanism.
BP207P.5	Measure/Determine BP, DLC and pH of various body fluids.

B.PHARM II SEMESTER RS3
SUBJECT: PATHOPHYSIOLOGY (THEORY)
COURSE CODE: (BP204T)

At the end of the course, student will be able to:

BP204T.1	Define and describe homeostasis, feedback mechanisms, etiology and pathogenesis of cell injury and adoptive changes (due to cell injury), accumulations, disorders and electrolyte imbalances.
BP204T.2	Explain the types, cardinal signs, mediators of inflammation, vascular and cellular events, and process of wound healing and pathogenesis of atherosclerosis.
BP204T.3	Describe the etiology and pathogenesis of associated with cardiovascular system, renal and respiratory system.
BP204T.4	Describe the etiology and pathogenesis of selected hematological disorders, endocrine disorders, and progressive neurological and psychiatric disorders.
BP204T.5	Describe the etiology and pathogenesis of Peptic ulcers, IBD, liver, degenerative / progressive disorders of bones and joints and infectious diseases.
BP204T.6	Classify cancer and describe the etiology and pathogenesis of cancer.
BP204T.7	Associate signs and symptoms of diseases / disorders with above mentioned diseases and (secondary) complications.

B.PHARM II SEMESTER RS3
SUBJECT: PHARMACEUTICAL ORGANIC CHEMISTRY I (THEORY)
COURSE CODE: (BP202T)

By the end of the course, students will be able to-

BP202T.1	Understand the nomenclature rules, isomerism, molecular structure and reaction mechanism for saturated and unsaturated hydrocarbons.
BP202T.2	Know about the structure, reactions and applications of hydrocarbons bearing halides and hydroxyl functional groups.
BP202T.3	Discuss the reactions pertaining to carbonyl compounds and to know about the structure, property and uses of compounds bearing carbonyl functional groups.
BP202T.4	Understand the property, structure and uses of compounds having carboxyl and amine functional groups.

B.PHARM II SEMESTER RS3
SUBJECT: PHARMACEUTICAL ORGANIC CHEMISTRY I (THEORY)
COURSE CODE: (BP208T)

By the end of the course, students will be able to-

BP208P.1	Carryout systematic qualitative analysis of mono functional organic compounds and determine their physical constant value.
BP208P.2	Gain knowledge about the preparation of derivatives of mono functional organic compounds.
BP208P.3	Construct the molecular models of the organic compounds.

B.PHARM III SEMESTER RS3
SUBJECT: PHARMACEUTICAL MICROBIOLOGY (THEORY)
COURSE CODE: (BP303T)

Upon the completion of the course the students will be able to:

BP303T.1	Describe basics of microbial structures, function and distinguish diverse microorganisms present in environment and apply knowledge of cell culture in pharmaceutical industry and research.
BP303T.2	Discuss cultivation, isolation, identification and preservation techniques of microorganisms.
BP303T.3	Explain and differentiate various sterilization techniques, discuss basic skills needed in aseptic techniques with study of various equipments used.
BP303T.4	Explain vital role of microorganisms in, validation of sterilization, sterility testing of sterile pharmaceutical formulations, evaluation of antimicrobial agents, pharmaceutical products and microbiological assays of antibiotics, vitamins and amino acids.
P303T.5	Discuss different sources of microbial contamination causing spoilage of pharmaceutical formulations with methods to prevent the same.

B.PHARM III SEMESTER RS3
SUBJECT: MICROBIOLOGY (PRACTI AL)
COURSE CODE: (BP303P)

Upon the completion of the course the students will be able to:

BP307P.1	Execute and handle the tools and equipments, used for demonstrating microbiological techniques.
BP307P.2	Identify and distinguish microorganisms by staining and biochemical tests
BP307P.3	Illustrate and analyze various techniques associated with, handing of microorganisms, cultivation and isolation of microorganisms
BP307P.4	Plan and evaluate : sterilization techniques, sterility testing of sterile products, antimicrobial agents and microbiological assay

B.PHARM III SEMESTER RS3
SUBJECT: PHARMACEUTICAL ENGINEERING [THEORY]
Course CODE: (BP304T)

Upon the completion of the course the students will be able to:

BP304T.1	Implement the basic concepts of fluid mechanics in measurement of rate of flow of fluids with its Industrial significance.
BP304T.2	Describe and analyze the concept of heat and mass transfer involved in unit operations; drying, evaporation and distillation.
BP304T.3	Explain and implement fundamental knowledge of separation techniques applicable in unit operations; filtration, centrifugation and size separation.
BP304T.4	Explain and analyze significance of size reduction and mixing operations.
BP304T.5	Discuss on materials of pharmaceutical plant construction, corrosion and its preventive measures.

B.PHARM III SEMESTER RS3
SUBJECT: PHARMACEUTICAL ENGINEERING [PRACTICAL]
Course CODE: (BP304P)

Upon the completion of the course the students will be able to:

BP308P.1	Apply the basic concept of heat transfer in determining- overall heat transfer coefficient of heat exchanger, construction of drying curve and efficiency of steam distillation process.
BP308P.2	Determine the factors affecting the rate of evaporation, filtration and crystallization techniques.
BP308P.3	Perform size reduction using ball mill and evaluate size distribution of granules by sieve analysis.
BP308P.4	Determine the mixing efficiency and uniformity index of blender. Estimate humidity of air using Psychrometric charts.
BP308P.5	Demonstrate the handling of Industrial equipments used in pharmaceutical Industry with its applications.

B.PHARM III SEMESTER RS3
SUBJECT: PHARMACEUTICAL ORGANIC CHEMISTRY II (THEORY)
COURSE CODE: (BP301T)
By the end of the course, students will be able to-

BP301T.1	Understand the aromaticity, properties, reactions and applications of benzene and its derivatives.
BP301T.2	Discuss the property, structure and uses of aromatic compounds, bearing hydroxyl, amino and carboxyl functional groups.
BP301T.3	Know the properties of fats and oils as well as the techniques used to analyze them.
BP301T.4	Understand the synthesis, reactions, property and uses of cycloalkanes and poly-nuclear hydrocarbons.

B.PHARM III SEMESTER RS3
SUBJECT: Pharmaceutical Organic Chemistry II (PRACTICAL)
Course CODE: **(BP305P)**
By the end of the course, students will be able to-

BP305P.1	Carry out the experiments involving lab techniques such as, re-crystallization and steam distillation.
BP305P.2	Evaluate fats and oils by employing various analytical techniques such as, acid value, saponification value and iodine value.
BP305P.3	Gain knowledge about the preparation of various organic compounds.

B.PHARM III SEMESTER RS3
SUBJECT: PHYSICAL PHARMACEUTICS-I (THEORY)
COURSE CODE: ((BP302T)
By the end of the course, students will be able to-

BP302T.1	Describe the physicochemical properties of drug molecules, pH, buffer equation and their applications.
BP302T.2	Definition of solubility, solubility phenomenon and factors influencing them.
BP302T.3	Explain law of distribution, limitation and its application.
BP302T.4	Describe the properties of matter and concept of Complexation.
BP302T.5	Explain the role of surfactants, interfacial phenomenon and surface tension, adsorption and methods for calculation of interfacial tension.

B.PHARM III SEMESTER RS3
SUBJECT: Pharmaceutics-I (PRACTICAL)
COURSE CODE: (BP306P)
By the end of the course, students will be able to-

BP306P.1	Determine Partition coefficient of binary system and HLB value of Surfactants.
BP306P.2	Deduce the CMC of surfactants and stability constant of complexes.
BP306P.3	Analyze the pKa value and % composition of NaCl.
BP306P.4	Determine the Freundlich and Langmuir constant and solubility of drugs.
BP306P.5	Determine the surface tension of liquids.

B.PHARM IV SEMESTER RS3
SUBJECT: MEDICINAL CHEMISTRY-I (THEOR)
COURSE CODE: (BP402T) (RS3)
By the end of the course, students will be able to-

BP402T.1	Recognize the physico-chemical aspects of drug molecule on biological activity, its stereochemical features and basic principles of drug metabolism
BP402T.2	Understand classification, MOA, uses, SAR and synthesis of drugs acting on Autonomic Nervous System
BP403T.3	To develop the concept of SAR, MOA and synthesis of different class of drugs such as sedatives and hypnotics, anti-psychotics and anti-convulsants
BP403T.4	Provide the basic knowledge of medicinal chemistry, through identification of the chemistry of different drug and synthesis of various classes such as general anesthetics, analgesics and anti-inflammatory.

B.PHARM IV SEMESTER RS3
SUBJECT: MEDICINAL CHEMISTRY-I (PRACTICAL)
COURSE CODE: (BP406P)
By the end of the course, students will be able to-

BP406P.1	Develop expertise in the various techniques of preparation of drug substances.
BP406P.2	Carry out various assay procedures involving various techniques.
BP406P.3	Determination of partition coefficient of certain drugs.

B.PHARM IV SEMESTER RS3
SUBJECT: PHARMACOGNOSY AND PHYTOCHEMISTRY-I(BP405T)
COURSE OUTCOMES (CO):
By the end of course, students will be able to-

BP405T.1	Create awareness regarding importance of Pharmacognosy and study sources of crude drugs.
BP405T.2	Gain knowledge regarding classification, cultivation, collection, plant hormones, storage of crude drugs along with polyploidy, mutation, hybridization and plant tissue culture.
BP405T.3	Enhance knowledge of source, active constituents, analysis, uses of crude drugs containing primary metabolites and various system of medicine.
BP405T.4	Define, apply the pharmacognostical importance of secondary metabolites and plant fibers as surgical dressings.

B.PHARM IV SEMESTER RS3
SUBJECT: PHARMACOLOGY-I (THEORY)
COURSE CODE: (BP404T)
At the end of the course, students will be able to:

BP404T.1	Define pharmacology and drug related terms and discuss various sources of drugs, dosage forms and routes of drug administration with specific advantages and disadvantages.
BP404T.2	Explain basic principles of pharmacokinetics and pharmacodynamics of drug molecules.
BP404T.3	Assess adverse effects (following drug use) and (potential / probable) drug interactions.
BP404T.4	Describe principles of drug discovery and phases of development of new drugs.
BP404T.5	Explain Neurohumoral transmission and Pharmacology of drugs acting on peripheral nervous system.
BP404T.6	Describe Pharmacology of drugs acting on Central nervous system and drugs used in the treatment of Psychiatric disorders.

B.PHARM IV SEMESTER RS3
SUBJECT: PHARMACOLOGY-I (PRACTICAL)
COURSE CODE: (BP408P)
At the end of the course, student will be able to

BP408P.1	Identify and understand the construction / working and uses of instruments / accessories / laboratory animals and their importance in experimental Pharmacology
BP408P.2	Administer drugs by different routes of drug administration ,perform simple surgical techniques, bleeding and IV injection, rendering the lab animals unconscious using General anesthetic and chemical euthanasia
BP408P.3	Perform computer simulated experiments, tabulate and interpret the results covering experiments to demonstrate enzyme induction / inhibition, ciliary motility, drugs effect on rabbit eye, skeletal muscle relaxants activity, anticonvulsant effect, stereotype and anti-catatonic activity, anxiolytic activity, locomotor activity.

B.PHARM IV SEMESTER RS3
SUBJECT: PHARMACEUTICAL ORGANIC CHEMISTRYIII (THEORY)
COURSE CODE: (BP401 T)
By the end of the course, students will be able to-

BP401T.1	Acquire knowledge on the concept of stereoisomerism.
BP401T.2	An ability to write the synthesis, reaction and structures of different heterocyclic compounds and their derivatives.
BP401T.3	Understand and explain the reactions of synthetic importance.

B.PHARM IVSEMESTER RS3
SUBJECT: Physical Pharmaceutics-II (THEORY)
Course CODE: (BP403T)
By the end of the course, students will be able to-

BP403T.1	Define; analyze the fundamental and derived Properties of Powder.
BP403T.2	Assess drug stability in designing stable and effective dosage form and calculate reaction rate constants by various methods.
BP403T.3	Discuss the theory, formulation, evaluation and factors influencing the stability of Pharmaceutical coarse and colloidal dispersions.
BP403T.4	Describe the flow behavior of fluids and deformation of solids.

B.PHARM IV SEMESTER RS3
SUBJECT: Physical Pharmaceutics-II (PRACTICAL)
COURSE CODE: (BP407P) []RS3]
By the end of the course, students will be able to-

BP407P.1	Analyze various fundamental and derived properties of powder.
BP407P.2	Determine the viscosity of liquids and rheology of semisolid.
BP407P.3	Preparation and evaluation of coarse dispersions.
BP407P.4	Deduce the rate constant for order of reactions and Accelerated stability studies.

B.PHARM V SEMESTER RS3
SUBJECT: INDUSTRIAL PHARMACY-I (THEORY)
COURSE CODE: (BP502T)
By the end of the course, students will be able to-

BP502T.1	Discuss theory or concept involved in the formulations of tablets, capsules, liquid, semisolid dosage forms
BP502T.2	Describe pre-formulation studies and their applications in development of various dosage forms
BP502T.3	Explain the manufacturing considerations, formulation and evaluation of various dosage forms including cosmetics and aerosols
BP502T.4	Describe the various packaging materials their legal and official requirements and quality control tests

B.PHARM V SEMESTER RS3
SUBJECT: INDUSTRIAL PHARMACY-I (PRACTICALS)
COURSE CODE : -(BP506P) [R]S3
By the end of the course, students will be able to-

BP506P.1	Perform pre-formulation studies priorto development ofvarious dosage forms
BP506P.2	Formulate and evaluate various solid dosage forms
BP506P.3	Prepare and evaluate parenteral preparations
BP506P.4	Conduct quality control tests of solid dosage forms
BP506P.5	Evaluate glass containers

B.PHARM V SEMESTER RS3
SUBJECT: MEDICINAL CHEMISTRY-II
COURSE CODE: (BP501T)
By the end of the course, students will be able to-

BP501T.1	Explain the SAR, mechanism of action, synthesis and use of antihistaminic, antineoplastic and antidiabetic agents.
BP501T.2	Discuss the chemistry of drugs acting on cardiovascular system – anti-anginal agents and anti-arrhythmic agents.
BP501T.3	To acquire knowledge about the structure, mechanism of action and uses of drugs acting on endocrine system.
BP501T.4	Describe the mechanism of action and SAR of local anesthetics.

B.PHARM V SEMESTER RS3
SUBJECT: Pharmaceutical Jurisprudence (THEORY)
COURSE CODE: (BP505T)
By the end of the course, students will be able to-

BP505T.1	Gain the basic knowledge about Pharmaceutical laws in India and role of ethics in the Pharmacy Profession, rules regarding pharmacy registration and Education Regulations in the country.
BP505T.2	Implement the rules and regulations of Drug Price Control Order and Pharmaceutical Policy 2002 in manufacture, sale and import of drugs.
BP505T.3	Describe and discuss the Rules, Regulations of Excise Duties Act & Narcotic, and Psychotropic Substances Act.
BP505T.4	Explain the rules and regulations framed and amendments made under Drugs & Magic Remedies Act, Animals Act, and Medical termination of pregnancy Act
BP505T.5	Gain basic knowledge about Intellectual property rights and rights to information Act.

B.PHARM V SEMESTER RS3
SUBJECT: PHARMACOGNOSY AND PHYTOCHEMISTRY II (THEORY)
COURSE CODE: (BP504T)
Upon the completion of the course the students will be able to:

BP504T.1	Elucidate the basic metabolic pathways and techniques involved in formation of secondary metabolites.
BP504T.2	Summarize the Pharmacognostic study and Commercial applications of selected crude drugs belonging to various secondary metabolites.
BP504T.3	Compile the isolation, identification and analytical methods of various phytoconstituents.
BP504T.4	Enhance the knowledge on Industrial production, estimation, utilization of phytoconstituents.
BP504T.5	Comprehend and describe the principles, instrumentation and application of various Spectroscopic, Chromatographic and Electrophoresis methods used in isolation, purification and identification of crude drugs.

B.PHARM V SEMESTER RS3
SUBJECT: PHARMACOGNOSY AND PHYTOCHEMISTRY-I (THEORY)
COURSE CODE (BP508P**)**
B.PHARM IVSEMESTER RS3
SUBJECT:

BP508P.1	Extraction and Evaluation of herbal drugs.
BP508P.2	Isolation and identification of active principles.
BP508P.3	Separation and detection of phytoconstituents by Chromatography.

B.PHARM VSEMESTER RS3

SUBJECT: PHARMACOGNOSY AND PHYTOCHEMISTRY-II (PRACTICAL)
COURSE CODE: (BP508P)
Upon the completion of the course the students will be able to:

BP508P.1	Extraction and Evaluation of herbal drugs.
BP508P.2	Isolation and identification of active principles.
BP508P.3	Separation and detection of phytoconstituents by Chromatography.

B.PHARM VSEMESTER RS3

SUBJECT: PHARMACOLOGY-II (THEORY)
COURSE CODE: (BP503T)
At the end of the course, student will be able to

BP503T.1	Explain pharmacology of various classes of drugs acting on Cardiovascular system and list out their clinical indications.
BP503T.2	Explain pharmacology of drugs acting on Urinary system.
BP503T.3	Explain the physiological and pathological roles of Autocoids, their antagonists and compile their therapeutic potential.
BP503T.4	Describe the Pharmacology of hormonal agonists and antagonists and their therapeutic uses.
BP503T.5	Describe the principles and applications of Bioassay.

B.PHARM V SEMESTER RS3

SUBJECT:PHARMACOLOGY-II (PRACTICALS)

COURSE CODE: (BP507P)

At the end of the course, student will be able to:

BP507P.1	Perform computer simulated DRC of Acetylcholine and effect of physostigmine, atropine on DRC of Acetylcholine.
BP507P.2	Understand effect of drugs on isolated frog heart and blood pressure by computer simulated experiments.
BP507P.3	Perform computer simulated bioassay of histamine, oxytocin, serotonin and acetylcholine.
BP507P.4	Determine PA2, PD2 value of prazocin by simulated experiments.
BP507P.5	Understand the effect of spasmogens, spasmolytics, diuretics, anti-inflammatory and analgesic agents by computer simulated experiments.

B.PHARM VI SEMESTER RS3

SUBJECT: BIOPHARMACEUTICS AND PHARMACOKINETICS (THEORY)

COURSE CODE: (BP 604T)

Course outcome: After completion of course students are able to

BP 604T.1	Define role of biopharmaceutics and pharmacokinetics in drug development and clinical settings and describe process of drug absorption, distribution, elimination and excretion.
BP 604T.2	Explain physicochemical, physiological and pathological factors affecting drug absorption, distribution and elimination.
BP 604T.3	Explain bioavailability and bioequivalence studies of drugs and able to integrate *in vitro* and *in vivo* data for clinical purpose.
BP 604T.4	Discuss one compartment and multicompartment kinetic models for the measurement of pharmacokinetic parameters.
BP 604T.5	Analyze differences between linear and non-linear kinetics and explain importance of non-linear kinetics in designing dosage regimen.

B.PHARM VI SEMESTER RS3

SUBJECT: HERBAL DRUG TECHNOLOGY (THEORY)

COURSE CODE: (BP603T)C(RS3)

Upon the completion of the course the students will be able to

BP603T.1	Narrate about selection, identification, authentication and processing of herbs with special emphasize on Good Agricultural Practice.
BP603T.2	Posses knowledge on basic principles of traditional medicinal system with preparation and standardization of Ayurvedic formulations.
BP603T.3	Discuss the role of Nutraceuticals in various diseases and also gain the knowledge of herb-drug and herb-food interactions.
BP603T.4	Describe about herbs used in cosmetics, formulations and as excipients with their significance.
BP603T.5	Describe evaluation guidelines of herbal drugs as per WHO and ICH guidelines and expand their knowledge on Patenting and regulatory requirements of natural products.
BP603T.6	Comprehend about Herbal Drug Industry and Schedule T. (GMP) for Indian systems of medicine.

B.PHARM VI SEMESTER RS3

SUBJECT: HERBAL DRUG TECHNOLOGY (PRACTICAL)

COURSE CODE : (BP609P)

Upon the completion of the course the students will be able to:

BP609P.1	To carry out preliminary Phytochemical screening of crude drugs and determine the total alkaloids, alcohol, aldehyde and phenol content
BP609P.2	To formulate and evaluate Herbal cosmetics and herbal formulations
BP609P.3	To analyze herbal drugs as per Monograph given in recent pharmacopoeias

B.PHARM VI SEMESTER RS3

SUBJECT: MEDICINAL CHEMISTRY-III (THEORY)

COURSE CODE: (BP601T)

By the end of the course, students will be able to-

BP601T.1	To understand historical background, Nomenclature, Stereochemistry, SAR, Chemical degradation and classification of antibiotics and antimalarials. To know the basic concepts of prodrug.
BP601T.2	Employ the core subject knowledge of anti-tubercular, antiviral and the drugs acting on urinary tract.
BP601T.3	To develop the concept of SAR, MOA and uses of Antifungal, antiprotozoal, anthelmintic and sulphonamide classes of drug.
BP601T.4	Understand the importance and various approaches used in drug design. To study the concept and applications of combinatorial chemistry.

B.PHARM VI SEMESTER RS3

SUBJECT: MEDICINAL CHEMISTRY-III (PRACTICAL)

COURSE CODE: (BP607P)

By the end of the course, students will be able to-

BP607P.1	Carry out various assay procedures involving various techniques; also relate the principle to new applications.
BP607P.2	Synthesize, recrystallize and understand reaction mechanisms involved in preparation of medicinally important organic compounds.
BP607P.3	Determination of physicochemical properties ofvarious class of drugs using drug design software.

B.PHARM VI SEMESTER RS3

SUBJECT: Pharmaceutical Biotechnology (THEORY)

Course CODE: (BP 605 T)

By the end of course, students will be able to-

BP605T.1	incorporate knowledge about tools of biotechnology useful in pharmaceutical sciences.
BP605T.2	develop knowledge about immunity, immunobiologics and hybridoma technology.
BP605T.3	learn blotting techniques, genetics of Eukaryotes and Prokaryotes and biotranformation and applications.
BP605T.4	explain the theoretical aspects of fermentation, fermentation products and blood products.

B.PHARM VI SEMESTER RS3

SUBJECT: PHARMACOLOGY-III (THEORY]

COURSE CODE: (BP602T)

At the end of the course, student will be able to

BP602T.1	Explain pharmacology of various classes of drugs acting on Respiratory system and GIT and list out its clinical indications
BP602T.2	Describe the general principles of chemotherapy of infectious diseases and cancer and pharmacology of important classes of antimicrobial agents
BP602T.3	Describe the Pharmacology of Immunosuppressants and Immunostimulants and its therapeutic uses
BP602T.4	Define toxicity and its types and describe the general principles in the treatment of poisoning specifically barbiturates, morphine, organophosphorous compounds and heavy metals
BP602T.5	Describe the basic concept of Chronopharmacology and identify its potential influence in the therapeutics of diseases.

B.PHARM VI SEMESTER RS3

SUBJECT: PHARMACOLOGY-III (PRACTICALS)

COURSE CODE: (BP608P)

At the end of the course, student will be able to

BP608P.1	Calculation of dose and pharmacokinetic parameters from given data, learning of Biostatistics methods in experimental pharmacology (student's t test, ANOVA, Chi-square test, Wilcoxon signed rank test)
BP608P.2	Estimation of serum biochemical parameters by using semi-auto analyzer, determination of acute oral toxicity, skin irritation, eye irritation of a given substance
BP608P.3	Perform computer simulated experiments, tabulate and interpret the results covering experiments to demonstrate Anti-allergic activity, anti-ulcer activity, effect of drugs on GI motility, agonist and antagonist on guinea pig ileum, saline purgative on frog intestine, hypoglycemic effect of insulin in rabbit, pyrogen test

B.PHARM VI SEMESTER RS3

SUBJECT: PHARMACEUTICAL QUALITY ASSURANCE (THEORY)

COURSE CODE: (BP606T)

Upon completion of the course student shall be able to:

BP606T.1	Discuss importance of Good practices such as GMP,GLP
BP606T.2	Explain theconcept of quality principles, regulatory aspects and its influence in pharmaceutical industry
BP606T.3	Describe the elements that are part of the quality measuring process in the industry.
BP606T.4	Distinguish between calibration and validation, predict errors in manufacturing and analyze the root cause
BP606T.5	Discuss the process and activity involved in manufacturing of pharmaceuticals in different section/department.

B.PHARM VII SEMESTER RS3
SUBJECT: INSTRUMENTAL METHODS OF ANALYSIS -Theory
COURSE CODE: BP701T

Upon completion of the course student shall be able to:

BP701T.1	Explain the principle and instrumentation of different spectroscopic and apply the same in the quantitative analysis of drugs and pharmaceuticals.
BP701T.2	Describe the principle and techniques of various types of chromatography and electrophoresis and apply the same in identification of substances and quantitative analysis of drugs and pharmaceuticals.
BP701T.2	Discuss advanced chromatographic techniques like HPLC and GC and apply them in estimations of pharmaceuticals.

B.PHARM VII SEMESTER RS3
SUBJECT: INSTRUMENTAL METHODS OF ANALYSIS -Practical
COURSE CODE: BP705P

Upon completion of the course student shall be able to:

BP705P.1	Operate common laboratory instruments used for analysis of drugs and pharmaceuticals.
BP705P.2	Develop practical skills to analyze drugs and pharmaceutical products using various spectroscopic techniques.
BP705P.3	Develop various chromatographic techniques for assay of drugs and pharmaceuticals with the knowledge gained.
BP705P.4	Gather, interpret, evaluate, and communicate data correctly in writing and orally.

B.PHARM VII SEMESTER RS3
SUBJECT: INDUSTRIAL PHARMACYII -Theory
COURSE CODE: BP 702 T
Upon completion of the course student shall be able to:

BP 702 T 1	Know the process of pilot plant and scale-up of pharmaceutical dosage forms
BP 702 T 2	Understand the process of technology transfer from laboratory scale to commercial batch
BP 702 T 3	Know different Laws and Acts that regulate pharmaceutical industry in producing quality products
BP 702 T 4	Understand the approval process and regulatory requirements for drug products

B.PHARM VII SEMESTER RS3
SUBJECT: PHARMACY PRACTICE -Theory
COURSE CODE: Upon completion of the course student shall be able to:

BP703T.1	Students will demonstrate knowledge of and ability to use principles of therapeutics, quality improvement, communication, economics, health behavior, social and administrative aspects,health policy and legal issues in the practice of pharmacy.
BP703T.2	Students will use knowledge of drug distribution methods in hospital and apply it in the practice of pharmacy.
BP703T.3	Students will effectively apply principles of drug store management and inventory control to medication use.
BP703T.4	Students will provide patient-centered care to diverse patients using the best available evidence and monitor drug therapy of patient through medication chart review, obtain medication history interview and counsel the patients, identify drug related problems.
BP703T.5	Students will engage in innovative activities by making use of the knowledge of clinical trials
BP703T.6	Students will exhibit professional ethics by producing safe and appropriate medication use throughout society

B.PHARM VII SEMESTER RS3
SUBJECT: NOVEL DRUG DELIVERY SYSTEMS-Theory
COURSE CODE: Upon completion of the course student shall be able to:

BP704T.1	Discuss the principle and approaches to design controlled release formulations including microencapsulation and apply the knowledge of polymers in formulation of CDDS.
BP704T.2	Describe the principles and concepts involved in of Mucoadhesive and implantable drug delivery systems.
BP704T.3	Explain the formulation and evaluation aspects of transdermal, Gastroretentive, Nasopulmonary, and ocular and intrauterine drug delivery systems
BP704T.4	Elaborate the concept, approaches and applications of targeted drug delivery systems as: liposomes, niosomes, nanoparticles and monoclonal antibodies.

PHARM VIII SEMESTER RS3
SUBJECT: BIOSTATISITCS AND RESEARCH METHODOLOGY -Theory
COURSE CODE: Upon completion of the course student shall be able to:

BP 801 T.1	Explain Statistics, Biostatistics, Frequency distribution and Measures of central tendency, Measures of dispersion and types of Correlation
BP 801 T.2	Describe the key parameters employed in the application of biostatistics for assessing the pharmaceutical experimental data by Curve fitting, Parametric test and Non-Parametric tests and probability distribution with examples
BP 801 T.3	Understand the basic need for research; protocol preparation, need for design of Experiments, Experiential Design Technique, plagiarism and representation of data
BP 801 T.4	Learn basics of Blocking and confounding system for Two-level factorial design and Hypothesis testing in Simple and Multiple regression models.
BP 801 T.5	Understand basic needs of Industrial and Clinical Trials Problems using Statistical Analysis tools ; Excel, SPSS, MINITAB®, DOE

PHARM VIII SEMESTER RS3
SUBJECT: SOCIAL AND PREVENTIVE PHARMACY -Theory
COURSE CODE: Upon completion of the course student shall be able to:

BP802 T.1	Get the knowledge about various factors that affect public health, and concepts of prevention and control of related diseases
BP802 T.2	Learns the principles of prevention and control of communicable and non-communicable diseases including drug addiction
BP802 T.3	Aware of various national health programs available for control and prevention of various communicable and non-communicable diseases
BP802 T.4	Aware of various national health programs available for healthcare and welfare of mother and child, family, elderly and public including tobacco control program. In addition, role of WHO in Indian national program
BP802 T.5	Get the knowledge about the importance of community services in the improvement of health of rural, urban and school population

PHARM VIII SEMESTER RS3
SUBJECT: PHARMA MARKETING MANAGEMENT
COURSE CODE: BP803ET

Upon completion of the course student shall be able to:

BP803 ET.1	Marketing concepts and techniques and the application of the same in the pharmaceutical industry.
BP803 ET.2	Market research and distribution channels along with their implementation in the pharmaceutical industry.
BP803 ET.3	Concepts of branding and product management
BP803 ET.4	Theories on promotion, sales and pricing of a product

PHARM VIII SEMESTER RS3
SUBJECT: PHARMACEUTICAL REGULATORY SCIENCE (Theory)
COURSE CODE: BP804 ET

Upon completion of the course student shall be able to:

BP 804 T.1	Discuss the various stages of drug discovery and development. Generic drug product development and getting approval from drug regulatory authorities.
BP 804 T.2	Describe Approval process of NDA, ANDA and IND
BP 804 T.3	Detailed explanation of different drug regulatory authorities of India, United States, European Union, Australia, Japan, Canada for getting an approval for Pharmaceutical products. DMF, CTD and eCTD
BP 804 T.4	Format and procedure for getting an approval to Clinical trials and have a knowledge about regulatory requirements for drug approval
BP 804 T.5	To know different acts and laws regulated in Pharmaceutical industry. To have a knowledge of Orange Book, Purple Book and Code of Federal Register

PHARM VIII SEMESTER RS3
SUBJECT: PHARMACOVIGILANCE (Theory)
COURSE CODE: BP 805T

Upon completion of the course student shall be able to:

BP 805T.1	Learn about development of pharmacovigilance as a science, basic terminologies used in pharmacovigilance
BP 805T.2	Basic terminologies used in pharmacovigilance
BP 805T1.3	Detect, assess and monitor adverse drug reaction, medication errors and drug related problems
BP 805T1.4	Guidelines for Pharmacovigilance
BP 805T1.5	Learn drug safety evaluation in special population

PHARM VIII SEMESTER RS3
SUBJECT: QUALITY CONTROL AND STANDARDIZATION OF HERBALS
COURSE CODE: BP 806 ET.

Upon completion of the course student shall be able to:

BP 806 ET.1	Narrate about basic tests for Pharmaceutical substances, commercial crude drugs and dosage forms.
BP 806 ET.2	Possess knowledge on Quality assurance in herbal drug industry with special emphasis to WHO guidelines with respect to cGMP, GACP and others.
BP 806 ET.3	Describe about Quality control of herbal drugs as per EU and ICH guidelines and expand their knowledge on Research Guidelines to evaluate Safety and Efficacy of Herbal Medicines
BP 806 ET.4	Comprehend about Standardization and Stability testing of Herbal medicines. Preparation of documents for NDA and export.
BP 806 ET.5	Narrate about Regulatory requirements for herbal medicines and Pharmacovigilance.

PHARM VIII SEMESTER RS3
SUBJECT: COMPUTER AIDED DRUG DESIGN (Theory)
COURSE CODE: BP 807 ET.

Upon completion of the course student shall be able to:

BP 807 ET1	Know the design and discovery of lead molecules
BP 807 ET2	Understand the role of computer aided drug design in drug discovery process.
BP 807 ET3	Understand the concept of QSAR and docking.
BP 807 ET4	Understand the strategies adopted to develop new drug candidates.

PHARM VIII SEMESTER RS3
SUBJECT: CELL AND MOLECULAR BIOLOGY
COURSE CODE: BP808ET

Upon completion of the course student shall be able to:

BP808ET.1	Explain the structure, molecular composition of cell and cell membrane, cellular reproduction and compare eukaryotic and prokaryotic cell.
BP808ET.2	Describe flow of molecular information, protein synthesis, DNA and RNA.
BP808ET.3	Explain Protein structure, regularities in protein pathways and cellular processes.
BP808ET.4	Describe the Science of genetics, transgenics, cell cycle and its checkpoints.
BP808ET.5	Describe the signaling pathways, receptors for cell signals, misregulation of signaling pathways and functioning of protein-kinases.

PHARM VIII SEMESTER RS3
SUBJECT: COSMETIC SCIENCE (Theory)
COURSE CODE: BP809ET

Upon completion of the course student shall be able to:

BP809ET.1	Explain Knowledge of regulations and guidelines of cosmetics as per Indian and EU regulations. To have a thorough understanding of the role of cosmetic ingredients in cosmetics and formulation of cosmeceuticals such as skincare, haircare, suncare and oral care products
BP809ET.2	Discuss the different Principles of formulation and building blocks of skin care products, Hair care products and oral care cosmeceuticals
BP809ET.3	Describe the various Sun protections, Classification of Sunscreens and SPF. Analytical cosmetics: BIS specification and analytical methods for shampoo, skin- cream and toothpaste
BP809ET.4	Understand the basic Principles of Cosmetic Evaluation: Principles of sebumeter, corneometer. Measurement of TEWL, Skin Color, Hair tensile strength, Hair combing properties Soaps and syndet bars. Evolution and skin benefits.
BP809ET.5	Explain various skin disorders: Oily and dry skin, causes leading to dry skin, skin moisturisation. Basic understanding of the terms Comedogenic, dermatitis. Cosmetic problems associated with Hair and scalp: Dandruff, Hair fall causes Cosmetic problems associated with skin: blemishes, wrinkles, acne, prickly heat and body odor. Antiperspirants and Deodorants- Actives and mechanism of action

PHARM VIII SEMESTER RS3
SUBJECT: PHARMACOLOGICAL SCREENING METHODS
COURSE CODE: BP810 ET

Upon completion of the course student shall be able to:

BP810ET.1	Describe the laboratory animals, handling and applications of different species and strains of animals used in laboratory including transgenic animal's production, maintenance and their application in research. Explain the different techniques for blood collection, anesthesia and euthanasia used; maintenance and breeding of laboratory animals. Appreciate the CPCSEA and OECD guidelines to conduct experiments on animals and good laboratory practice.
BP810ET.2	Describe the rationale of dose selection, calculation, preparation of drug solutions and basis of grouping with negative & positive controls, selection of species & sex for the study. Describe *in-vivo*, *in-vitro* pre-clinical screening of drugs used in CNS pharmacology which includes:- antipyretic, anti-inflammatory, general anesthetics, Nootropics, sedative and hypnotics, antipsychotic, antidepressant, antiepileptic, anti-Parkinsonism, Alzheimer's disease and Diuretics & anti-histamines.
BP810ET.3	Explain *in-vivo*, *in-vitro* pre-clinical screening of drugs used in for autonomic nervous system activity, sympathomimetics, sympatholytics, parasympathomimetics, parasympatholytics, skeletal muscle relaxants, drugs acting on eye, local anesthetics.
BP810ET.4	Discuss *in-vivo*, *in-vitro* pre-clinical screening of drugs used in cardiovascular system including anti-hypertensives, anti-arrythmics, anti-anginal; metabolic disorders like anti-diabetic, anti-dyslipidemics; anti-cancer drugs and anticoagulants.
BP810ET.5	Elucidate the selection of research topic, review of literature, research hypothesis and study design. Understand the biostatistical analysis of data using Students't' test and One-way ANOVA & interpret the data, and represent the data in graphical method.

PHARM VIII SEMESTER RS3
SUBJECT: ADVANCED INSTRUMENTATION TECHNIQUES
COURSE CODE: BP8011ET

Upon completion of the course student shall be able to:

BP811ET.1	Explain the principle and instrumentation of advanced analytical techniques like NMR spectroscopy and Mass spectrometry and apply the same in the analysis of drugs and pharmaceuticals.
BP811ET.2	Describe the principle, techniques and applications of various thermal methods of analysis and X-ray diffraction methods
BP811ET.3	Perform calibration and validation of analytical instruments
BP811ET.4	Explain the principle, technique and applications of Radio immunoassay, solid phase and liquid-liquid extractions and hyphenated techniques.

PHARM VIII SEMESTER RS3
SUBJECT: DIETARY SUPPLEMENTS AND NUTRACEUTICALS
COURSE CODE : BP 812 ET

Upon completion of the course student shall be able to:

BP 812 ET1	Discuss the need of supplements by the different group of people to maintain healthy life.
BP 812 ET2	Explain outcome of deficiencies in dietary supplements
BP 812 ET3	Explain about free radicals, their role in different diseases and antioxidants, dietary fibres, complex carbohydrates used in scavenging free radicals.
BP 812 ET4	Discuss processing, storage and intermediate and regulatory aspects of nutraceuticals.