MAHATHI COLLEGE OF PHARMACY
(Approved by AICTE, PCI, New Delhi & Affiliated to JNTUA, Ananthapuramu)
MAHATHI COLLEGE for Innovative Learning
Madanapalle Road Railway Station,
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2.6

Student Performance and Learning Outcomes

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Programme Outcomes (POs) and Course Outcomes (COs) for all Programmes offered by the institution are stated and displayed on website and attainment of POs and COs are evaluated

PROGRAMME OUTCOMES

B PHARMACY

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

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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.

M.PHARMACY PROGRAMME PHARMACEUTICS

1.Scientific knowledge: To apply the scientific and technological principles to design, develop effective pharmaceutical dosage forms and drug delivery systems for better therapeutic results.

2.Technological applications: To utilize technical knowledge and identify any factors affecting the quality of pharmaceutical production.

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

4.Entrepreneurship: To understand the basics of establishing and management of pharmaceutical enterprise.

5.Practical skills: To gain practical expertise in formulating and evaluating various novel drug release systems for minor ailments to major diseases.

6.Applied science: To employ contemporary scientific knowledge viz., pharmacology, biotechnology for designing disease-centric pharmaceuticals.

7.Computational and statistical methodologies: Applying and utilizing the statistical tools with the aid of computer software to optimize the formulations.

8.Pharmaceutical ethics: To respect personal values and apply ethical principles in professional and social contexts. Demonstrate behavior that recognizes cultural, 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.

9.Environment and sustainability: To understand, protect and cooperate environmental concerns for sustaining biodiversity.

10.Life-long learning: To develop the habit of updating knowledge from time to time to meet industrial demands and social needs for having a fruitful career.

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M.PHARMACY PROGRAMME PHARMACEUTICAL ANALYSIS (MPA)

1. Analytical Knowledge: Acquire knowledge on various chromatographic and spectroscopic techniques and differentiate with volumetric analysis.
2. Analytical Reasoning: To categorize assumptions and disclose the data according to guidelines.
3. Problem Solving: To utilize the principles of analytical techniques with clear and critical thinking, while solving problems and making decisions. Find, analyze, evaluate and apply information systematically and shall make defensible decisions.
4. Modern Techniques: To learn, choose and apply appropriate hyphenated methods and procedures and related computing tools with thoughtfulness of their applications.
5. Experimental Ethics: To believe and follow ethics and guidelines specified by the regulatory authorities of various countries and Government of India for good laboratory practice.
6. Interdisciplinary Commitment: To acquire skill oriented practical ability and utilize the needs of pharmacy in all other programmes to emerge as potent researcher.
7. Professional Identity: To be committed and responsible person to play a proactive role with loyalty to community and to empower society.
8. Statistical Skills: To apply and evaluate quantitative metrics to gain safety data on dosage and also to compare the effectiveness among different marketed formulations.
9. Rational Flexibility: To engage in critical and logical thinking and to gain an overall knowledge in developing newer methods, impurity profiling and validation protocols those are useful in routine and laboratory purpose.
10. Environment and Sustainability: To understand the level of bio hazardous solvents and chemicals in relation to environmental contexts and sustainable development.
11. Lifelong Learning: Understand and apply the concepts in day to day life activities for the benefit of self and for the welfare of society.

M. PHARMACY PROGRAMME PHARMACOLOGY (MPL)

1. Drug Expertise: Acquire knowledge on various classes of drugs and their mode of actions to unveil the remedies for many ailments.
2. Analytical Reasoning: Identify assumptions and reveal the evidence based reason for the disease or disorder take place, to select the type of relevant

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treatment.

3. Experimental Ethics: Consider and follow ethics and guidelines specified by the authorities of various agencies and Government of India for animal congenial laboratory practice.

4. Interdisciplinary engagement: Obtain skill oriented practical proficiency by exposing and utilizing the needs of pharmacy in all disciplines to emerge as potent researcher.

5. Professional Identity: Be committed and responsible person to play a proactive role with fidelity to community and empower society.

6. Statistical Skills: Apply and analyze quantitative metrics to gain safety data on dosage, also to compare the effectiveness among experimental groups.

7. Intellectual Flexibility: Engage in critical thinking and gain insight to identify, design and formulate pharmaceutical products that are in need of current aspects by using material from natural sources.

8. Lifelong learning: Understand and apply the concepts in day to day life activities for the benefit of self and for the welfare of society and its concerns.

M. PHARMACY PROGRAMME PHARMACEUTICAL REGULATORY AFFAIRS (MRA)

1. Regulatory Knowledge: Possess knowledge, comprehension of the core and basic knowledge associated with the profession of Pharmaceutical Regulatory Sciences, including drug development process, dossier preparation, good manufacturing practices, clinical trials and human research.

2. Planning Abilities: Demonstrate effective planning abilities and elements that are necessary to accumulate the regulatory submissions 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 while reviewing and submission of dossiers to regulatory markets.

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

5. Collaboration and Team Work: Understand and consider the human reaction to change, motivation, issues, leadership and team-building when planning changes required for fulfilment of practice, professional and societal responsibilities which also includes interpersonal skills, knowledge sharing and strategy in between members of a virtual team.

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6. Ethics: Use ethical frameworks, apply ethical principles while making decisions and take responsibility for the outcomes associated with the decisions in clinical research and clinical investigations.
7. Regulatory Professional: Understand, analyze and communicate the value of their professional roles in society and business development and be reliable with critical thinking and regulatory writing skills.
8. Cross Cultural Communication: Appreciation of and ability to learn from and work with people from diverse linguistic and cultural backgrounds. It should emphasize how regulatory strategy increases a products chance of entering a market and staying there. Once cross-functional teams understand regulatory strategy and its importance in product development and inter-team communication.
9. Initiative and Entrepreneurialism: Individual's ability to turn ideas into practice. Like finding new opportunities to share information and concepts. Generating options and solutions to cope with changes. It involves imagination, novelty and risk-taking, as well as the ability to plan and manage projects in order to achieve objectives.
10. Creativity and Innovation: Function of knowledge, curiosity, imagination, and evaluation. The greater individual knowledge base and level of curiosity, the more ideas, patterns, and combinations will achieve, which then correlates to creating new and innovative products and services.
11. Lifelong 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- access and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis.

PHARM.D PROGRAMME

1. Comprehensive pharmacy and clinical knowledge: Demonstrate mastery and application of core knowledge and skills in relation to the evolving pharmaceutical, biomedical, clinical and epidemiological sciences. This includes competency in areas supporting high quality pharmacy practice (e.g., pharmaceutics, medicinal chemistry, pharmacokinetics, pharmacodynamics, pharmacology, pathophysiology, pharmacotherapeutics, and pharmaceutical care).
2. Patient centered care: Provide patient-centered care to diverse patients using the best available evidence and in consideration of patients' circumstances to devise, modify, implement, document and monitor pharmacotherapy care plans, either independently or as part of healthcare teams.
3. Problem solving and decision making: Demonstrate the ability to use

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observational, analytical and critical thinking skills to develop, implement and evaluate solutions that solve pharmacotherapy problems and build the ability to take decisions based on evidenced based practice.

4. Social and cultural awareness: Recognize social determinants of health and respect patients' cultural, social and religious perspectives to produce safe and appropriate medication use throughout society. Reflect their knowledge, experiences, values, attitudes, biases and beliefs, to show evidence of being self-aware and life-long learners.

5. Professionalism: Exhibit professional ethics, attitudes and behaviors by demonstrating patient advocacy, altruism, accountability, compassion, integrity and respect for others. Understand, analyze and communicate the value of their professional roles in society (Ex. Health care professionals, health promoters, educators, managers, employers and employees).

6. Innovation and entrepreneurship: Engage in innovative activities by using creative thinking to envision better ways of accomplishing professional goals. Utilize the principles of scientific enquiry and critical thinking while solving problems and making decisions in daily practice. Attain the key ability to start a community pharmacy or chain community pharmacies with patient care services.

7. Confidentiality and professional ethics: Practice ethically, maintaining patient confidentiality, responding to errors in care and professional misconduct (including plagiarism), and understanding principles of ethical research (including conflicts of interest and obtaining appropriate informed consent). Apply ethical principles while making decisions and take responsibility for the outcomes associated with decisions.

8. Interpersonal and communication skills: Demonstrate effective interpersonal written and verbal skills, adapt to socioeconomic and cultural factors as well as situational applications. Effectively educate families, patients, caregivers and other health care professional (HCPs). Function effectively in a team and act in a consultative position for other members of the health care team, regulatory agencies and policy makers.

9. Clinical pharmacist and society: Apply contextual knowledge to assess the societal health care needs and demonstrate effective planning abilities in order to solve problems related to health care practice. Educate and aware the patients regarding the aspect of health and prevention of diseases and provide them a cost-effective drug therapy.

10. Environment and sustainability: Understand the impact of professional pharmacy solution in societal and environmental context and demonstrate the knowledge and need of sustainable development.

11. Practice based learning and improvement: Evaluate practice and care,

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and promote continuous improvement in one's own patient care and pharmacy services. Demonstrate self-calibration skills and a commitment to the lifelong learning needed to provide high quality care. Locate, appraise and assimilate evidence from scientific studies to enhance the quality of care and services. Effectively utilize information, informatics and technology to optimize learning and patient care.

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I B.PHARMACY 1st SEMESTER COURSE OUTCOMES

Course Name: Human Anatomy and Physiology - I (Theory);
Course code: BP101T, **Year of Study:** 1st B.Pharmacy 1 st Semester

C101.1	To recognize the various homeostatic mechanisms, basic anatomical terms and cellular level organization.
C101.2	To summarize the characteristics of different types of tissues and their location in various organs
C101.3	To organize the structure and functions of skin, bones and joints of human body.
C101.4	To analyze the importance of blood, lymphatic system and immunity in human body.
C101.5	To relate the physiology of sympathetic, parasympathetic, spinal/cranial nerv es and organization of special senses.
C101.6	To adapt the anatomy and physiology of heart and blood vessels.

Course Name: Pharmaceutical Analysis – I (Theory);
Course code: BP102T **Year of Study:** 1st B.Pharmacy 1 st Semester

C102.1	To understand the principles of volumetric/gravimetric and gasometric analytical techniques.
C102.2	To gain knowledge of sources of errors and minimizing techniques.
C102.3	To analyze the techniques of volumetric, gravimetric and gas analysis.
C102.4	To explain about accuracy, precision and significant figure error concepts.
C102.5	To compute analytical results and understand the physiochemical concepts of analysis, theories of acids and bases, stoichiometry etc.,
C102.6	To analyze various electro chemical titrations.

Course Name: Pharmaceutics – I (Theory)
Course code: BP103T, **Year of Study:** 1st B.Pharmacy 1 st Semester

C103.1	To know the historical background and profession of pharmacy and basics of pharmaceutical dosage forms.
C103.2	To understand the importance of prescription and posology.
C103.3	To solve pharmaceutical calculations and understand the formulation of powders and liquid dosage forms.
C103.4	To develop monophasic and biphasic liquid dosage forms.
C103.5	To explain the concepts of suppositories and pharmaceutical incompatibilities.
C103.6	To formulate and evaluate semi solid dosage forms.

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Course Name: Pharmaceutical Inorganic chemistry (Theory) ;
Course code: BP104T, **Year of Study:** 1st B.Pharmacy 1 st Semester

C104.1	To understand the history and concept of pharmacopoeia and its editions.
C104.2	To know the sources of impurities and methods to determine the impurities in inorganic pharmaceuticals.
C104.3	To gain knowledge on limit tests of different pharmaceutical inorg anic compounds.
C104.4	To understand the method to prepare inorganic pharmaceuticals.
C104.5	To justify the medicinal importance of acidifiers, antacids, cathartics and antimicrobial agents as gastrointestinal agents.
C104.6	To discuss the handling and applications of radiopharmaceuticals.

Course Name: Communication skills (Theory) ;
Course code: BP105T, **Year of Study:** 1st B.Pharmacy 1 st Semester

C105.1	To understand the behavioral needs for a pharmacist to function effectively in the areas of pharmaceutical operation.
C105.2	To communicate effectively (Verbal and Non Verbal).
C105.3	To effectively manage the team as a team player.
C105.4	To understand Do's and Don'ts of an interview.
C105.5	To analyze and apply communication skills and other interpersonal skills.
C105.6	To develop Leadership qualities and essentials.

Course Name: Remedial Biology (Theory) ;
Course code: BP106 RBT, **Year of Study:** 1st B.Pharmacy 1 st Semester

C106.1	To understand the characters of living organisms and classification of kingdoms
C106.2	To develop basic knowledge on morphology and functions of various plant parts such as root, stem, leaf, flower, fruit and seed.
C106.3	To analyze functions of organs in the cardiovascular, digestive and respiratory systems of human body
C106.4	To assess the physiology of brain and spinal cord, and role of kidney in regulation of body fluids
C106.5	To determine role of hormones in regulation of various organs functioning in the body and process of oogenesis and spermatogenesis.
C106.6	To elaborate the physiology, nutrient requirements for plants and to predict plant/animal tissues.

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Course Name: Remedial Mathematics (Theory) ;
Course code: BP106 RMT, **Year of Study:** 1st B.Pharmacy 1 st Semester

C106.1	To understand the role of mathematics in pharmacy.
C106.2	To know about theory and their application in pharmacy.
C106.3	To relate the mathematical tools in the wide professional views and solve problems of trigonometry, calculus and matrices.
C106.4	To solve the different types of problems by applying theory.
C106.5	To adopt both conventional and creative techniques to the solutions of mathematical problems.
C106.6	Apply a range of techniques effectively to solve problems including theory deduction, approximation and simulation.

Course Name: Human Anatomy and Physiology - I (Practical) ;
Course code: BP107P , **Year of Study:** 1st B.Pharmacy 1 st Semester

C107.1	To recall handling of compound microscope and to memorize various animal tissues.
C107.2	To summarize the characteristics of different bones (skeletal system).
C107.3	To identify the bleeding/clotting time and blood group.
C107.4	To analyze the blood cells using heamocytometry.
C107.5	To estimate the hemoglobin concentration of human blood and blood pressure.
C107.6	To predict the erythrocyte sedimentation rate of human blood and heart rate/ pulse rate.

Course Name: Pharmaceutical Analysis – I (Practical) ;
Course code: BP108P , **Year of Study:** 1st B.Pharmacy 1 st Semester

C108.1	To understand the importance of calibration, calibration of weights, pipette and burette.
C108.2	To demonstrate standardization of solutions with different strengths.
C108.3	To experiment with volumetric analysis such as acidimetry and alkalimetry, oxidation and reduction reactions, iodometry, complexometry, precipitation and non -aqueous titration.
C108.4	To analyze gravimetric analytical techniques.
C108.5	To evaluate pharmaceuticals by cerimetry.
C108.6	To analyze pharmaceuticals by electro -analytical methods.

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Course Name: Pharmaceutics – I (Practical);
Course code: BP 109 P, **Year of Study:** 1st B.Pharmacy 1 st Semester

C109.1	To recall the principles used in the preparation of solid, liquid and semi solid dosage forms.
C109.2	To experiment with monophasic liquid dosage forms for internal and external administration.
C109.3	To prepare biphasic liquid dosage forms.
C109.4	To design powders and granules.
C109.5	To develop semi solid dosage forms.
C109.6	To formulate suppositories.

Course Name: Pharmaceutical inorganic chemistry (Practical) ;
Course code: BP110P , **Year of Study:** 1st B.Pharmacy 1 st Semester

C110.1	To recall the sources of limit tests, preparation and identification of compounds.
C110.2	To demonstrate the preparation of inorganic pharmaceuticals.
C110.3	To apply knowledge to perform modified limit tests.
C110.4	To analyze various inorganic pharmaceutical compounds.
C110.5	To select suitable method for the preparation of inorganic pharmaceuticals.
C110.6	To assess quality of inorganic pharmaceuticals.

Course Name: Communication Skills (Practical) ;
Course code: BP111P , **Year of Study:** 1st B.Pharmacy 1 st Semester

C111.1	To understand the behavioral needs for a pharmacist to function effectively in the areas of pharmaceutical operation.
C111.2	To apply the practical skills for effective communication (Verbal and Non verbal).
C111.3	To distinguish pronunciation of vowel and consonant sounds.
C111.4	To take part in advanced learning on comprehension/direct and indirect speech.
C111.5	To develop the interview handling skills.
C111.6	To improve in email etiquette.

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Course Name: Remedial Biology (Practical) ;
Course code: BP112RBP , **Year of Study:** 1st B.Pharmacy 1 st Semester

C112.1	To know the handling of microscope and permanent slide preparation techniques.
C112.2	To understand the structure of cell and its inclusions.
C112.3	To identify various plant parts, and to organize their modifications
C112.4	To categorize the physiology of frog by using computer models
C112.5	To assess the microscopical study and identification of tissues pertinent to stem, root, leaf, seed, fruit and flower.
C112.6	To compile the bones identification, blood group, blood pressure and tidal volume determination.

I B.PHARMACY 2nd SEMESTER

Course Name: Human Anatomy and Physiology – II (Theory)
Course code: BP201T, **Year of Study:** 1st B.Pharmacy 2nd Semester

C201.1	To relate the basic knowledge about central nervous system including nervous tissue, brain and spinal cord.
C201.2	To illustrate the structure and functions of gastrointestinal tract and to learn about ATP/CTP/BMR.
C201.3	To learn about structure and functions of respiratory system and various mechanisms involved in regulation of respiration.
C201.4	To categorize the anatomy of urinary system and physiology of urine formation/micturition.
C201.5	To appraise the essentiality of endocrine glands and their hormones.
C201.6	To predict the physiology of male and female reproductive organs and concepts of genetics.

Course Name: Pharmaceutical organic chemistry – I (Theory);
Course code: BP202T, **Year of Study:** 1st B.Pharmacy 2nd Semester

C202.1	To explain the nomenclature, properties, reactions and uses of organic compounds.
C202.2	To remember the orientation of reactions and influence products.
C202.3	To apply the knowledge for the identification of organic compounds.
C202.4	To discuss chemistry and reactions of various organic compounds.
C202.5	To elaborate the concepts of hybridization, electronic and steric effects of organic compounds.
C202.6	To appraise the applications of pharmaceutical organic compounds.

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Course Name: Biochemistry (Theory) ;
Course code: BP203T, **Year of Study:** 1st B.Pharmacy 2nd Semester

C203.1	To remember the properties, significance and metabolic reactions of carbohydrates, lipids, nucleic acids, proteins and amino acids
C203.2	To understand the metabolism of carbohydrates and process of electron transport and ATP formation
C203.3	To apply the concept of catalytic activity and enzyme inhibition in design of new drugs, diagnostic and therapeutic applications of enzyme
C203.4	To distinguish the process of DNA replication, transcription and translation
C203.5	To appraise the causes, ma nifestations and diagnosis of metabolic disorders
C203.6	To discuss the metabolism of nucleic acids, lipids and amino acids

Course Name: Pathophysiology (Theory) ;
Course code: BP204T, **Year of Study:** 1st B.Pharmacy 2nd Semester

C204.1	To understand the process of cell injury, morphology of cell injury and cellular adaptations.
C204.2	To understand the etiopathogenesis of cardiovascular, respiratory and renal diseases mentioned.
C204.3	To apply the principles of pathogenesis in understanding symptoms, signs and complications of disease states mentioned.
C204.4	To explain the etiopathogenesis of hematologic, endocrine, nervous, gastrointestinal, musculo skeletol diseases and Immunopathogenesis of infectious diseases.
C204.5	To appraise the principles of physical, chemical and biologic carcinogenesis.
C204.6	To adapt the principles of inflammation in understanding pathogenesis of various disease states.

Course Name: Computer applications in pharmacy (Theory) ;
Course code: BP205T, **Year of Study:** 1st B.Pharmacy 2nd Semester

C205.1	To understand different types of databases, applications of computers and databases in pharmacy.
C205.2	To illustrate the concept of number system in computers.
C205.3	To make use of web technologies such as HTML, XML, CSS, programming languages, Web servers and pharmacy drug database.
C205.4	To appraise the applications of computers in pharmacy such as drug information services, pharmacokinetics, mathematical model in drug design, hospital and clinical pharmacy etc.,
C205.5	To explain about bioinformatics and its impact in vaccine discovery.
C205.6	To elaborate the applications of computers for data analysis in preclinical development.

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Course Name: Environmental studies (Theory) ;
Course code: BP206T, **Year of Study:** 1st B.Pharmacy 2nd Semester

C206.1	To extend basic knowledge on environment and its allied problems.
C206.2	To compare the natural, renewable and non renewable resources and the problems associated with them.
C206.3	To motivate the learners to participate in environment protection and improvement.
C206.4	To analyze the concepts of eco system including structure and functions.
C206.5	To adopt skills in identifying and solving environmental problems.
C206.6	To develop an attitude of concern for the environment.

Course Name: Human anatomy and physiology – II (Practical) ;
Course code: BP207P , **Year of Study:** 1st B.Pharmacy 2nd Semester

C207.1	To recall the physiology of special senses with the help of models, charts and specimens.
C207.2	To develop the knowledge on coordinating working of organs of various systems with the help of models, charts and specimens.
C207.3	To analyze the functions of cranial nerves by various sensory and motor functions.
C207.4	To evaluate body temperature and body mass index.
C207.5	To determine tidal volume and vital capacity.
C207.6	To assess the knowledge on family planning devices, pregnancy diagnostic tests, tissues of vital organs and gonads.

Course Name: Pharmaceutical organic chemistry – I (Practical);
Course code: BP208P , **Year of Study:** 1st B.Pharmacy 2nd Semester

C208.1	To explain the qualitative analysis and preparation of pharmaceutical organic compounds.
C208.2	To identify the extra elements present in the pharmaceutical organic compounds.
C208.3	To find the presence of several functional groups in pharmaceutical compounds.
C208.4	To appraise the rules concerned with reactivity and orientation of organic compounds.
C208.5	To analyze unknown pharmaceutical organic compounds by determining their melting point/boiling point.
C208.6	To prepare and characterize the derivatives of organic compounds.

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Course Name: Biochemistry (Practical);
Course code: BP209P, **Year of Study:** 1st B.Pharmacy 2nd Semester

C209.1	To remember the qualitative analysis of carbohydrates and proteins
C209.2	To understand the principle and clinical significance of blood glucose
C209.3	To identify the amount of reducing sugars by DNSA method
C209.4	To examine the constituents present in Urine and their clinical significance
C209.5	To determine the effect of temperature and substrate concentration on salivary amylase activity
C209.6	To elaborate the clinical significance of creatinine, proteins and cholesterol in blood

Course Name: Computer applications in pharmacy (Practical) ;
Course code: BP210P, **Year of Study:** 1st B.Pharmacy 2nd Semester

C210.1	To demonstrate and make use of MS Office, MS Word, MS Excel, MS Access and MS Power point.
C210.2	To understand the paradigms of program languages and be exposed to at least one language from each model, C and SQL.
C210.3	To summarize the report and printing the report from patient database
C210.4	To design a questionnaire using a word processing package to gather information about a particular disease.
C210.5	To create HTML web page to show personal information
C210.6	To create mailing labels Using Label Wizard , generating label in MS WORD

II B.PHARMACY 3rd SEMESTER

Course Name: Pharmaceutical organic chemistry – II (Theory);
Course code: BP301T, **Year of Study:** 2nd B.Pharmacy 3rd Semester

C301.1	To understand about aromaticity, chemistry and reactions of benzene.
C301.2	To understand the concept of hydrolysis, hydrogenation, saponification and rancidity of oils.
C301.3	To gain knowledge on structure and medicinal uses of pharmaceutical organic compounds.
C301.4	To understand the concept of Baeyer's theory and Sachse Mohr's theory.
C301.5	To gain knowledge on chemistry of phenols, aromatic amines and aromatic acids.
C301.6	To estimate the analytical constants of fats and oils.

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Course Name: Physical Pharmaceutics – I (Theory);
Course code: BP302T, **Year of Study:** 2nd B.Pharmacy 3rd Semester

C302.1	To recollect the states of matter and understand the applications of various physiochemical properties to design dosage forms.
C302.2	To gain knowledge of pH and buffers and their use in the stabilization of pharmaceutical formulations.
C302.3	To understand the principle of interfacial tension and the applications of surface active agents in drug solubilization.
C302.4	To describe the principles of diffusion in biological systems.
C302.5	To perceive and apply the concepts of complexation and protein binding in pharmacy.
C302.6	To elaborate the significance of physical properties of drug molecules in design and stability of dosage forms.

Course Name: Pharmaceutical Microbiology (Theory) ;
Course code: BP303T, **Year of Study:** 2nd B.Pharmacy 3rd Semester

C303.1	To remember the scope of microbiology and its branches, methods of classification.
C303.2	To understand the importance and implementation of sterilization in pharmaceutical processing and industry.
C303.3	To utilize the knowledge in identification, cultivation and preservation of various microorganisms.
C303.4	To test for the microbiological standardization of pharmaceuticals.
C303.5	To choose the cell culture technology and microbial characters for the pharmaceutical industry.
C303.6	To compile the microbiological testing protocols.

Course Name: Pharmaceutical Engineering (Theory) ;
Course code: BP304T, **Year of Study:** 2nd B.Pharmacy 3rd Semester

C304.1	To classify and explain various unit operations involved in manufacturing of pharmaceuticals.
C304.2	To understand the concepts of flow of fluids, size reduction and size separation.
C304.3	To summarize different mechanisms of heat transfer.
C304.4	To compare and contrast different types of evaporation and distillation process.
C304.5	To determine the factors influencing mixing, filtration and centrifugation.
C304.6	To elaborate various preventive methods used for corrosion control in pharmaceutical industries.

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Course Name: Professional Ethics and Human Values (Theory)
Course code: BP305T, **Year of Study:** 2nd B.Pharmacy 3rd Semester

C305.1	To remember and recall the human values and professional ethics.
C305.2	To outline the ethical norms, anti corruption measures and central vigilance bodies.
C305.3	To apply moral concepts and reasoning in pharmacy.
C305.4	To discover ethical issues in clinical pharmacy practice and manufacturing of pharmaceutical products.
C305.5	To appraise professional societies and various pharmaceutical associations.
C305.6	To adapt social pharmacy and code of pharmaceutical ethics.

Course Name: Pharmaceutical organic chemistry – II (Practical)
Course code: BP305P, **Year of Study:** 2nd B.Pharmacy 3rd Semester

C305.1	To gain the knowledge on different recrystalization and steam distillation techniques.
C305.2	To remember and recall the different laboratory techniques used in pharmaceutical chemistry.
C305.3	To identify the purity of fats and oils by acid value, saponification value and iodine value.
C305.4	To perform various reaction like diazotization, oxidation reactions.
C305.5	To analyze named reactions like perkin and claisen schmidt reactions by using carbonyl compounds.
C305.6	To test the knowledge on different electrophilic aromatic substitutions reactions like bromination, nitration in monosubstituted aromatic compounds.

Course Name: Physical Pharmaceutics – I (Practical);
Course code: BP306P, **Year of Study:** 2nd B.Pharmacy 3rd Semester

C306.1	To understand the significance of physical properties such as solubility, surface tension, partition coefficient and pK_a in the design of dosage forms.
C306.2	To explain adsorption isotherms and determine Freundlich -Langmuir constant using activated charcoal.
C306.3	To apply Henderson – Hasselbalch equation for interpretation of pK_a value of drugs.
C306.4	To determine the surface tension of sample liquids by drop count and drop weight methods
C306.5	To deduce the HLB value and critical micellar concentration of a surfactant.
C306.6	To estimate the stability constants of complexes by solubility and pH titration methods.

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Course Name: Pharmaceutical Microbiology (Practical) ;
Course code: BP307P , **Year of Study:** 2nd B.Pharmacy 3rd Semester

C307.1	To recall different techniques of sterilization.
C307.2	To demonstrate various staining methods – simple, gram staining and acid fast staining.
C307.3	To interpret the results of microbial testing.
C307.4	To test for possible microbial contaminants.
C307.5	To estimate the amount of biomass in the given sample.
C307.6	To choose the correct method to evaluate the microbes to be tested.

Course Name: Pharmaceutical Engineering (Practical) ;
Course code: BP308P , **Year of Study:** 2nd B.Pharmacy 3rd Semester

C308.1	To understand the basic principles involved in unit operations such as size reduction, size separation, distillation and drying.
C308.2	To demonstrate and explain about the construction, working and applications of pharmaceutical equipments such as colloid mill, planetary mixer, fluidized bed dryer and freeze dryer.
C308.3	To experiment with the process variables of filtration, evaporation and infer the same.
C308.4	To determine radiation constant of brass, iron, unpainted and painted glass.
C308.5	To determine overall heat transfer coefficient by heat exchanger and calculate the efficiency of steam distillation.
C308.6	To estimate moisture content, loss on drying and construct drying curves for calcium carbonat e and starch.

II B.PHARMACY 4th SEMESTER

Course Name: Pharmaceutical organic chemistry – III (Theory)
Course code: BP401T, **Year of Study:** 2nd B.Pharmacy 4th Semester

C401.1	To understand the nomenclature, properties and methods of preparation of heterocyclic compounds.
C401.2	To understand the fundamentals of stereo chemical aspects.
C401.3	To identify medicinal uses and other applications of organic compounds.
C401.4	To explain stereo isomerism in biphenyl compounds (atropisomerism) and conditions for optical activity.
C401.5	To elaborate the reactions and synthetic importance of metal hydride reduction (NaBH4 & LiAlH4), Clemmensen reduction, Oppenauer oxidation and Beckmann rearrangement.
C401.6	To discuss optical isomerism-optical activity, enantiomerism, diastereoisomerism and meso compounds.

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Course Name: Medicinal Chemistry – I (Theory);
Course code: BP402T, **Year of Study:** 2nd B.Pharmacy 4th Semester

C402.1	To recall the various classes of medicinal compounds
C402.2	To explain the physicochemical properties , steric aspects of drugs and their metabolic pathways
C402.3	To identify the structural requirements of drugs to eli cit biological response
C402.4	To categorize the drugs based on their mechanism of action and clinical uses
C402.5	To design the synthetic routes for medicinal compounds.
C402.6	To choose the appropriate medicinal compound for treatment of disease or disorder

Course Name: Physical Pharmaceutics – II (Theory);
Course code: BP403T, **Year of Study:** 2nd B.Pharmacy 4th Semester

C403.1	To introduce and categorize the dispersed systems and understand the properties and applications of colloidal dispersions.
C403.2	To make the use of principles of kinetics in the stabilization of dosage forms.
C403.3	To interpret the rheological behavior of fluids and illustrate the physics of tablet compression.
C403.4	To determine the properties of powders and apply them in formulation development.
C403.5	To formulate and evaluate coarse dispersions making use of rheological and electrical properties.
C403.6	To discuss the importance of zeta potential in the stabilization of dispersed systems.

Course Name: Pharmacology – I (Theory);
Course code: BP404T, **Year of Study:** 2nd B.Pharmacy 4th Semester

C404.1	To define the fundamental concepts of pharmacology and pharmacokinetics.
C404.2	To understand the basics of pharmacodynamics, adverse reactions, drug interactions and drug discovery
C404.3	To identify the role of neurohumoral transmission and drugs acting on peripheral nervous system.
C404.4	To analyze the functions of neurotransmitters and drugs acting on central nervous system.
C404.5	To appraise the pharmacology of Psychopharmacological agents.
C404.6	To predict the effects of drugs again st neurodegenerative disorders and to elaborate the concepts of drug addiction/abuse/tolerance/ dependence

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Course Name: Pharmacognosy and Phytochemistry – I (Theory)
Course code: BP405T, **Year of Study:** 2nd B.Pharmacy 4th Semester

C405.1	To recall the history, scope and development of pharmacognosy.
C405.2	To remember different sources of crude drugs and also classify them accordingly.
C405.3	To illustrate students about cultivation, collection, processing and storage of crude drugs.
C405.4	To plan systematic pharmacognostic study of primary metabolites, ayurvedic drugs, marine drugs and teratogens.
C405.5	To analyze quality of crude drugs.
C405.6	To elaborate the applications of advanced technologies like polyploidy, mutation and hybridization in medicinal plants.

Course Name: Medicinal chemistry – I (Practical);
Course code: BP406P, **Year of Study:** 2nd B.Pharmacy 4th Semester

C406.1	To recall the basic requirements for synthesis and assay of drugs
C406.2	To explain the techniques involved in isolation and purification of drugs and intermediates
C406.3	To synthesize, characterize and purify medicinal compounds and intermediates
C406.4	To analyze the selected drugs present in dosage forms and to determine the percentage purity
C406.5	To determine the physicochemical property of drugs and draw its importance

Course Name: Physical Pharmaceutics – II (Practical);
Course code: BP407P, **Year of Study:** 2nd B.Pharmacy 4th Semester

C407.1	To choose a good suspending agent to formulate a stable suspension.
C407.2	To interpret the shelf life of a given formulation by accelerated stability studies.
C407.3	To make use of derived and flow properties of powders to ensure a stable solid formulation.
C407.4	To distinguish the rate constants as per the chemical reaction.
C407.5	To determine the viscosity using Ostwald's and Brookfield's viscometer.
C407.6	To predict the flux by Franz diffusion cell.

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Course Name: Pharmacology – I (Practical);
Course code: BP408P, **Year of Study:** 2nd B.Pharmacy 4th Semester

C408.1	To learn about basic instruments, common laboratory animals used in experimental pharmacology and to organize animal house as per the CPCSEA guidelines.
C408.2	To demonstrate the common laboratory techniques like routes of administration , blood withdrawal, anesthetics and euthanasia used for animal studies
C408.3	To interpret the effects of various drugs on rabbit eye and ciliary motility of frog oesophagus in correlation with humans
C408.4	To analyse the effect of drugs acting as enzyme inducers, skeletal muscle relaxants and affecting locomotor activity in laboratory animals
C408.5	To evaluate the stereotype and anticatatonic activity of drugs in rats/m ice
C408.6	To predict various screening models for anticonvulsant and anxiolytic activity

Course Name: Pharmacognosy and Phytochemistry –I (Practical)
Course code: BP409P, **Year of Study:** 2nd B.Pharmacy 4th Semester

C409.1	To remember different morphological and microscopical characteristic features of crude drugs.
C409.2	To understand the cellular structure of crude drugs.
C409.3	To evaluate the crude drugs by quantitative evaluation methods.
C409.4	To evaluate the crude drugs by physical methods of evaluation.
C409.5	To evaluate the crude drugs by chemical methods of evaluation.

III B.PHARMACY 5 th SEMESTER

Course Name : Medical Chemistry-II (Theory)
Course Code : BP501T, **Year of study :** 3rd B.Pharmacy 5th Semester

C501.1	To recall the classification of drugs obtained by natural and synthetic route
C501.2	To explain the biological targets for medicinal compounds
C501.3	To apply the knowledge of biochemical processes to understand the mechanism of action and therapeutic uses of drugs
C501.4	To understand the relationships between structure of compound and its activity
C501.5	To choose the synthetic route for selected category of drugs
C501.6	To discuss the significance, advantages and limitations of drugs

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Course Name : Industrial Pharmacy -I (Theory) **Course Code :** BP502T, **Year of study :** 3rd B.Pharmacy 5th Semester	
C502.1	To outline the objectives and applications of preformulation studies in the development and stability of dosage forms.
C502.2	To discuss the formulation, manufacturing, coating and quality control tests of tablets.
C502.3	To review the formulation and manufacturing considerations of liquid orals.
C502.4	To illustrate the pharmaceutical aspects of capsules and pellets.
C502.5	To describe the preparation and quality control of parenterals and ophthalmic preparations.
C502.6	To summarize formulation, manufacturing and evaluation of cosmetic preparations, pharmaceutical aerosols and appraise the science of packaging materials.
Course Name : Pharmacology-II (Theory) **Course Code :** BP503T, **Year of study :** 3rd B.Pharmacy 5th Semester	
C503.1	To relate the relative pros and cons in the use of drugs for various cardiac complications.
C503.2	To illustrate the drugs acting on hematopoietic system, shock diuretics and anti-diuretics.
C503.3	To identify the role of autocoids and related drugs.
C503.4	To analyze and summarize the drugs acting on endocrine system .
C503.5	To appraise the physiological role of sex hormones and to assess the effects of oral contraceptives and drugs acting on the uterus .
C503.6	To predict principles of bioassay and to construct the bioassay methods of various compounds .
Course Name : Pharmacognosy and Phytochemistry -II (Theory) **Course Code :** BP504T, **Year of study :** 3rd B.Pharmacy 5th Semester	
C504.1	To outline the metabolic pathway in higher plants and their biogenetic studies.
C504.2	To the pharmacognistic study of secondary metabolites like alkaloids, glycosides, tannins, volatile oils etc,
C504.3	To demonstrate the different types and steps involved in isolation, identification and analysis of Phytoconstituents like terpenoids, glycosides, alkaloids and resins.
C504.4	To plan the industrial production, estimation and utilization of Phytoconstituents.
C504.5	To assess the crude drug by modern methods of extraction, spectroscopy, chromatography, isolation and purification.

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Course Name : Pharmaceutical Jurisprudence (Theory)
Course Code : BP505T, **Year of study :** 3rd B.Pharmacy 5th Semester

C505.1	To recall the pharmaceutical legislations, ethics, right to information, medical termination of pregnancy and intellectual property rights
C505.2	To relate the significance of Drugs and cosmetics act 1940 and its rules 1945 in relation to import and manufacture of drugs
C505.3	To apply the knowledge on schedules pertaining to Drugs and cosmetics act 1940 and its rules 1945 and also administration of the act and rules
C505.4	To understand the functions of pharmacy councils and implementation of education regulations in pharmacy
C505.5	To appraise the importance of medicinal and toilet preparations act and narcotic drugs and psychotropic substances act and rules
C505.6	To discuss the salient features of drugs and magic remedies act, prevention of cruelty to animals act and drugs price control order

Course Name : Industrial Pharmacy -I (Practical)
Course Code : BP506P, **Year of study :** 3rd B.Pharmacy 5th Semester

C506.1	To interpret the preformulation studies on drugs.
C506.2	To explain the preparation, evaluation and coating of tablets.
C506.3	To illustrate the formulation and evaluation of capsules.
C506.4	To design parenteral and ophthalmic products.
C506.5	To describe the preparation of creams.
C506.6	To evaluate glass containers as per pharmacopeial specifications.

Course Name : Pharmacology-II (Practical)
Course Code : BP507P, **Year of study :** 3rd B.Pharmacy 5th Semester

C507.1	To learn the importance of physiological salt solutions and to identify the effect of various drugs on isolated frog heart, blood pressure and heart rate of dog.
C507.2	To illustrate the diuretic activity of drugs in mice/rats
C507.3	To identify the dose response relationship, effect of drugs on DRC and to construct the drug concentrations by various bioassay methods using animal simulator software.
C507.4	To categorize the PA_2 and PD_2 value of drugs using rat anoco ccygeus muscle and guinea pig ileum.
C507.5	To interpret the effect of spasmogens and spasmolytics using rabbit jejunum.
C507.6	To predict various screening models for analgesic and anti - inflammatory.

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Course Name : Pharmacognosy and Phytochemistry -II (Practical)
Course Code : BP508P, **Year of study :** 3rd B.Pharmacy 5th Semester

C508.1	To remember the wide variety of the crude drugs and their sources by morphological characteristics.
C508.2	To identify the powder mixture and to report the types of adulterants and substituents present.
C508.3	To analyze and evaluate the powdered crude drug samples by morphological and microscopical characteristics.
C508.4	To isolate the drug from the given crude drug sample.
C508.5	To predict the crude drug by performing chromatographic techniques.

III B.PHARMACY 6th SEMESTER

Course Name : Medicinal Chemistry – III (Theory)
Course Code : BP601T, **Year of study :** 3rd B.Pharmacy 6th Semester

C601.1	To recall the classification and nomenclature of drugs of natural and synthetic origin
C601.2	To explain the concept of prodrugs and their importance
C601.3	To identify the mechanism of action and therapeutic uses of drugs
C601.4	To understand the relationship between structure of compound and its biological activity
C601.5	To choose the synthetic route for selected category of drugs
C601.6	To discuss the approaches in drug design including QSAR, pharmacophore modeling, docking and combinatorial chemistry

Course Name : Pharmacology-III (Theory)
Course Code : BP602T, **Year of study :** 3rd B.Pharmacy 6th Semester

C602.1	To list the drugs used in respiratory and gastrointestinal complications
C602.2	To understand the principles of chemotherapy and illustrate the mechanism of action of antibiotics.
C602.3	To explain and compare the mechanism of anti -mycobacterial, anti-fungal, anti-viral,
C602.4	To analyze the chemotherapy of UTI's, STD's, anti -cancer drugs and to categorize the immunopharmacology.
C602.5	To assess the various types of toxicity studies, principles of treatment of poisoning and management of various poisoned conditions.
C602.6	To compile the biological clock and its significance leading to chronotherapy.

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Course Name : Herbal Drug Technology (Theory) **Course Code :** BP 603T, **Year of study :** 3rd B.Pharmacy 6th Semester	
C603.1	To recall the fundamental concepts of herbal raw materials and biodynamic agriculture techniques
C603.2	To understand the concept of neutraceuticals and herbal food interactions.
C603.3	To apply the knowledge for evaluation and preparation of herbal formulations.
C603.4	To remember the regulatory guidelines for the assessment of herbal drugs and patenting.
C603.5	To illustrate the scope and future prospects of the herbal drug industry.
C603.6	To establish and follow the SOP's, infrastructure of industries as per GMP
Course Name : Biopharmaceutics and Pharmacokinetics (Theory) **Course Code :** BP 604T, **Year of study :** 3rd B.Pharmacy 6th Semester	
C604.1	To recall and understand basic concepts of absorption, distribution, metabolism and excretion of drugs.
C604.2	To understand the mechanisms, interpret various factors affecting drug absorption, distribution, metabolism and excretion of drugs.
C604.3	To utilize the pharmacokinetic models for the determination of pharmacokinetic parameters.
C604.4	To analyze the bioavailability of a drug and to compare the bioequivalence between drug products.
C604.5	To evaluate various pharmacokinetic parameters for the drugs exhibiting saturation kinetics.
C604.6	To design multiple dosage regimens based on pharmacokinetic parameters for maximizing patient compliance and therapeutic effectiveness.
Course Name : Pharmaceutical Biotechnology (Theory) **Course Code :** BP 605T, **Year of study :** 3rd B.Pharmacy 6th Semester	
C605.1	To remember the basic concepts of biotechnology with respect to enzyme technology, immunology, microbial technology, genetic engineering and protein engineering.
C605.2	To understand the steps involved in development of biosensors, recombinant products and concepts of immunology.
C605.3	To outline the production parameters important in pharmaceutical product development using principles of biotechnology.
C605.4	To compare the genetic organization of different types of cells and to list detection methods at genomic level, gene transfer methods and mutag ens.
C605.5	To explain general requirements of fermentative production and biotechnological production of pharmaceuticals.
C605.6	To elaborate on microbial genetics, biotransformation and various immunological products.

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Course Name : Quality Assurance (Theory)
Course Code : BP 606T, **Year of study :** 3rd B.Pharmacy 6th Semester

C606.1	To remember the concepts of quality assurance, quality management and ICH guidelines.
C606.2	To explain the ISO, NABL and QbD concepts in pharmaceutical industry.
C606.3	To identify the organization and personnel responsibilities.
C606.4	To analyze quality control parameters and good laboratory practices in pharmaceutical industry.
C606.5	To evaluate the complaints and documents maintenance in industry with required regulatory guidelines.
C606.6	To elaborate the calibration, validation procedures and good warehousing practices.

Course Name : Medicinal Chemistry-III (Practical)
Course Code : BP 607P, **Year of study :** 3rd B.Pharmacy 6th Semester

C607.1	To define and select the method for preparation of drugs and intermediates
C607.2	To explain principle underlying the preparation of drugs
C607.3	To choose the method for assay of drugs by quantitative analysis
C607.4	To compare the advantages of microwave technique over conventional synthesis of drugs
C607.5	To select the tools needed for drawing structures and reactions
C607.6	To predict the relation between physicochemical properties and biological activity

Course Name : Pharmacology-III (Practical)
Course Code : BP 608P, **Year of study :** 3rd B.Pharmacy 6th Semester

C608.1	To recall the dose calculations in pharmacological experiments, and to relate the antiallergic activity / anti-ulcer activity in rat models.
C608.2	To demonstrate of effect of drugs on gastrointestinal motility and the effect of agonist/antagonists on guinea pig ileum
C608.3	To construct serum biochemical parameters by using semi auto analyzer.
C608.4	To analyze effect of saline purgative on frog intestine, insulin hypoglycemic effect and test for pyrogens using rabbit method.
C608.5	To evaluate acute oral toxicity (LD50), acute skin irritation / corrosion and acute eye irritation / corrosion of a test substance
C608.6	To predict the pharmacokinetic parameters and adapt the biostatistics methods in experimental pharmacology.

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Course Name : Herbal Drug Technology (Practical)
Course Code : BP 609P, **Year of study :** 3rd B.Pharmacy 6th Semester

C609.1	To remember different preliminary phytochemical screening of crude drugs
C609.2	To evaluate the various herbal formulations
C609.3	To apply monographic analysis of herbal drugs as per pharmacopoeias
C609.4	To evaluate parameters such as aldehyde and phenol contents
C609.5	To assess the total alkaloid content

IV/B.PHARMACY 7th SEMESTER

Course Name : Instrumental Methods of Analysis (Theory)
Course Code : BP 701T, **Year of study :** 4th B.Pharmacy 7th Semester

C701.1	To understand selected instrumental analytical techniques (spectroscopic and chromatographic methods) and differentiate with volumetric analysis.
C701.2	To gain knowledge on interaction of EMR with matter and to build the analytical understanding at the level of atom, group and molecular structure of organic and inorganic compounds with different functional groups and their applications in pharmacy.
C701.3	To maximize knowledge on characterization and estimation of ions by spectroscopical techniques
C701.4	To simplify affinity of matter with stationary phase and mobile phase, physical and chemical properties of matter
C701.5	To elaborate various principles, theory and instruments employed for the characterization and analysis of drugs.
C701.6	To categorize different organic and inorganic compounds using suitable spectroscopic and chromatographic techniques.

Course Name : Industrial Pharmacy -II (Theory)
Course Code : BP 702T, **Year of study :** 4th B.Pharmacy 7th Semester

C702.1	To explains pilot plant scale up techniques and SUPAC guidelines.
C702.2	To outline various aspects of technology transfer involved from R & D to productions.
C702.3	To choose and to apply various responsibilities and regulatory requirements for drug approval.
C702.4	To analyze and study various quality management systems in pharmacy field.
C702.5	To determine the requirements and approval procedures for new drugs by Indian Regulatory.
C702.6	To discuss about approval process and regulatory requirements for drug products.

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Course Name : Pharmacy Practice (Theory)
Course Code : BP 703T, **Year of study :** 4th B.Pharmacy 7th Semester

C703.1	To acquire the knowledge on organization of hospitals, various methods of distribution and hospital formulary in hospitals and apply it in the practice of pharmacy.
C703.2	To outline the organization and structure of community pharmacy and to build ability to design and run own community pharmacy.
C703.3	To demonstrate the knowledge of therapeutic drug monitoring, patient medication history interview and to apply the knowledge on assessment of drug related problems.
C703.4	To categorize and evaluate the role of hospital pharmacist inpharmacy and therapeutic committee, drug information services, patient counseling, education and training programmes in hospitals.
C703.5	To explain the principles of drug store management and inventory control methods during practice.
C703.6	To interpret clinical laboratory tests of specific disease states to provide better patient centered service.

Course Name : Novel Drug Delivery Systems (Theory)
Course Code: BP 704T, **Year of study :** 4th B.Pharmacy 7th Semester

C704.1	To understand and rationalize fundamentals and polymers used in the design of controlled drug delivery systems.
C704.2	To outline the concepts of formulation and evaluation of oral, mu cosal and implantable drug delivery system.
C704.3	To develop and study oral, mucosal, dermal, pulmonary and Nasa ldrug delivery systems over conventional dosage forms for prolonged action.
C704.4	To illustrate the principles and fundamentals of drug targeting in the design of site specific drug delivery system.
C704.5	To study the importance of site specific drug delivery systems or devices for ocular and intra uterine routes
C704.6	To predict the rate and maximize therapeutic compliance of site specific drug delivery systems by modifying conventional dosage forms.

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Course Name : Instrumental Methods of Analysis (Practical)
Course Code : BP 705P, **Year of study :** 4th B.Pharmacy 7th Semester

C705.1	To recall the principle involved in spectroscopy and importance of absorption maximum in the estimation of organic compounds.
C705.2	To experiment with selected drugs by UV, Visible spectroscopy and flourimetry.
C705.3	To estimate the amount of sodium and potassium ions by flame photometry
C705.4	To characterize and quantify the organic compounds/amino acids/plant pigments by using various chromatographic and spectroscopical techniques.
C705.5	To analyze the various organic compounds using nepheloturbidimetry.
C705.6	To maximize the knowledge on integration and interpretation of chromatograms and spectra.

Course Name : Practice School
Course code: BP 706PS , **Year of study:** 4th B.Pharmacy 7th Semester

C706.1	To understand the importance of realistic learning through practice in various domains such as community pharmacy, drug testing and manufacturing, preclinical testing, clinical practice, patent filing, regulatory filing accounting, green audit and article writing.
C706.2	To get familiarize with the aspects of realistic practice in the domain of interest.
C706.3	To develop knowledge and skills related to practical learning in the domain of interest.
C706.4	To analyze the problems encountered during realistic practice and make use of theoretical knowledge to resolve those problems.
C706.5	To build up the ability to perform well in the domain of interest after becoming an employee/entrepreneur.

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IV B.PHARMACY 8th SEMESTER

Course Name : Biostatistics and Research methodology (Theory)
Course Code : BP 801T, **Year of study:** 4th B.Pharmacy 8th Semester

CB801.1	To understand the basic aspects of statistics such as central tendency, dispersion and correlation.
CB801.2	To make use of regression and probability while analyzing data by statistical methods.
CB801.3	To explain the need of research, research designs and their applications and to explain methodological designs.
CB801.4	To assess the need of regression modeling and to build up the ability to use various statistical problems.
CB801.5	To elaborate design and analysis of experiments and response surface methodology.
CB801.6	To build the ability to perform various parametric and non parametric statistical tests and to draw graphs and plots based on type of data.

Course Name : Social and Preventive Pharmacy (Theory)
Course Code : BP 802T, **Year of study:** 4th B.Pharmacy 8th Semester

C802.1	To understand the concept of health and health education.
C802.2	To create awareness about various preventive measures of stated communicable and non communicable diseases.
C802.3	To apply the knowledge of national health programmes mentioned in real world to serve the society.
C802.4	To elaborate various vaccines under national immunization programme and their schedule.
C802.5	To demonstrate the impact of socio-cultural factors and urbanization on health.
C802.6	To evaluate the health and pharmacy related problems in societal perspective.

Course Name : Pharma Marketing Management (Theory)
Course Code : BP 803 ET, **Year of study:** 4th B.Pharmacy 8th Semester

C803.1	To understand different concepts of marketing.
C803.2	To identify marketing mix for pharmaceutical products.
C803.3	To classify different types of sales promotion.
C803.4	To examine pharmaceutical marketing channels.
C803.5	To compare pricing of the pharmaceutical products.
C803.6	To adapt to emerging concepts of marketing.

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Course Name : Pharmaceutical Regulatory Science (Theory)
Course Code : BP 804 ET, **Year of study:** 4th B.Pharmacy 8th Semester

C804.1	To recall the concepts of Drug discovery, development process, clinical studies and generic drug product development.
C804.2	To perceive the regulatory approval process and timelines for IND, NDA and ANDA and to know about changes to an approved NDA/ANDA.
C804.3	To familiar with Regulatory authorities and agencies like India, USA, Europe, Australia, Japan and Canada.
C804.4	To know the regulatory registration process of Indian drugs in overseas market which include to understand about technical documents like DMF, CTD, eCTD and ACTD.
C804.5	To assimilate the process of clinical trials and pharmacovigilance as well as to understand obligations of GCP in clinical trials.
C804.6	To understand the concepts of Regulatory science in pharmaceutical industry as well as to make use of regulatory guidelines, laws, acts, orange and purple book.

Course Name : Pharmacovigilance (Theory)
Course Code : BP 805 ET, **Year of study:** 4th B.Pharmacy 8th Semester

C805.1	To understand the history of pharmacoivigilance, adverse drug reactions and basic terminologies in Pharmacovigilance.
C805.2	To make use of various drug disease classifications, drug dictionaries and drug information resources in pharmacovigilance.
C805.3	To explain various methods of pharmacovigilance and communication process during ADR reporting.
C805.4	To appraise safety data generation and ICH guidelines in pharmacovigilance.
C805.5	To evaluate drug and vaccine safety in special population and to appraise the process of haemovigilance and materiovigilance.
C805.6	To build the ability to report adverse drug reactions through various ADR reporting forms.

Course Name : Quality control and standardization of Herbals (Theory)
Course Code : BP 806 ET, **Year of study:** 4th B.Pharmacy 8th Semester

C806.1	To recall the WHO guidelines for the quality control of herbal drugs.
C806.2	To illustrate and outline the quality assurance in traditional system of medicine including CGMP, GAP, GMP and GLP.
C806.3	To compare the quality control parameters of drugs according to European union and ICH guidelines.
C806.4	To make use of research guidelines for evaluation of safety and effiency of herbal medicine.
C806.5	To apply the knowledge of chromatography in standardization of herbal drugs and to perform the stability studies.
C806.6	To improve the knowledge on regulatory issues for herbal medicine including GMP, WHO guidelines on safety monitoring of herbal medicine in Pharmacovigilance.

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Course Name : Computer aided drug design (Theory)
Course Code : BP 807 ET, **Year of study:** 4th B.Pharmacy 8th Semester

C807.1	To recall the approaches in drug discovery, drug development, lead discovery based on metabolism and clinical observation and also analog based drug design
C807.2	To explain the development, approaches of QSAR, importance and determination of physicochemical parameters
C807.3	To make use of molecular modeling and virtual screening techniques
C807.4	To apply the molecular docking techniques to examine the binding interactions of ligand with molecular targets
C807.5	To explain the applications of bioinformatics, chemo informatics, ADME databases, chemical, biochemical and pharmaceutical databases relevant to drug design
C807.6	To discuss the conformational analysis of molecules using molecular and quantum mechanics approach and also determine the global conformational minima

Course Name : Cell and Molecular Biology (Elective Subject))
Course Code : BP 808 ET, **Year of study:** 4th B.Pharmacy 8th Semester

C808.1	To relate the basic structure, properties of cells (prokaryotic and eukaryotic) and cell membranes / cellular reproduction.
C808.2	To illustrate DNA structure and functioning, RNA and protein synthesis (transcription/translation).
C808.3	To organize protein structure, pathways, cellular processes and significance of protein synthesis.
C808.4	To distinguish the science of genetics, transgenics, genomic and cell cycle analysis.
C808.5	To interpret mitosis / meiosis, cellular activities and checkpoints.
C808.6	To elaborate how cell communication occur and discuss mech anisms of receptors for cell signaling/signaling pathways/Protein kinase

Course Name : Cosmetic Science
Course Code : BP 809 ET, **Year of study:** 4th B.Pharmacy 8th Semester

C809.1	To remember classification and historical evolution of cosmetics, cosmeceutical products, cosmetic excipients and recall the basic structure, functions and common problems associated with skin, hair and oral cavity.
C809.2	To understand the principles of formulation and building blocks of various skin care products and hair care products.
C809.3	To describe the role of herbs in cosmetics and analytical methods for cosmetics.
C809.4	To evaluate various cosmetics using analytical instruments.
C809.5	To apply the knowledge gained and develop cosmetics to solve problems associated with skin, hair and scalp.

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Course Name: Pharmacological Screening Methods
Course Code: BP 810 ET, **Year of study:** 4th B.Pharmacy 8th Semester

C810.1	To recall the CPCSEA/OECD guidelines for maintenance, breeding and conduct of experiments on laboratory animals and to demonstrate different laboratory/transgenic/ mutant animals, various routes of administration, techniques of blood collection and euthanasia.
C810.2	To outline various preclinical screening models for diuretics, nootropics, antiasthmatics and drugs acting on CNS.
C810.3	To construct preclinical screening models for drugs acting on ANS, eye and local anesthetics.
C810.4	To analyze the preclinical screening models for drugs acting on CVS.
C810.5	To appraise the preclinical screening models for drugs like antiulcer, antidiabetic and anticancer agents.
C810.6	To compile research methodology and biostatistics

Course Name : Advanced Instrumentation Techniques
Course Code : BP 811 ET, **Year of study:** 4th B.Pharmacy 8th Semester

C811.1	To understand the principle and procedure involved in selected instrumental analytical techniques (spectroscopy,chromatography and thermal methods)
C811.2	To gain knowledge on interaction of EMR with matter and to build the analytical understanding at the level of atom, group and molecular structure of organic and inorganic compounds with different functional groups and their applications in pharmacy.
C811.3	To maximize knowledge on characterization and estimation of drugs by spectroscopical and thermal techniques
C811.4	To simplify the importance of calibration a nd validation of analytical instruments as per ICH and USFDA guidelines.
C811.5	To elaborate various principles and procedure employed in radio immuno assay and extraction techniques.
C811.6	To detail the principle, instrumentation and applications of hyphenated techniques.

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Course Name : Dietary Supplements and Nutraceuticals
Course Code : BP812 ET, **Year of study:** 4th B.Pharmacy 8th Semester

C812.1	To define, classify and understand the functional foods, Nutraceuticals and dietary supplements.
C812.2	To remember the sources, chemical nature, medicinal uses and health benefits of Nutraceuticals and functional foods.
C812.3	To interprete the applications of phytochemicals as Nutraceuticals like sulfies, phytochemicals as Nutraceuticals like sulfides, polyphenolics, flavonoids, probiotics, Tocopherols, proteins, minerals etc.
C812.4	To examine (to identify the damaging reactions of free radicals on tepids, carbohydrates. Proteins and nucleic acids. Role of functional foods in various disease conditions.
C812.5	To analyse the role of dietary fibres and complex carbohydrates as functional food ingredients
C812.6	To discuss the regulatory aspects, adultration of dietary fibres and Nutraceuticals and their pharmacopoeal specifications.

Course Name : Elective course of Pharmaceutical Product Development
Course Code : BP813 PW, **Year of study:** 4th B.Pharmacy 8th Semester

C813.1	To recall the formulation development of different types of dosage forms
C813.2	To outline the role of different pharmaceutical excipients in product development
C813.3	To select the excipients for a specific drug products
C813.4	To classify different of packaging for the drug product and materials used for primary and secondary packaging.
C813.5	To choose optimization technique in the development of pharmaceutical drug product.
C813.6	To design the drug product by using principles of Quality by Design

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COURSE OUTCOMES OF PHARM.D PROGRAMME

Programme : I Pharm.D

Course Name : Human Anatomy and Physiology

Course code : 17T00101

C1.1.1	To recall the terminologies in the human anatomy and physiology, along with learn the functions of human cell
C1.1.2	To summarize the functions of tissue, bones and joints in the skeleton.
C1.1.3	To explain the functions of formed elements in the bloodalong with lymph and its role in immunity
C1.1.4	To compare the anatomical features of heart, lungs and GIT and to analyze their physiology.
C1.1.5	To assess the structure and function of brain, spinal cord and cranial nerves and to interpret the physiology of urinary system.
C1.1.6	To elaborate the physiology of endocrine glands, reproductive organs, sensory organs and to discuss the physiology skeletal muscles.

Programme : I Pharm.D

Course Name : Human anatomy and Physiology

Course code : 17T00107

C1.1.1	To find and relate characteristics of various tissues of human body
C1.1.2	To demonstrate bleeding time, clotting time, blood pressure and blood grouping.
C1.1.3	To identify the number of RBC and WBC using hemocytometer
C1.1.4	To examine the functions of various organ systems in human body
C1.1.5	To interpret the mechanisms of pregnancy diagnosis tests and various family planning appliances
C1.1.6	To construct and record simple curves using frog gastroenemius sciatic nerve

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Programme	:	I Pharm.D
Course Name	:	Pharmaceutics
Course code	:	17T00102

C1.2.1	To define the profession of pharmacy and pharmacopoeias.
C1.2.2	To outline the classification of dosage forms, summarize importance of prescription and posology.
C1.2.3	To develop monophasic and biphasic liquid dosage forms.
C1.2.4	To simplify the preparation of suppositories and powders.
C1.2.5	To explain the concepts of surgical aids and galenicals.
C1.2.6	To elaborate the importance of pharmaceutical incompatibilities and solve calculations.

Programme	:	I Pharm.D
Course Name	:	Pharmaceutics
Course code	:	17T00108

C1.2.1	To remember the principles used in the preparation of liquid, semisolid and solid dosage forms.
C1.2.2	To illustrate monophasic internal and external liquid dosage forms.
C1.2.3	To experiment with biphasic liquid dosage forms.
C1.2.4	To take part in formulation of powder dosage forms.
C1.2.5	To appraise the formulation of suppositories.
C1.2.6	To solve the prescriptions having the incompatibility problems.

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Programme	:	I Pharm.D
Course Name	:	Medicinal Biochemistry
Course code	:	17T00103

C1.3.1	To recall the importance of biochemistry, catalytic activity, mechanism of action and applications of enzymes.
C1.3.2	To understand the metabolism of carbohydrates, lipids, electron transport chain and ATP formation.
C1.3.3	To apply the clinical chemistry knowledge in diagnosis and prognosis of diseases.
C1.3.4	To simplify the metabolism and disorders associated with nucleic acids and amino acids.
C1.3.5	To interpret the genetic organization of mammalian genome, study protein synthesis and DNA replication.
C1.3.6	To elaborate the knowledge on immunochemical techniques and their applications.

Programme	:	I Pharm.D
Course Name	:	Medicinal Biochemistry
Course code	:	17T00109

C1.3.1	To remember the qualitative analysis of urine and confirmatory test for carbohydrates.
C1.3.2	To understand the quantitative estimation and clinical significance of constituents like glucose, creatinine, calcium and chlorides in urine.
C1.3.3	To experiment with estimation of glucose, creatinine, urea, uric acid in blood and their clinical significance
C1.3.4	To perform the liver function tests and lipid profile tests.
C1.3.5	To determine the enzymatic hydrolysis of starch and influence of factors like pH and temperature on enzyme activity.
C1.3.6	To discuss the preparation of standard buffer solutions and their pH measurements.

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Programme	:	I Pharm.D
Course Name	:	Pharmaceutical Organic Chemistry
Course code	:	17T00104

C1.4.1	To recall the nomenclature, properties and isomerism in organic compounds
C1.4.2	To explain the preparation, reactions and stability of alkanes and alicyclic compounds
C1.4.3	To study the kinetics, mechanism, stereochemistry of free radical, electrophilic, nucleophilic addition reactions and theory of resonance
C1.4.4	To compare reactivity, orientation and factors influencing aliphatic nucleophilic substitution with aromatic nucleophilic substitution
C1.4.5	To explain the mechanism and applications of selected named reactions
C1.4.6	To discuss the method of preparation, test for purity, assay and medicinal uses of selected organic compounds

Programme	:	I Pharm.D
Course Name	:	Pharmaceutical Organic Chemistry
Course code	:	17T00110

C1.4.1	To recall and show the stereo models of organic compounds
C1.4.2	To outline the preliminary tests and detection of elements for qualitative analysis
C1.4.3	To apply the laboratory techniques involved in synthesis of organic compounds
C1.4.4	To analyze the organic compounds and identify the functional groups by systematic qualitative analysis
C1.4.5	To explain the synthesis and characterization of selected organic compounds
C1.4.6	To discuss the appropriate method of purification of organic compounds

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Programme	:	I Pharm.D
Course Name	:	Pharmaceutical Inorganic Chemistry
Course code	:	17T00105

C1.5.1	To recall the errors in pharmaceutical analysis and principles of volumetric analysis
C1.5.2	To understand acid-base titrations and limit tests for inorganic compounds
C1.5.3	To select the appropriate titrimetric method for analysis of drugs
C1.5.4	To classify and study the method of preparation and assay of selected inorganic compounds
C1.5.5	To explain the importance of inorganic pharmaceuticals in preventing and curing the disease
C1.5.6	To discuss the radioisotopes and applications of radiopharmaceuticals

Programme	:	I Pharm.D
Course Name	:	Pharmaceutical Inorganic Chemistry
Course code	:	17T00111

C1.5.1	To recall the glassware and apparatus used in volumetric analysis
C1.5.2	To explain the limit test for impurities in inorganic compounds
C1.5.3	To make use of volumetric methods for performing assays
C1.5.4	To analyze selected inorganic compounds by different titrimetric methods
C1.5.5	To estimate the compounds present in a mixture
C1.5.6	To perform test for identity of selected inorganic compounds

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Programme : I Pharm.D

Course Name : Remedial Mathematics

Course code : 17T00106

C1.6.1	To recall the importance of mathematics in pharmacy
C1.6.2	To outline the various topics in mathematics
C1.6.3	To utilize mathematical equations in doing problems
C1.6.4	To take part in solving problems by applying the concepts
C1.6.5	To appraise the important applications of mathematics
C1.6.6	To solve and convert elementary functions using Laplace transform

Programme : I Pharm.D

Course Name : Remedial Biology

Course code : 17T00106

C1.6.1	To learn the organization and nomenclature of living things
C1.6.2	To summarize the functions of various types of tissues in plants and animals
C1.6.3	To develop knowledge on structural modifications in plants and importance of pollination in plants
C1.6.4	To analyze various physiological processes in plants and animals
C1.6.5	To determine the various taxonomical characters of different families and micro-organisms
C1.6.6	To elaborate the study of different kinds of phylum's includes Pisces, Reptiles, Amphibians, Aves& Mammals

Programme : I Pharm.D

Course Name : Remedial Biology

Course code : 17T00112

C1.6.1	To understand the basic experiments in Biology and to list out the parts in cell
C1.6.2	To demonstrate the preparation of permanent slides, section cutting techniques & different staining methods
C1.6.3	To improve knowledge on identification of various animal and plant specimens
C1.6.4	To distinguish the various plant by microscopically examination of roots, stems, fruits, leaf and seeds
C1.6.5	To assess the plant taxonomy based on macroscopic and microscopy findings
C1.6.6	To create experiments on the plant physiology

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Programme	:	III Pharm.D
Course Name	:	Pharmaceutical Formulations
Course code	:	17T00306

C3.6.1	To recall the basic concepts of pharmaceutical dosage forms.
C3.6.2	To explain formulation, coating and evaluation of tablets.
C3.6.3	To develop and examine capsule dosage forms.
C3.6.4	To simplify the formulation, evaluation and stability considerations of liquid orals. the preparation and quality control of parenteral preparations.
C3.6.5	To appraise parenteral, ophthalmic, semisolids products and packaging material.
C3.6.6	To design various sustained and controlled drug delivery systems.

Programme	:	III Pharm.D
Course Name	:	Pharmaceutical Formulations
Course code	:	17T00311

C3.6.1	To recall the preparation and evaluation of compressed tablets.
C3.6.2	To illustrate the basic requirements for formulation and evaluation of capsules.
C3.6.3	To develop parenteral formulations.
C3.6.4	To take part in formulation of liquid orals.
C3.6.5	To justify the use of excipients and formulate of semisolid dosage forms.
C3.6.6	To develop various cosmetic preparations.

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Programme	:	IV Pharm.D
Course Name	:	Pharmacotherapeutics-III
Course code	:	17T00401

C4.1.1	To remember the etiopathogenesis and clinical presentation of gastrointestinal and haematological diseases.
C4.1.2	To summarize the diagnosis and therapeutic approaches of gastrointestinal and haematological diseases.
C4.1.3	To identify the causes, pathogenesis and clinical manifestations of neurological and psychiatric diseases.
C4.1.4	Tosimplify understanding on diagnosis, desired outcomes and management of neurological and psychiatric diseases
C4.1.5	To explain the physiology of pain pathway and management of pain, neuralgia and headaches.
C4.1.6	To develop skills on evidence-based practice in diseases management to become a competent pharmacist.

Programme	:	IV Pharm.D
Course Name	:	Pharmacotherapeutics-III
Course code	:	17T00407

C4.1.1	To understand the therapeutic approaches and treatment alternatives in the management of gastrointestinal diseases.
C4.1.2	Torelate the concept of pharmaceutical care to identify therapeutic problems in haematological diseases.
C4.1.3	To apply the knowledge to develop therapeutic decision-making skills in gastrointestinal and haematological diseases.
C4.1.4	To take part in drug related problem identification and problem-solving skills in neurological diseases.
C4.1.5	To prioritize the rational pharmacotherapeutic alternatives in the management of psychiatric diseases.
C4.1.6	To develop skills on drug of choice and patient education in management of diseases.

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Programme : IV Pharm.D

Course Name : Hospital Pharmacy

Course code : 17T00402

C4.2.1	To define the structure, organization and functions of hospital and hospital pharmacist
C4.2.2	To understand and involve in the preparation and implementation of budget, inventory control various drug policies
C4.2.3	To make use of various hospital drug policies to develop hospital pharmacy news letters
C4.2.4	To list out various drug distribution methods for inpatients and outpatients including narcotic and controlled drugs.
C4.2.5	To prioritize the procurement, manufacturing and storage process of various formulations and handling of radio pharmaceuticals
C4.2.6	To develop programmes for professional upraising continuously and to build inter professional relations in the hospitals.

Programme : IV Pharm.D

Course Name : Hospital Pharmacy

Course code : 17T00408

C4.2.1	To understand various drug distribution systems in hospital.
C4.2.2	To extend the professional practice management skills in hospital pharmacy.
C4.2.3	To utilize various methods for the preparation and labelling of pharmaceutical products such as powders and intravenous solutions
C4.2.4	To recommend the solutions to overcome the drug interaction and adverse drug reactions.
C4.2.5	To appreciate various store management and inventory control.
C4.2.6	To solve drug related problems through prescription analysis and individualized dose.

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Programme : IV Pharm.D

Course Name : Clinical Pharmacy

Course code : 17T00403

C4.3.1	To understand and explain the daily activities of clinical pharmacist and to monitor the patient rug therapy through medication chart review and clinical review.
C4.3.2	To obtain medication history interview and counsel the patients on various diseases and lifestyle modifications and by applying communication skills.
C4.3.3	To provide response to a drug and poison information queries using modified systemic approach and to gain ability to establish a drug and poison information center.
C4.3.4	To interpret selected laboratory results of specific disease states mentioned and to report ADRs and understand the process of pharmacovigilance.
C4.3.5	To identify and resolve drug related problems and medication errors.
C4.3.6	To critically evaluate biomedical literature in order to get an unbiased clinical evidence to develop individualized pharmaceutical care plan.

Programme : IV Pharm.D

Course Name : Clinical Pharmacy

Course code : 17T00409

C4.3.1	To create awareness in patients by counselling them on various diseases and drugs using clinical knowledge and communication skills.
C4.3.2	To conduct comprehensive and meticulous medication history interview for the preparation of individualized pharmaceutical care plan.
C4.3.3	To interpret laboratory results of specific disease states mentioned and correlating with patient drug therapy while monitoring disease progression.
C4.3.4	To provide response to a drug and poison information queries using modified systemic approach by critically appraising the biomedical literature.
C4.3.5	To report and assess causality of adverse drug reactions to establish a causal relation between an ADR and a drug.

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Programme : IVPharm.D

Course Name : Biostatistics and Research Methodology

Course code : 17T00404

C4.4.1	To define the concepts of research methodology and sample size determination with report writing.
C4.4.2	To discuss different types of clinical study designs involved in medical research like case studies, observational studies and interventional studies.
C4.4.3	To apply the concepts of biostatistics and data graphics along with clinical soft wares like SPSS, SAS to support the research design.
C4.4.4	To learn to utilize the computer applications and their advantages in both hospital, community pharmacy.
C4.4.5	To simplify the understanding of statistical methods in epidemiology and be conscious about its relative, attributable risks
C4.3.6	To critically evaluate biomedical literature in order to get an unbiased clinical evidence to develop individualized pharmaceutical care plan.

Programme : IV Pharm.D

Course Name : Biopharmaceutics & Pharmacokinetics

Course code : 17T00405

C4.5.1	To recall basic concepts of absorption, distribution, metabolism and excretion of drugs.
C4.5.2	To understand the mechanisms, interpret various factors affecting drug absorption, distribution, metabolism and excretion of drugs.
C4.5.3	To apply the pharmacokinetic models for the determination of pharmacokinetic parameters.
C4.5.4	To examine multiple dosage regimens based on pharmacokinetic parameters for maximizing therapeutic effectiveness and patient compliance.
C4.5.5	To evaluate various pharmacokinetic parameters for the drugs exhibiting saturation kinetics.
C4.5.6	To design the bioavailability testing protocol of a drug and compare the bioequivalence between marketed products.

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Programme : IV Pharm.D

Course Name : Biopharmaceutics & Pharmacokinetics

Course code : 17T00410

C4.5.1	To recall the concepts in biopharmaceutics, basic pharmacokinetic parameters and their significance.
C4.5.2	To interpret the effect of surfactant, diluents, lubricant and polymorphism on rate of drug dissolution.
C4.5.3	To solve bioavailability parameters of drugs by using plasma data and methods to improve bioavailability.
C4.5.4	To analyze absorption rate constant, K_E, biological half-life, mean residence time and mean absorption time for the given data.
C4.5.5	To estimate the extent of protein biding by equilibrium dialysis or dynamic dialysis methods.
C4.5.6	To predict the pharmacokinetic parameters for the given data as per one compartment and two compartment models.

Programme : IV Pharm.D

Course Name : Clinical Toxicology

Course code : 17T00406

C4.6.1	To understand the general principles involved in the management of poisoning with toxicokinetics parameters.
C4.6.2	To identify the role of antidotes, supportive care, gut decontamination and elimination enhancement in poisoning.
C4.6.3	To distinguish the clinical symptoms and to plan various managements of pesticides, drugs acting on CNS, hydrocarbons, caustics and radiation poisoning.
C4.6.4	To categorize the toxic symptoms and management of venomous snake bites, toxicity of plants and contaminated foods and heavy metals.
C4.6.5	To compare the characteristics and specific standard treatment guideline for the treatment of various toxins.
C4.6.6	To propose several preventive approaches to reduce unintended poisoning.

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Programme	:	IV Pharm.D
Course Name	:	Pharmacotherapeutics I & II
Course code	:	17T00407

C4.7.1	To remember and recall the pathophysiology of selected diseases and rationale for drug therapy.
C4.7.2	To identify various therapeutic approaches for the management of selected diseases.
C4.7.3	To apply the concepts of various drug therapies and identify the controversies in drug therapy.
C4.7.4	To distinguish between various disease conditions and analyze the results with drug induced disorders.
C4.7.5	To select the patient-specific parameters relevant in initiating drug therapy, and monitoring therapy among pediatric, geriatric, pregnant and lactating women.
C4.7.6	To develop competency to design individual care plan for cardiovascular, respiratory, ocular and hormonal disorders.

Programme	:	IV Pharm.D
Course Name	:	Pharmacotherapeutics I & II
Course code	:	17T00411

C4.7.1	To remember and recall the pathophysiology and management of cardiovascular, respiratory, endocrine diseases and viral infections
C4.7.2	To identify various drug interactions and rationalize the prescription.
C4.7.3	To plan the quality use of medicines surrounding the therapeutic agents in the treatment of selected diseases
C4.7.4	To analyze the clinical skills in the therapeutic management of selected disease conditions
C4.7.5	To prioritize the treatment strategies for better patient outcome and discuss the controversies in treatment
C4.7.6	To improve the skills on patient – centred approach to improve treatment satisfaction and perform patient counselling.

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Programme : V Pharm.D

Course Name : Clinical Research

Course code : 17T00501

C5.1.1	To study the regulations involved in drug discovery and drug development process.
C5.1.2	To understand the regulatory guidelines and ethics of clinical trials.
C5.1.3	To plan and construct pre-clinical trials and clinical trial activities.
C5.1.4	To distinguish the roles and responsibilities of trial related personnel and designing of clinical trial documents.
C5.1.5	To compare the regulatory aspect of clinical trials in India with other countries (USA and Europe).
C5.1.6	To adapt and improve the skills in data management, safety monitoring and reporting to regulatory authorities.

Programme : V Pharm.D

Course Name : Pharmacoepidemiology and Pharmacoeconomics

Course code : 17T00502

C5.2.1	To remember and recall the origin and need; measurement of outcomes in pharmacoepidemiology and pharmacoeconomics.
C5.2.2	To understand the various concepts of risks in pharmacoepidemiology.
C5.2.3	To apply the concepts of pharmacoepidemiological methods in conducting various research studies with the help of case studies and available software's.
C5.2.4	To distinguish the selected special applications of pharmacoepidemiology.
C5.2.5	To evaluate the outcome by using various Pharmacoeconomic methods.
C5.2.6	To solve various case studies by applying the concepts of pharmacoepidemiology and Pharmacoeconomics in designing a good outcome.

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Programme : II Pharm.D

Course Name : Pathophysiology

Course code : 17T00201

C2.1.1	To understand the process of cell injury by various etiological agents, morphology of cell injury and cellular adaptations.
C2.1.2	To summarize the events of acute and chronic inflammation and to relate them to the process of wound healing.
C2.1.3	To apply the knowledge of immune tolerance and Human Leucocytic antigen system in understanding the process of organ transplantation, autoimmunity and hypersensitivity reactions.
C2.1.4	To assess the need of balanced diet and the effect of radiation and air pollution on human body.
C2.1.5	To appraise the principles of physical, chemical and biologic carcinogenesis and to evaluate the pathological changes observed in a cancer tissue.
C2.1.6	To adapt the principles of cell injury, inflammation and immune-pathology in understanding pathogenesis of various disease states and their clinical features and complications.

Programme : II/VI Pharm.D

Course Name : Pharmaceutical Microbiology

Course code : 17T00202

C2.2.1	To list the branches, scope of microbiology and morphology of microbes.
C2.2.2	To explain the methods of identification, cultivation and preservation of various microorganisms.
C2.2.3	To apply the principles of sterilization in pharmaceutical processing and sterility testing.
C2.2.4	To compare different types of immunological reactions, antigens, vaccines and their role in immunity.
C2.2.5	To evaluate microbiological standards of pharmaceuticals and presence of pathogens.
C2.2.6	To elaborate the characteristics, mode of infection, diagnosis, prophylaxis and treatment of bacterial, fungal and viral infectious agents.

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Programme : II Pharm.D

Course Name : Pharmaceutical Microbiology

Course code : 17T00207

C2.2.1	To recall different techniques of sterilization and equipment used in microbiology laboratory.
C2.2.2	To interpret characteristics of microbes using staining techniques, isolation methods and quantitative estimation.
C2.2.3	To construct standard graphs for estimating antibiotics and vitamins using microbes.
C2.2.4	To test for possible microbial contamination in a given sample.
C2.2.5	To estimate qualitatively and quantitatively the amount of microbes in a sample.
C2.2.6	To choose the correct method for evaluating the microbes by serological and bacteriological methods.

Programme : II Pharm.D

Course Name : Pharmacognosy and Phyto pharmaceuticals

Course code : 17T00203

C2.3.1	To define and introduce the history, scope and classification of crude drugs
C2.3.2	To explain and relate about the cultivation, collection, processing and storage of crude drugs
C2.3.3	To apply the knowledge of microscopical for studying properties of cell constituents
C2.3.4	To compare and classify the natural pesticides
C2.3.5	To determine and evaluate the importance of carbohydrates, proteins, lipids and fibers along with their pharmacognistic study
C2.3.6	To estimate and predict the types of adulteration of crude drugs

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Programme : II Pharm.D

Course Name : Pharmacognosy & Phytopharmaceuticals

Course code : 17T00208

C2.3.1	To understand collection and preparation of crude drugs and to recall selected crude drugs.
C2.3.2	To understand microscopic study and the methods of quality control for crude drugs with WHO guidelines.
C2.3.3	To perform the transversection of the crude drugs for identification.
C2.3.4	To identify crude drugs by chemical tests: Tragacanth, Acacia, Agar, Gelatin, Starch, Honey and lipids.
C2.3.5	To evaluate the crude drugs for adulteration by macroscopic features.
C2.3.6	To estimateacid value, saponification value, ester value, iodine value and extractive values of crude drugs.

Programme : II Pharm.D

Course Name : Pharmacology - I

Course code : 17T00204

C2.4.1	To define the fundamental concepts of pharmacology, pharmaco kinetics and to understand the basics of drugs interactions, drug discovery and toxicity studies.
C2.4.2	To classify the role of neurotransmitter in autonomic nervous system and summarize the drugs action on it.
C2.4.3	To organize the pharmacology of the drugs acting oncardiovascular system.
C2.4.4	To analyze the role of neurotransmitter in central nervous system and summarize the drugs action on CNS and respiratory system.
C2.4.5	To appraise the physiological role of hormones and assess the therapeutic effects of its replacement therapy.
C2.4.6	To predict the role of autocoids in pathological conditions and their importance in treating various diseases.

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Programme : II Pharm.D

Course Name : Community Pharmacy

Course code : 17T00205

C2.5.1	To recollect the parts of prescription and study the concepts of pharmaceutical care.
C2.5.2	To understand the scope of community pharmacy, site selection, space layout, legal requirements and inventory management of community pharmacy.
C2.5.3	To identify the best way of improving medication adherence and to excel in conducting patient counseling.
C2.5.4	To survey the health status of patients in the community by participating on health screening services and to build the ability to manage minor ailments.
C2.5.5	To explain the importance of rational drug therapy, OTC medication counseling and code of ethics to became a competent pharmacist.
C2.5.6	To improve the professional skills about health, balance diet, family planning, health promotion and prevention of communicable diseases in community.

Programme : II Pharm.D

Course Name : Pharmacotherapeutics-I

Course code : 17T00206

C2.6.1	To recall the pathophysiology of cardiovascular disorders and relate their etiology with the therapeutic approach including treatment controversies.
C2.6.2	To outline the concept of essential drugs use and rational drug therapy and summarize the choice of drugs with justification in various disease conditions.
C2.6.3	To identify various types of respiratory and endocrine disorders with respect to clinical features and laboratory investigations, list their complications along with replacement in their management.
C2.6.4	To distinguish between various disease conditions and analyze the results with drug induced disorders.
C2.6.5	To select the patient-specific parameters relevant in initiating drug therapy, and monitoring therapy among pediatric, geriatric, pregnant and lactating women.
C2.6.6	To develop competency to design individual care plan for cardiovascular, respiratory, ocular and hormonal disorders.

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Programme : II Pharm.D

Course Name : Pharmacotherapeutics-I

Course code : 17T00209

C2.6.1	To list the sign and symptoms, laboratory parameters of the cardiovascular diseases.
C2.6.2	To identify the drug interactions and find a solutions to overcome drug interactions in the given prescriptions.
C2.6.3	To plan an individual care plan in the cases with endocrine and thyroid disorders.
C2.6.4	To analyze the prescription for rational drug use.
C2.6.5	To explain the safety of oral contraceptives, hormone replacement therapy and the drugs used on occular disorder
C2.6.6	To minimize the drug related problems in the prescriptions and to choose a choice of drugs in various diseases.

Programme : III Pharm.D

Course Name : Pharmacology-II

Course code : 17T00301

C3.1.1	To list the various drugs acting on bloodand blood forming agents
C3.1.2	To classify drugs acting on renal system and explain the mechanism adverseeffects & therapeuticuses of drugs.
C3.1.3	To develop the knowledge on principles of chemotherapy and treatment for various microbial infections.
C3.1.4	To assume the role of immunotherapeutic agents and distinguish acute, sub-acute and chronic animal toxicity studies
C3.1.5	To predict the structure and functions of the components of the cell, role of secondary messengers in cell signaling and determine the structure of chromosome
C3.1.6	To compile the role of genetic material in synthesis of proteins. The appropriateness of gene therapy and recombinant DNA technology.

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Programme : III Pharm.D

Course Name : Pharmacology-II

Course code : 17T00307

C3.1.1	To recall the different laboratory animals, laboratory appliances, physiological salt solutions and anesthetic agents used in experimental pharmacology.
C3.1.2	To demonstrate the different animal handling techniques, routes of administration of drugs to experimental animals.
C3.1.3	To apply knowledge on the various bio-assay and improve techniques to construct DRC by using standard drugs
C3.1.4	To analyse the data obtained from various animal experiments and compare the potency of test compound
C3.1.5	To assesspharmacological action of minor and major tranquillizers with the experimental animal models
C3.1.6	To evaluate the cardiotonic activity of drugs using isolated frog heart preparations.

Programme : III Pharm.D

Course Name : Pharmaceutical Analysis

Course code : 17T00302

C3.2.1	To recall the principle and theory of instrumental analytical techniques
C3.2.2	To outline the instrumentation of spectroscopic, chromatographic and thermal techniques
C3.2.3	To apply the knowledge of spectroscopic, chromatographic and thermal methods in analysis of drugs
C3.2.4	To analyze API's and formulation by using elements of interpretation of data
C3.2.5	To explain theory, instrumentation and applications of electrometric methods of analysis
C3.2.6	To maximize knowledge on concepts of validation, calibration, ICH, GLP, ISO9000, TQM and quality variation concepts

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Programme : III Pharm.D

Course Name : Pharmaceutical Analysis

Course code : 17T00308

C3.2.1	To recall the separation and identification of compounds by chromatographic techniques
C3.2.2	To explain the qualitative and quantitative analysis of drugs by spectroscopic techniques
C3.2.3	To experiment with instrumental analysis of selected drugs as per pharmacopoeia
C3.2.4	To compare and characterize compounds by using analytical techniques
C3.2.5	To determine concentration of ions by electrometric analysis
C3.2.6	To discuss the instrumentation, applications of advanced analytical techniques and to interpret spectral data

Programme : III Pharm.D

Course Name : Pharmacotherapeutics-II

Course code : 17T00303

C3.3.1	To remember and recall the pathophysiology of selected diseases and rationale for drug therapy.
C3.3.2	To identify various therapeutic approaches for the management of selected diseases.
C3.3.3	To apply the concepts of various drug therapies and identify the controversies in drug therapy.
C3.3.4	To assess the drug therapy by preparing individual therapeutic plan based on diagnosis.
C3.3.5	To evaluate the patient specific parameters relevant in initiating drug therapy and monitoring therapy.
C3.3.6	To create a pharmaceutical care plan, design a list of patient counselling points on the specific illness.

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Programme	:	III/VI Pharm.D
Course Name	:	Pharmacotherapeutics-II
Course code	:	17T00309

C3.3.1	To remember and recall the pathophysiology and management of cardiovascular, respiratory ,endocrine diseases and viral infections
C3.3.2	To identify various drug interactions and rationalize the prescription.
C3.3.3	To plan the quality use of medicines surrounding the therapeutic agents in the treatment of selected diseases
C3.3.4	To analyze the clinical skills in the therapeutic management of selected disease conditions
C3.3.5	To prioritize the treatment strategies for better patient outcome and discuss the controversies in treatment
C3.3.6	To improve the skills on patient – centred approach to improve treatment satisfaction and perform patient counselling

Programme	:	III Pharm.D
Course Name	:	Pharmaceutical Jurisprudence
Course code	:	17T00304

C3.4.1	To recall the concepts of pharmaceutical legislations in India and code of pharmaceutical ethics
C3.4.2	To outline the schedules and provisions given under Drugs and Cosmetics act 1940 and its rules 1945
C3.4.3	To apply the provisions of Pharmacy act 1948 and procedure for registration of pharmacist
C3.4.4	To list out the provisions under medicinal and toilet preparations act, narcotic drugs and psychotropic substances act and rules, drugs and magic remedies act and rules
C3.4.5	To understand the importance of Essential commodities act and National drug policy
C3.4.6	To discuss the salient features of Prevention of cruelty to animals act 1960 and Patents and design act 1970

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Programme	:	III Pharm.D
Course Name	:	Medicinal Chemistry
Course code	:	17T00305

C3.5.1	To recall the various classes of medicinal compounds
C3.5.2	To outline the drugs used as chemotherapeutic agents
C3.5.3	To identify the structural features of drugs required for activity and study their mechanism of action
C3.5.4	To plan for the synthesis of selected category of drugs and their clinical uses
C3.5.5	To explain the importance of diagnostic agents and concept of anti-sense molecules
C3.5.6	To discuss the QSAR studies, combinatorial chemistry and CADD techniques used in rational drug design

Programme	:	III Pharm.D
Course Name	:	Medicinal Chemistry
Course code	:	17T00310

C3.5.1	To recall the basic requirements for synthesis of medicinal compounds
C3.5.2	To explain the principle and techniques involved in synthesis of drugs
C3.5.3	To apply the various methods for quantitative analysis of drugs
C3.5.4	To analyze medicinal compounds and study their pharmacopoeial monographs
C3.5.5	To determine the percentage purity of marketed formulations
C3.5.6	To estimate the physicochemical parameters for QSAR analysis

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M.PHARMACY PROGRAMME

PHARMACOLOGY

M. PHARMACY PROGRAMME – PHARMACOLOGY

PROGRAMME OUTCOMES (PO's)	
PO 1	**Drug Expertise :** Acquire knowledge on various classes of drugs and their mode of actions to unveil the remedies for many ailments.
PO 2	**Analytical Reasoning:** Identify assumptions and reveal the evidence based reason for the disease or disorder take place, to select the type of relevant treatment.
PO 3	**Experimental Ethics :** Consider and follow ethics and guidelines specified by the authorities of various agencies and Government of India for animal congenial laboratory practice.
PO 4	**Interdisciplinary engagement :** Obtain skill oriented practical proficiency by exposing and utilizing the needs of pharmacy in all disciplines to emerge as potent researcher.
PO 5	**Professional Identity :** Be committed and responsible person to play a proactive role with fidelity to community and empower society.
PO 6	**Statistical Skills :** Apply and analyze quantitative metrics to gain safety data on dosage, also to compare the effectiveness among experimental groups.
PO 7	**Intellectual Flexibility :** Engage in critical thinking and gain insight to identify, design and formulate pharmaceutical products that are in need of current aspects by using material from natural sources.
PO 8	**Lifelong learning :** Understand and apply the concepts in day to day life activities for the benefit of self and for the welfare of society and its concerns.

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M. PHARMACY PROGRAMME – PHARMACOLOGY	
PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)	
PEO 1	**Innovation Culture :** Devise research strategies for empowering and promoting culture of innovation among students for the industrial needs. Also encourage and excel the students to perform their skills in the areas of interest to promote the potency and zeal towards research.
PEO 2	**Professional Interaction :** Develop comprehensive skills by identifying time to time life situations and keep updating the knowledge professionally for community up-liftment. Also acquire higher order thinking skills and become professionally competent to take up careers in academics, health care and service industry.
PEO 3	**Global Health Care :** Integrate and apply techniques to advance the research scenario for the welfare of Global health care. Also acquire knowledge on diagnostic, therapeutic, rehabilitative and preventive health care for qualitative skills.
PEO 4	**Entrepreneurial Spirit :** Build capacities and develop practical awareness which results in smooth transition from education to self-employment and finally to entrepreneurship. Also relocate the gained knowledge, skills and training to their own personal interests for socio economic empowerment. o promote the potency and zeal towards research.

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M.PHARMACY PROGRAMME – PHARMACOLOGY	
PROGRAMME SPECIFIC OUTCOMES (PSOs)	
PSO 1	**Integrative and Applied Learning :** An Approach where learning through connections and relativity to the concepts of theoretical aspect with preclinical experimentation. Apply knowledge and skills developed in traditional classroom learning to hands-on and real-world settings.
PSO 2	**Biological Research :** Demonstrate an understanding of the action of drugs, and test samples with isolated organs or non invasive methods by in-vitro and in-vivo techniques. Biological research leads to analyze and compare the safety and toxicity of products at initiation.
PSO 3	**Technical Advancements :** Exhibit the usage of various advanced equipment to analyze and assess the potency of drug by using the animals. Creates innovative screening methods and best practices to identify and evaluate parameters for various pharmacological activities.
PSO 4	**Ethical Reasoning :** Apply ethical principles to validate the pre clinical experiments. Plan, implement and evaluate the procedures as per the CPCSEA guidelines. Enhance the functional skills and transparency by record keeping.
PSO 5	**Employability:** Acquire in depth knowledge on life sciences and exhibit critical thinking, problem solving and decision making to enhance employability. Apply skill based knowledge in various sectors and relate the principles of scientific advancement.

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Programme	:	I/II M.Pharmacy
Semester/Year of Study	:	Ist Semester
Branch	:	**Pharmacology**
Subject Name	:	Modern PharmaceuticalAnalytical Techniques
Subject code	:	**21S01101** T (Theory)

C1101.1	Understand the basic knowledge on assay ofsingle and multiple componentpharmaceuticals by using various analytical instruments.
C1101.2	Develop the theoretical knowledge on various instrumental techniques available for analysis of organic substances by using analytical instruments.
C1101.3	Improve skills in selecting the suitable techniques for analysis of drugs and pharmaceuticals.
C1101.4	Interpret spectra of UV-visible, IR, NMR andMass to identity the given compound.
C1101.5	Describe the general methods for separation and purification of components from a mixture and their application to pharmaceutical industry.
C1101.6	Apply the knowledge learnt in developing newprocedures of their own design.

Programme	:	I/II M.Pharmacy
Semester/Year of Study	:	Ist Semester
Branch	:	**Pharmacology**
Subject Name	:	Advanced Pharmacology - I
Subject code	:	**21S01102** T (Theory)

C1102.1	Discuss the pathophysiology andpharmacotherapy of certain diseases.
C1102.2	Explain the mechanism of drug actions atcellular and molecular level.
C1102.3	Understand the adverse effects, contraindications and clinical uses of drugs used in treatment of diseases.
C1102.4	Study the General aspects and steps involvedin neurotransmission.
C1102.5	Demonstrate the physiological and pathologicalrole of hormones in the human body.

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Programme : I/II M.Pharmacy

Semester/Year of Study : Ist Semester

Branch : **Pharmacology**

Subject Name : Clinical Pharmacology & Pharmacotherapeutics

Subject code : **21S01103** T (Theory)

C1103.1	Understand the pathophysiology of selected disease states and the rationale for drug therapy.
C1103.2	Outline the importance of preparation of individualized therapeutic plans based on diagnosis.
C1103.3	Identify the needs to the patient-specificparameters relevant in initiating drug therapy.
C1103.4	Study the drug therapy of pediatric, geriatricsand pregnant women's.
C1103.5	Summarize the therapeutic approach tomanagement of various diseases.

Programme : I/II M.Pharmacy

Semester/Year of Study : Ist Semester

Branch : **Pharmacology**

Subject Name : Cellular and Molecular Pharmacology

Subject code : **21S01104** T (Theory)

C1104.1	Understand the interaction of cellularcomponents with drugs.
C1104.2	Describe the receptor signal transductionprocesses.
C1104.3	Study of the molecular pathways affected bydrugs.
C1104.4	Explain the applicability of molecular pharmacology and biomarkers in drug discovery process.
C1104.5	Illustrate molecular biology techniques asapplicable for pharmacology.

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Programme : I/II M.Pharmacy

Semester/Year of Study : Ist Semester

Branch : **Pharmacology**

Subject Name : Modern Pharmaceutical Analytical Techniques Lab

Subject code : **21S01105** L (Practical)

C1103.1	Recall and relate the principle of spectroscopy, chromatography and other commonly usedinstrumental methods of analysis.
C1103.2	Train the students and to give hands ontraining on these sophisticated instruments.
C1103.3	Perform quantitative & qualitative analysis ofdrugs using various analytical instruments like UV-visible and IR spectrophotometer andHPLC.
C1103.4	Plan and select lab experiments using appropriate analytical skills. Evaluate thequantity of a drug in a given formulation.
C1103.5	Practice them on solving spectral problems andgenerate a comprehensive analytical report on the findings.
C1105.6	Interpret spectra of UV-visible, IR, NMR andMass to identity the given compound.

Programme : I/II M.Pharmacy

Semester/Year of Study : Ist Semester

Branch : **Pharmacology**

Subject Name : Advanced Pharmacology - I Lab

Subject code : **21S01106** L (Practical)

C1106.1	Demonstrate the various routes of drugadministration in experimental animals.
C1106.2	Compute various techniques of blood samplingin experimental animals.
C1106.3	Employ different bio assay techniques inisolated preparations of experimental animals.
C1106.4	Practice anaesthetic techniques inexperimental animals.
C1106.5	Operate dose response curve of Ach using isolated ileum/rectus abdominis muscle preparation.

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Programme	:	I/II M.Pharmacy
Semester/Year of Study	:	I[st] Semester
Branch	:	**Pharmacology**
Subject Name	:	Disaster Management
Subject code	:	**21DAC101b** T (Theory)

C101b.1	Analyze the vulnerability of an area to natural and man-made disasters/hazards as per the guidelines to solve complex problems using appropriate techniques ensuring safety, environment and sustainability.
C101b.2	Propose appropriate mitigation strategies for earthquake and tsunami impacts as per code of practice using suitable techniques ensuring safety, environment and sustainability beside communicatingeffectively in graphical form.
C101b.3	Analyze the causes and impacts of floods,cyclones and droughts using appropriate tools and techniques and suggest mitigation measures ensuring safety, environment and sustainability besides communicatingeffectively in graphical form.
C101b.4	Analyze the causes and impacts of landslides using appropriate tools and techniques and suggest mitigation measures ensuring safety, environment and sustainability.
C101b.5	Design disaster management strategies to solve pre, during and post disaster problems using appropriate tools and techniques following the

Programme	:	I/II M.Pharmacy
Semester/Year of Study	:	II[nd] Semester
Branch	:	**Pharmacology**
Subject Name	:	Advanced Pharmacology-II
Subject code	:	**21S01201** T (Theory)

C1201.1	Explain the mechanism of drug actions atcellular and molecular level.
C1201.2	Discuss the Pathophysiology andpharmacotherapy of certain diseases.
C1201.3	Understand the adverse effects, contraindications and clinical uses of drugs used in treatment of diseases.
C1201.4	Understand the chemotherapystrategies ofvarious diseases in the human body.
C1201.5	Demonstrate the free radical pharmacology inthe treatment of diseases.

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Programme : I/II M.Pharmacy

Semester/Year of Study : II[nd] Semester

Branch : **Pharmacology**

Subject Name : Pharmacological Screening Methods & Toxicology

Subject code : **21S01202** T (Theory)

C1202.1	Describe the regulations and ethical requirement for the usage of experimentalanimals.
C1202.2	Describe the various animals used in the drugdiscovery process and good laboratory.
C1202.3	Reproduce the practices in maintenance andhandling of experimental animals.
C1202.4	Describe the various newer screening methodsinvolved in the drug discovery process.
C1202.5	Compare and correlate the preclinical data tohumans.

Programme : **I/II** M.Pharmacy

Semester/Year of Study : II[nd] Semester

Branch : **Pharmacology**

Subject Name : Principles of Drug Discovery

Subject code : **21S01203** T (Theory)

C1203.1	Explain the various stages of drug discovery.
C1203.2	Summarize the importance of the role of genomics, proteomics and bioinformatics in drug discovery.
C1203.3	Describe various targets for drug discovery.
C1203.4	Explain various lead seeking method and leadoptimization.
C1203.5	Memorize the importance of the role ofcomputer aided drug design in drug discovery.

Programme : I/II M.Pharmacy

Semester/Year of Study : II[nd] Semester

Branch : **Pharmacology**

Subject Name : Clinical research andPharmacovigilance

Subject code : **21S01204** T (Theory)

C1204.1	Understand the regulatory requirements forconducting clinical trial.
C1204.2	Describe the types of clinical trial designs.

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C1204.3	Discuss the responsibilities of key playersinvolved in clinical trials.
C1204.4	Explain the principles of Pharmacovigilance.
C1204.5	Detect new adverse drug reactions and theirassessment.

Programme : **I/II** M.Pharmacy

Semester/Year of Study : II[nd] Semester

Branch : **Pharmacology**

Subject Name : Advanced Pharmacology – II Lab

Subject code : **21S01205** L (Practical)

C1205.1	Isolation and identification of DNA from various sources like Bacteria, Cauliflower, onion and Goat liver.
C1205.2	Analysis of enzyme based *in-vitro* assays.
C1205.3	Examine DNA fragmentation assay by agarosegel electrophoresis.
C1205.4	Identify Enzyme inhibition and inductionactivity using virtual software's.

Programme : **I/II** M.Pharmacy

Semester/Year of Study : II[nd] Semester

Branch : **Pharmacology**

Subject Name : Pharmacological Screening Methods and Toxicology Lab

Subject code : **21S01206** L (Practical)

C1206.1	Recall the various newer screening methodsinvolved in the drug discovery process.
C1206.2	Identify and correlate the preclinical data tohumans.
C1206.3	Identify the regulations and ethical requirement for the usage of experimentalanimals.
C1206.4	List the various animals used in the drugdiscovery process and good laboratory.
C1206.5	Demonstrate the practices in maintenance andhandling of experimental animals.

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Programme	:	I/II M.Pharmacy
Semester/Year of Study	:	II[nd] Semester
Branch	:	**Pharmacology**
Subject Name	:	Pedagogy Studies
Subject code	:	**21DAC201a** T (Theory)

C201a.1	Recognize the theories underlyingmethodology, searching, and learning.
C201a.2	Describe the pedagogical approaches of teachers in formal and informal classrooms in developing countries practice.
C201a.3	Analysis of pedagogical practices effectiveness.
C201a.4	Describe the teacher's classroom professionaldevelopment in detail.
C201a.5	Determine and fill research gaps for futureresearch actions.

Programme	:	II/I M.Pharmacy
Semester/Year of Study	:	III[rd] Semester
Branch	:	**Pharmacology**
Subject Name	:	Research Methodology and Intellectual Property Rights
Subject code	:	**21DRM101** T (Theory)

CM101.1	Understand Research Problem formulation.
CM101.2	Analyze research Related information.
CM101.3	Follow research ethics.
CM101.4	Understand that today's world is controlled by computer, Information technology, but tomorrow world will be ruled by ideas, concept, and creativity.
CM101.5	Understand that when IPR would take suchimportant place in growth of individuals &nation, it is needless to emphasis the need of information about Intellectual Property Rightto be promoted among students in general &engineering in particular.
CM101.6	Understand that IPR protection provides an incentive to inventors for further research workand investment in R & D, which leads to creation of new and better products, and in turn brings about, economic growth and social benefits.

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Programme	:	II/I M.Pharmacy
Semester/Year of Study	:	III[rd] Semester
Branch	:	**Pharmacology**
Subject Name	:	Entrepreneurship Management
Subject code	:	**21SOE301c** T (Theory)

C204.1	To define enterprise, types of enterprises, government policies and schemes for enterprise development.
C204.2	To outline the process entrepreneurship development, interpersonal skills, creativity and factors affecting entrepreneur.
C204.3	To plan for launching an enterprise, its organization and SWOT analysis.
C204.4	To analyze the resources, raw materials, manpower, market and quality control of an enterprises.
C204.5	To appraise the performance, assessment of growth, networking and profitability of an enterprise.

Subject Name: ASSIGNMENTS Year of Study: 1[st]M.Pharmacy 1[st] and 2[nd] Semester	
C.1	To recall the fundamentals of proposed topic and carry out literature review.
C.2	To classify / compare, interpret the various methods and techniques.
C.3	To organize the collected data in chronological order and develop writing skills.
C.4	To analyze the data and interpret the relationships.
C.5	To evaluate and conclude the given topic.
C.6	To propose, design research in given concept and improve presentation skills.

Subject Name: SEMINARS Year of Study: 1[st]M.Pharmacy 1[st] and 2[nd] Semester	
C.1	To recall the fundamentals of proposed topic and carry out literature review.
C.2	To classify / compare, interpret the various methods and techniques.
C.3	To organize the collected data in chronological order and develop writing skills.
C.4	To analyze the data and interpret the relationships.
C.5	To evaluate and conclude the given topic.
C.6	To propose, design research in given concept and improve presentation skills.

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Subject Name: RESEARCH WORK I & II Year of Study: 2nd M.Pharmacy 3rd & 4th Semester	
C.1	To recall the fundamentals, carry out literature review on proposed research topic and identify research problem.
C.2	To outline the requirements toper form the proposed research.
C.3	To construct the research hypothesis.
C.4	To take part in research experiments meticulously and documentation as per format.
C.5	To evaluate and conclude the results using statistical analysis.
C.6	To appraise societal application and appreciation.

Subject Name: Co-Curricular activities Year of Study: 2nd M.Pharmacy 4th Semester	
C.1	To select the scientific concept based on literature and define the objectives ofresearch.
C.2	To outline the hypothesis and summarize the concept for presentation.
C.3	To plan for a meeting, discuss SOWT analysis, the design and methods usedin concept.
C.4	To analyze the variables and their inter relationships.
C.5	To conclude the results and to discuss its significance.
C.6	To appraise the concept for societal needs, acknowledge and improve presentation skills.

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M.PHARMACY PROGRAMME

PHARMACEUTICS

M.PHARMACY PROGRAMME – PHARMACEUTICS	
PROGRAMME OUTCOMES (PO's)	
PO 1	**Scientific knowledge**: To apply the scientific and technological principles to design, develop effective pharmaceutical dosage forms and drug delivery systems for better therapeutic results.
PO 2	**Technological applications**: To utilize technical knowledge and identify any factors affecting the quality of pharmaceutical production.
PO 3	**Modern tool usage:** Learn, select, apply appropriate methods, procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.
PO 4	**Entrepreneurship:** To understand the basics of establishing and management of pharmaceutical enterprise.
PO 5	**Practical skills:** To gain practical expertise in formulating and evaluating various novel drug release systems for minor ailments to major diseases.
PO6	**Applied science:** To employ contemporary scientific knowledge viz., pharmacology, biotechnology for designing disease-centric pharmaceuticals.
PO 7	**Computational and statistical methodologies:** Applying and utilizing the statistical tools with the aid of computer software to optimize the formulations.
PO 8	**Pharmaceutical ethics:** To respect personal values and apply ethical principles in professional and social contexts. Demonstrate behavior that recognizes cultural, 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.
PO 9	**Environment and sustainability:** To understand, protect and cooperate environmental concerns for sustaining biodiversity.
PO10	**Life-long learning:** To develop the habit of updating knowledge from time to time to meet industrial demands and social needs for having a fruitful career.

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M. PHARMACY PROGRAMME PHARMACEUTICS	
PROGRAMME EDUCATIONAL OBJECTIVES (PEO's)	
PEO 1	To impart sound pharmaceutical knowledge, scientific principles to make them ever-ready for producing quality, safety and effective pharmaceutical formulations.
PEO 2	To develop creative thinking, innovative strategies to overcome therapeutic challenges with customized medicines time to time for society.
PEO 3	To produce skilled pharmaceutical professionals, leaders, policy makers and entrepreneurs for building healthy nation.

M. PHARMACY PROGRAMME PHARMACEUTICS (MPH)	
PROGRAMME SPECIFIC OUTCOMES (PSO's)	
PSO 1	**Formulation strategies:** To impart practical knowledge, expertise to develop, design disease-centric formulations, targeting approaches using current, advanced scientific principles for better patient care and compliance.
PSO 2	**Emerging science:** To introduce knowledge about emerging cutting-edge technologies and their application in pharmaceutical field with better formulations for effective treatments.
PSO 3	**Computational literacy:** To demonstrate the use of artificial intelligence, computer programs or software applications useful in screening formulations, interpretation of experimental data and their validation.
PSO 4	**Pharmaceutical regulations:** To understand the objectives, roles, functions of various pharmaceutical regulatory bodies governing quality, safety and efficacy of pharmaceuticals from manufacturing to patient door.

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Programme	:	I/II M.Pharmacy
Semester/Year of Study	:	1st Semester
Branch	:	**Pharmaceutics**
Subject Name	:	Advanced Physical Pharmaceutics
Course code	:	21S03101 T (Theory)

C3101.1	Describe the particle size analysis method, solid dispersion,physics of tablets, polymerclassification and its applications.
C3101.2	Explain the stability calculations, shelf lifecalculations and accelerated stability studies.
C3101.3	Explain the rheology, absorption related toliquids and semi-solid dosage forms.
C3101.4	State the factors affecting the dissolution and solubility in related to *in-vitro/in-vivo*correlations.
C3101.5	To understand the various Stability testing methods follow the ICH Guidelines

Programme	:	I/II M.Pharmacy
Semester/Year of Study	:	1st Semester
Branch	:	**Pharmaceutics**
Subject Name	:	Modern Pharmaceutics-I
Course code	:	**21S03102 T** (Theory)

C3102.1	Explain the Preformulation parameters, apply ICH guidelines and evaluate drug, drug excipients compatibility.
C3102.2	Explain about formulation and development, useof excipients in various solid dosage form.
C3102.3	Describe the tablets, powders, micro-encapsulesand coating techniques.
C3102.4	Describe the capsules, advances in capsule manufacture, machines, processing and control including pharmaceutical aspects.
C3102.5	Apply the statistical design in differentformulations.

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Programme : I/II M.Pharmacy

Semester/Year of Study : 1st Semester

Branch : **Pharmaceutics**

Subject Name : Advanced Biopharmaceutics& Pharmacokinetics

Course code : **21S03103 T** (Theory)

C3103.1	Understand the various factors affecting drug absorption and apply the various regulations related to developing the BA-BE study protocol for the new drug molecule.
C3103.2	Determine the various pharmacokineticparameters from either plasma concentration or urinary excretion data of the drug following one and multi compartment models.
C3103.3	Determine the various pharmacokineticparameters of a drug after oral administration.
C3103.4	Summarize the concept of non-linear and clinicalpharmacokinetics and their significance.
C3103.5	Understand the various causes of thepharmacokinetics and drug interactions.

Programme : I/II M.Pharmacy

Semester/Year of Study : **Ist Semester**

Branch : **Pharmaceutics**

Course Name : Modern PharmaceuticalAnalytical Techniques Lab

Course code : 21S01105 (Lab)

C1105.1	Recall and relate the principle of spectroscopy, chromatography and other commonly usedinstrumental methods of analysis.
C1105.2	Train the students and to give hands on training on these Sophisticated instruments.
C1105.3	Perform quantitative & qualitative analysis ofdrugs using various analytical instruments like UV-visible and IR spectrophotometer and HPLC.
C1105.4	Plan and select lab experiments using appropriate analytical skills. Evaluate the quantity of a drug in a given formulation.
C1105.5	Practice them on solving spectral problems and generate a comprehensive analytical report on the findings.
C1105.6	Interpret spectra of UV-visible, IR, NMR andMass to identity the given compound.

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Programme	:	I/II M.Pharmacy
Semester/Year of Study	:	Ist Semester
Branch	:	**Pharmaceutics**
Subject Name	:	Modern Pharmaceutics – I Lab
Course code	:	**21S03104(Lab)**

C3104.1	Perform Preformulation studies for development of various dosage forms.
C3104.2	Perform the effect of compressional force on tablet disintegration time.
C3104.3	Perform the effect of particle size and binders on dissolution of tablets.
C3104.4	Compare the dissolution efficiency of various marketed pharmaceutical products.
C3104.5	Perform the Accelerated stability testing of different tablets.
C3104.6	Determine the beta cyclodextrin complexes of new drugs and rate order constants.

Programme	:	I M.Pharmacy
Semester/Year of Study	:	2nd Semester
Branch	:	**Pharmaceutics**
Subject Name	:	**Modern Pharmaceutics-II**
Course code	:	**21S03201** (Theory)

C3201.1	Understand the planning of pilot plant techniques used for all pharmaceutical dosage forms such as tablets, capsules, parenterals, aerosols, cosmetics and neutraceuticals.
C3201.2	Describe the formulation development of parenteral dosage forms.
C3201.3	Outline the principles and formulation aspects of various aerosol dosage forms.
C3201.4	Explain the principles and formulation aspects of cosmetics and neutraceuticals.
C3201.5	Understand the concept of aseptic processing and HVAC system.

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Programme : I/II M.Pharmacy

Semester/Year of Study : 2nd Semester

Branch : **Pharmaceutics**

Subject Name : **Advanced Drug Delivery System**

Course code : 21S03202 T (Theory)

C3202.1	Explain fundamentals of controlled drug deliverysystem.
C3202.2	Describe design, fabrication, evaluation andapplications of controlled drug delivery system.
C3202.3	Summarize on transdermal drug delivery system,ocular drug delivery system.
C3202.4	Explain bioadhesive drug delivery system andnasal drug delivery system.
C3202.5	Explain on vaccine delivery for immunization.
C3202.6	Generalize on liposomes, niosomes, microsphersand nanoparticles.

Programme : I/II M.Pharmacy

Semester/Year of Study : 2nd Semester

Branch : **Pharmaceutics**

Course Name : **Industrial Pharmacy**

Course code : **21S03203 T (Theory)**

C3203.1	Explain the machinery involved in mixing,milling, filtration and drying.
C3203.2	Describe packaging material constructions usedin the production of pharmaceutical materials.
C3203.3	Represent the salient features of GMP, TQMapplicable in industry.
C3203.4	Explain the effluent treatment and prevention ofpollution.
C3203.5	Evaluate the validation of analytical methodsand processes.

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Programme : **I/II M.Pharmacy**
Semester/Year of Study : **2nd Semester**
Branch : **Pharmaceutics**
Subject Name : Nano Drug Delivery System
Course code : **21S03204 T (Theory)**

C3204.1	Identify the right material for the nanoformulations
C3204.2	Apply the knowledge to develop nanoformulations with appropriate technologies.
C3204.3	Evaluate the product related test and foridentified diseases.
C3204.4	Understand the toxicological aspects of nanosized surfaces, particle size and stability for release of drugs.
C3205.1	Develop and evaluate mouth washes, cold cream, vanishing cream, calamine lotion, foundationcreams and cleansing creams.

Programme : I/II M.Pharmacy
Semester/Year of Study : 1st Semester
Branch : **Pharmaceutics**
Course Name : Modern Pharmaceutics – II Lab
Course code : **21S03205 (Lab)**

C3205.1	Develop and evaluate mouth washes, cold cream, vanishing cream, calamine lotion, foundationcreams and cleansing creams.
C3205.2	Design and evaluate antiseptic cream, Film coated tablets, floating, fast dissolving and chewable tablets.
C3205.3	Illustrate the effect of surfactants on drugrelease.
C3205.4	Develop and evaluate oral rehydration solution,calcium carbonate tablets

Programme : I/II M.Pharmacy
Branch : **Pharmaceutics**
Course Name : **Advanced Drug Delivery System Lab**
Course code : **21S03206 (Lab)**

C3206.1	Develop formulation and evaluate sustainedrelease oral matrix tablets.
C3206.2	Develop formulation and evaluate microspheres.
C3206.3	Develop formulation and evaluate transdermalfilms.
C3206.4	Develop formulation and evaluate mucoadhesive system.
C3206.5	Develop formulation and evaluate enteric coatedtablets.

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Programme : I/II M.Pharmacy

Branch : **Pharmaceutics**

Course Name : Padagogy Studies

Course code : **21DAC201a (Theory)**

C201a.1	Recognize the theories underlying methodology,searching and learning.
C201a.2	Describe the pedagogical approaches of teachersin formal and informal classrooms in developing countries practice.
C201a.3	Analysis of pedagogical practices effectiveness.
C201a.4	Describe the teacher's classroom professionaldevelopment in detail.
C201a.5	Determine and fill research gaps for futureresearch actions.

Programme : II /II M.Pharmacy

Semester/Year of Study : 3rd Semester

Branch : **Pharmaceutics**

Course Name : Research Methodology andIntellectual Property Rights

Course code : **21DRM101**

CM101.1	Understand Research Problem formulation.
CM101.2	Analyze research Related information.
CM101.3	Follow research ethics.
CM101.4	Understand that today's world is controlled bycomputer, Information technology, but tomorrow world will be ruled by ideas, concept, and creativity.
CM101.5	Understand that when IPR would take suchimportant place in growth of individuals &nation, it is needless to emphasis the need of information about Intellectual Property Right to be promoted among students in general &engineering in particular.
CM101.6	Understand that IPR protection provides an incentive to inventors for further research work and investment in R & D, which leads to creation of new and better products, and in turn brings about, economic growth and social benefits.

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M.PHARMACY PROGRAMME
PHARMACEUTICAL ANALYSIS

M.PHARMACY PROGRAMME – PHARMACEUTICAL ANALYSIS

PROGRAMME OUTCOMES (PO's)	
PO 1	**Analytical Knowledge:** Acquire knowledge on various chromatographic and spectroscopic techniques and differentiate with volumetric analysis.
PO 2	**Analytical Reasoning:** To categorize assumptions and disclose the data according to guidelines.
PO 3	**Problem Solving:** To utilize the principles of analytical techniques with clear and critical thinking, while solving problems and making decisions. Find, analyze, evaluate and apply information systematically and shall make defensible decisions.
PO 4	**Modern Techniques:** To learn, choose and apply appropriate hyphenated methods and procedures and related computing tools with thoughtfulness of their applications.
PO 5	**Experimental Ethics:** To believe and follow ethics and guidelines specified by the regulatory authorities of various countries and Government of India for good laboratory practice.
PO 6	**Interdisciplinary Commitment:** To acquire skill oriented practical ability and utilize the needs of pharmacy in all other programmes to emerge as potent researcher.
PO 7	**Professional Identity:** To be committed and responsible person to play a proactive role with loyalty to community and to empower society.
PO 8	**Statistical Skills:** To apply and evaluate quantitative metrics to gain safety data on dosage and also to compare the effectiveness among different marketed formulations.
PO 9	**Rational Flexibility:** To engage in critical and logical thinking and to gain an overall knowledge in developing newer methods, impurity profiling and validation protocols those are useful in routine and laboratory purpose.
PO 10	**Environment and Sustainability:** To understand the level of biohazardous solvents and chemicals in relation to environmental contexts and sustainable development.
PO 11	**Lifelong Learning:** Understand and apply the concepts in day to day life activities for the benefit of self and for the welfare of society.

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M.PHARMACY PROGRAMME – PHARMACEUTICAL ANALYSIS

PROGRAMME EDUCATIONAL OBJECTIVES (PEO's)	
PEO1	**Erudition:** Program encompasses the students with profound functional knowledge in core subjects of pharmaceutical Analysis. This enables students to understand the basics of analytical methods to test the drug molecules. This will also enable students to learn the basic theory of analytical tools.
PEO2	**Substantive skills:** To provide students with a strong foundation of analytical aspects such as handling of instruments, principles, method development, method validation, testing of samples and report the results accurately.
PEO3	**Breadth:** To train students to understand different hyphenated techniques and apply them practically. To train the students to understand different bio-analytical methods and analyze the bio-analytical samples.
PEO4	**Analytical skills:** Implementation of innovative teaching learning methodologies with visual aids/ computer aided tools empowers the students in understanding the concepts with clarity and transparency. Students are trained in handling of software's to report the results in a transparent manner.
PEO5	**Personal Attribute:** To inculcate in students professional and ethical attitude, effective communication skills, teamwork skills, multidisciplinary approach and an ability to relate Pharmaceutical and Health care issues to broader social context.

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M.PHARMACY PROGRAMME – PHARMACEUTICAL ANALYSIS

PROGRAMME SPECIFIC OUTCOMES (PSO's)	
PSO1	To deal with various hyphenated instrumental techniques for identification, characterization and quantification of drugs.
PSO2	To provide studies on drug bioavailability, pharmacodynamics, cell culture techniques and ensure the efficacy and safety use of herbal medicine according to AYUSH guidelines.
PSO3	To understand calibration, validation methodologies and their applications in industry.
PSO4	To determine the assay of drugs by spectroscopical and chromatographical methods and preservatives in food and food products.
PSO5	To understand quality assurance aspects of pharmaceutical industries such as cGMP, documentation, certification, GLP and other regulatory guidelines.
PSO6	To create a talent pool by involving students in research projects under the guidance of faculty and for publishing their research work.
PSO7	To impart knowledge about extraction and separation of drugs from biological samples by different analytical techniques.
PSO8	To deal with detection of impurities in pharmaceutical formulations and development of protocol for stability testing of products.

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Programme	:	I/II M.Pharmacy
Semester/Year of Study	:	1st Semester
Branch	:	**Pharmaceutical Analysis**
Course Name	:	Modern Pharmaceutical Analytical Techniques
Course code	:	21S01101 T (Theory)

C101.1	To recall selected instrumental analytical techniques (spectroscopic, chromatographic, electrochemical methods) and relate with volumetric analysis.
C101.2	To gain knowledge on interaction of EMR with matter, affinity of matter with stationary phase and mobile phase, physical and chemical changes of matter on heating, potential differences in different aqueous and organic solution.
C101.3	To build the analytical understanding in the level of ion, atom, group and molecular structure of organic and inorganic compounds with different functional groups and their applications in pharmacy.
C101.4	To categorize different organic and inorganic compounds using suitable spectroscopy, chromatography, electrophoresis, thermal and immuno assay.
C101.5	To elaborate principle, theory and instruments employed for the analysis of drugs.
C101.6	To maximize knowledge of electrophoresis, immunological, thermal and X-Ray crystallographic techniques.

Programme	:	I/II M.Pharmacy
Semester/Year of Study	:	1st Semester
Branch	:	**Pharmaceutical Analysis**
Course Name	:	Advanced Pharmaceutical Analysis
Course code	:	21S07101 T (Theory)

C102.1	To learn the impurity and stability studies in API'S and new drug products.
C102.2	To understand the classification and quantification procedures as ICH.
C102.3	To illustrate the identification of elemental impurities, analytical procedures, instrumentation, C, H, N & S analysis and stability testing protocols as per ICH.
C102.4	To explain impurity profiling, degradant characterization as per ICH and WHO and also stability guidelines for biological products as per ICH.
C102.5	To evaluate the testing of phytopharmaceuticals as per regulatory requirements including finger printing interactions.

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Programme	:	I/II M.Pharmacy
Semester/Year of Study	:	1st Semester
Branch	:	**Pharmaceutical Analysis**
Course Name	:	Pharmaceutical & Food Analysis
Course code	:	21S07102 T (Theory)

C104.1	To recall the knowledge on analysis of primary metabolites
C104.2	To discuss skill oriented approach on analytical techniques in the determination of food additives
C104.3	To produce awareness on natural products and its applications
C104.4	To analyze the traces of pesticides in various products
C104.5	To explain legislation and regulations of analysis of food products
C104.6	To get aware of analytical procedures of milk products and fermentation products

Programme	:	I/II M.Pharmacy
Semester/Year of Study	:	1st Semester
Branch	:	**Pharmaceutical Analysis**
Course Name	:	Quality Control and Quality Assurance
Course code	:	21S07103 T (Theory)

C203.1	To remember the quality assurance, quality management concepts and quality control tests.
C203.2	To create the document maintenance in industry with required regulatory body guidelines, to analyze the complaints and documents maintenance in industry.
C203.3	To understand the good laboratory practice and GMP concepts as per ICH
C203.4	To analyze the raw materials, finished product, packaging materials as per IP, USP, BP and to check for the compliance
C203.5	To evaluate the organization and personal responsibilities as per USFDA and WHO
C203.6	To discuss the manufacturing operations and controls of pharmaceutical products and documentation

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Programme	:	M.Pharmacy
Semester/Year of Study	:	Ist Semester
Branch	:	**Pharmaceutical Analysis**
Subject Name	:	Modern Pharmaceutical Analytical Techniques Lab
Subject code	:	21S01105 L (Practical)

C1105.1	Recall and relate the principle of spectroscopy, chromatography and other commonly usedinstrumental methods of analysis.
C1105.2	Train the students and to give hands ontraining on these sophisticated instruments.
C1105.3	Perform quantitative & qualitative analysis ofdrugs using various analytical instruments like UV-visible and IR spectrophotometer andHPLC.
C1105.4	Plan and select lab experiments using appropriate analytical skills. Evaluate thequantity of a drug in a given formulation.
C1105.5	Practice them on solving spectral problems andgenerate a comprehensive analytical report on the findings.
C1105.6	Interpret spectra of UV-visible, IR, NMR andMass to identity the given compound.

Programme	:	I/II M.Pharmacy
Semester/Year of Study	:	1st Semester
Branch	:	**Pharmaceutical Analysis**
Course Name	:	Pharmaceutical & Food Analysis Lab
Course code	:	21S07104 L (Practical)

C104.1	To recall the knowledge on analysis of primary metabolites
C104.2	To discuss skill oriented approach on analytical techniques in the determination of food additives
C104.3	To produce awareness on natural products and its applications
C104.4	To analyze the traces of pesticides in various products
C104.5	To explain legislation and regulations of analysis of food products
C104.6	To get aware of analytical procedures of milk products and fermentation products

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C201.4	To illustrate principle, theory and instruments employed for the analysis of drugs
C201.5	To evaluate the drugs using conventional and hyphenated instrumental techniques
C201.6	To maximize the knowledge on interpretation of spectra for structural analysis

Programme : I/II M.Pharmacy

Semester/Year of Study : 2nd Semester

Branch : **Pharmaceutical Analysis**

Course Name : Modern Bio-Analytical Techniques

Course code : 21S07202 T (Theory)

C202.1	To list out the various extraction procedures and bioavailability studies.
C202.2	To explain various extraction principle and procedures involved in bioanalytical method, its validation according to USFDA and EMEA guidelines and biopharmaceutical considerations.
C202.3	To illustrate biopharmaceutics classification system, pharmaco-kinetics and toxicokinetics studies.
C202.4	To explain different cell culture and metabolite identification techniques and regulatory perspectives in assay of drugs.
C202.5	To elucidate drug product performance, *in-vivo* bioavailability and bioequivalence studies and their clinical significance.
C202.6	To create the knowledge on bioavailability and bioequivalence studies in accordance to regulatory guidelines.

Programme : I/II M.Pharmacy

Semester/Year of Study : 2nd Semester

Branch : **Pharmaceutical Analysis**

Course Name : Pharmaceutical Validation

Course code : 21S0E301a T (Theory)

C301.1a	To remember the validation, qualification, concepts and understand the qualification parameters.
C301.2a	To understand and apply the qualification of analytical instruments.
C301.3a	To demonstrate the water systems in pharmaceutical industry.

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Programme	:	M.Pharmacy
Semester/Year of Study	:	I[st] Semester
Branch	:	**Pharmaceutical Analysis**
Subject Name	:	Disaster Management
Subject code	:	21DAC101b T (Theory)

C101b.1	Analyze the vulnerability of an area to natural and man-made disasters/hazards as per the guidelines to solve complex problems using appropriate techniques ensuring safety, environment and sustainability.
C101b.2	Propose appropriate mitigation strategies for earthquake and tsunami impacts as per code of practice using suitable techniques ensuring safety, environment and sustainability beside communicatingeffectively in graphical form.
C101b.3	Analyze the causes and impacts of floods,cyclones and droughts using appropriate tools and techniques and suggest mitigation measures ensuring safety, environment and sustainability besides communicatingeffectively in graphical form.
C101b.4	Analyze the causes and impacts of landslides using appropriate tools and techniques and suggest mitigation measures ensuring safety, environment and sustainability.
C101b.5	Design disaster management strategies to solve pre, during and post disaster problems using appropriate tools and techniques following the

Programme	:	I/II M.Pharmacy
Semester/Year of Study	:	2[nd] Semester
Branch	:	**Pharmaceutical Analysis**
Course Name	:	Advanced Instrumental Analysis
Course code	:	21S07201 T (Theory)

C201.1	To recall selected instrumental analytical techniques and immobilized polysaccharide chiral stationary phases
C201.2	To gain knowledge on affinity of matter with stationary phase and mobile phase in different chromatographic techniques and capillary electrophoresis
C201.3	To explain the instrumentation of mass and NMR and their hyphenated techniques with applications

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C301.4a	To explain the validation parameters according to ICH and USP.
C301.5a	To evaluate the cleaning of equipment's as per ICH cleaning validation protocol.
C301.6a	To formulate the IPR concepts as per present industry scenario

Programme : I/II M.Pharmacy

Semester/Year of Study : 2nd Semester

Branch : **Pharmaceutical Analysis**

Course Name : Herbal and Cosmetic Analysis

Course code : 21S07203 T (Theory)

C204.1	To recall the efficacy, validation, pharmacodynamics and pharmacokinetic concerned with herbal medicine products.
C204.2	To develop the skills for the detection of adulteration in herbal drugs and identification of drugs
C204.3	To choose WHO and AYUSH guidelines in quality assessment of herbal drugs
C204.4	To analyze the natural products and drugs using modern analytical instruments and study their monographs in pharmacopoeias
C204.5	To explain the safety monitoring of herbal medicine and reporting bio-drug adverse reactions
C204.6	To evaluate and analyze the herbal cosmetic products including the raw materials and finished products

Programme : I/II M.Pharmacy

Semester/Year of Study : 2nd Semester

Branch : **Pharmaceutical Analysis**

Course Name : Advanced Instrumental Analysis Lab

Course code : 21S07204 L (Practical)

C204.1	To recall selected instrumental analytical techniques and immobilized polysaccharide chiral stationary phases
C204.2	To gain knowledge on affinity of matter with stationary phase and mobile phase in different chromatographic techniques and capillary electrophoresis
C204.3	To explain the instrumentation of mass and NMR and their hyphenated techniques with applications

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C204.4	To illustrate principle, theory and instruments employed for the analysis of drugs
C204.5	To evaluate the drugs using conventional and hyphenated instrumental techniques
C204.6	To maximize the knowledge on interpretation of spectra for structural analysis

Programme : I/II M.Pharmacy
Semester/Year of Study : 2nd Semester
Branch : **Pharmaceutical Analysis**
Course Name : Modern Bio-Analytical Techniques Lab
Course code : 21S07205 L (Practical)

C205.1	To list out the various extraction procedures and bioavailability studies.
C205.2	To explain various extraction principle and procedures involved in bioanalytical method, its validation according to USFDA and EMEA guidelines and biopharmaceutical considerations.
C205.3	To illustrate biopharmaceutics classification system, pharmaco-kinetics and toxicokinetics studies.
C205.4	To explain different cell culture and metabolite identification techniques and regulatory perspectives in assay of drugs.
C205.5	To elucidate drug product performance, *in-vivo* bioavailability and bioequivalence studies and their clinical significance.
C205.6	To create the knowledge on bioavailability and bioequivalence studies in accordance to regulatory guidelines.

Programme : M.Pharmacy
Semester/Year of Study : IInd Semester
Branch : **Pharmaceutical Analysis**
Subject Name : Pedagogy Studies
Subject code : 21DAC201a T (Theory)

C201a.1	Recognize the theories underlyingmethodology, searching, and learning.
C201a.2	Describe the pedagogical approaches of teachers in formal and informal classrooms in developing countries practice.
C201a.3	Analysis of pedagogical practices effectiveness.

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C201a.4	Describe the teacher's classroom professionaldevelopment in detail.
C201a.5	Determine and fill research gaps for futureresearch actions.

Programme : M.Pharmacy

Semester/Year of Study : III[rd] Semester

Branch : **Pharmaceutical Analysis**

Subject Name : Research Methodology and Intellectual Property Rights

Subject code : 21DRM101 T (Theory)

CM101.1	Understand Research Problem formulation.
CM101.2	Analyze research Related information.
CM101.3	Follow research ethics.
CM101.4	Understand that today's world is controlled by computer, Information technology, but tomorrow world will be ruled by ideas, concept, and creativity.
CM101.5	Understand that when IPR would take suchimportant place in growth of individuals &nation, it is needless to emphasis the need of information about Intellectual Property Rightto be promoted among students in general &engineering in particular.
CM101.6	Understand that IPR protection provides an incentive to inventors for further research workand investment in R & D, which leads to creation of new and better products, and in turn brings about, economic growth and social benefits.

Programme : M.Pharmacy

Semester/Year of Study : III[rd] Semester

Branch : **Pharmaceutical Analysis**

Subject Name : **Biological Screening Methods**

Subject code : 21S0E301d T (Theory)

CM301.1d	Students will be able to appraise the regulations and ethical requirement for the usage of experimental animals
CM301.2d	Students will be able to describe the various animals used in the drug discovery process
CM301.3d	Students will be able to describe good laboratory practices in maintenance and handling of experimental animals

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CM301.4 d	Students will be able to describe the various newer pre-clinical screening methods involved in the drug discovery process
CM301.5 d	Students will be able to appreciate and correlate the preclinical data to humans

Subject Name: ASSIGNMENTS Year of Study: 1stM.Pharmacy 1st 2nd and 3rd Semester	
C.1	To recall the fundamentals of proposed topic and carry out literature review.
C.2	To classify / compare, interpret the various methods and techniques.
C.3	To organize the collected data in chronological order and develop writing skills.
C.4	To analyze the data and interpret the relationships.
C.5	To evaluate and conclude the given topic.
C.6	To propose, design research in given concept and improve presentation skills.

Subject Name: SEMINARS Year of Study: 1stM.Pharmacy 1st and 2nd Semester	
C.1	To recall the fundamentals of proposed topic and carry out literature review.
C.2	To classify / compzare, interpret the various methods and techniques.
C.3	To organize the collected data in chronological order and develop writing skills.
C.4	To analyze the data and interpret the relationships.
C.5	To evaluate and conclude the given topic.
C.6	To propose, design research in given concept and improve presentation skills.

Subject Name: Co-Curricular activities Year of Study: 2ndM.Pharmacy 4th Semester	
C.1	To select the scientific concept based on literature and define the objectives of research.
C.2	To outline the hypothesis and summarize the concept for presentation.
C.3	To plan for a meeting, discuss SOWT analysis, the design and methods used in concept.
C.4	To analyze the variables and their inter relationships.
C.5	To conclude the results and to discuss its significance.
C.6	To appraise the concept for societal needs, acknowledge and improve presentation skills.

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	Subject Name: RESEARCH WORK I & II Year of Study: 2nd M.Pharmacy 3rd & 4th Semester
C.1	To recall the fundamentals, carry out literature review on proposed research topic and identify research problem.
C.2	To outline the requirements toper form the proposed research.
C.3	To construct the research hypothesis.
C.4	To take part in research experiments meticulously and documentation as per format.
C.5	To evaluate and conclude the results using statistical analysis.
C.6	To appraise societal application and appreciation.

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M.PHARMACY PROGRAMME

PHARMACEUTICAL REGULATORY AFFAIRS

PHARMACEUTICAL REGULATORY AFFAIRS	
PROGRAMME OUTCOMES (PO's)	
PO1	**Regulatory Knowledge:** Possess knowledge, comprehension of the core and basic knowledge associated with the profession of Pharmaceutical Regulatory Sciences, including drug development process, dossier preparation, good manufacturing practices, clinical trials and human research.
PO2	**Planning Abilities:** Demonstrate effective planning abilities and elements that are necessary to accumulate the regulatory submissions including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.
PO3	**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 while reviewing and submission of dossiers to regulatory markets.
PO4	**Modern tool usage:** Learn, select, and apply appropriate methods and procedures, resources and modern regulatory-related computing tools with an understanding of their limitations.
PO5	**Collaboration and Team Work:** Understand and consider the human reaction to change, motivation, issues, leadership and team-building when planning changes required for fulfilment of practice, professional and societal responsibilities which also includes interpersonal skills, knowledge sharing and strategy in between members of a virtual team.
PO6	**Ethics:** Use ethical frameworks, apply ethical principles while making decisions and take responsibility for the outcomes associated with the decisions in clinical research and clinical investigations.
PO7	**Regulatory Professional:** Understand, analyze and communicate the value of their professional roles in society and business development and be reliable with critical thinking and regulatory writing skills.

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PO8	**Cross Cultural Communication:** Appreciation of and ability to learn from and work with people from diverse linguistic and cultural backgrounds. It should emphasize how regulatory strategy increases a products chance of entering a market and staying there. Once cross-functional teams understand regulatory strategy and its importance in product development and inter-team communication.
PO9	**Initiative and Entrepreneurialism:** Individual's ability to turn ideas into practice. Like finding new opportunities to share information and concepts. Generating options and solutions to cope with changes. It involves imagination, novelty and risk-taking, as well as the ability to plan and manage projects in order to achieve objectives.
PO10	**Creativity and Innovation:** Function of knowledge, curiosity, imagination, and evaluation. The greater individual knowledge base and level of curiosity, the more ideas, patterns, and combinations will achieve, which then correlates to creating new and innovative products and services.
PO11	**Lifelong 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- access and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis.

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PHARMACEUTICAL REGULATORY AFFAIRS	
PROGRAMME EDUCATIONAL OBJECTIVES (PEO's)	
PEO1	**Cognition:** Program encompasses the students with profound functional knowledge in core subjects of pharmaceutical regulatory sciences. This enables students to understand the basics of regulatory compilation, create and assemble the regulation submission as per the requirements of regulatory agencies and be competent enough and apply these tools in pharmaceutical and health care industries, research, clinical laboratories, hospitals and community pharmacies for overall maintenance of public health.
PEO2	**Core competence:** To provide students with a strong foundation of regulatory and compliance elements with respect to Good Manufacturing Practices, Good Laboratory Practices, Good Automated Laboratory Practices and Good Documentation Practices as well as prepare for the readiness and conduct of audits and inspections.
PEO3	**Amplitude:** To train students for understanding different acts and guidelines that regulate Drugs & Cosmetics, Medical devices, Biologicals, Herbals and Food & Nutraceuticals industries as well as comprehend the approval process and regulatory requirements for pharmaceutical products in different regulatory markets.
PEO4	**Technicality:** Implementation of innovative teaching learning methodologies with visual aids/ computer aided tools to empower the students in understanding the concepts with clarity and transparency. Students are trained in handling regulatory software's like e-CTD and in their troubleshooting procedures, problem-based learning which makes them to apply the learned theoretical concepts to real time applications and meet the current pharmaceutical industrial demand in regulatory market.
PEO5	**Adroitness:** To inculcate in students professional and ethical attitude, effective communication skills, teamwork skills, multidisciplinary approach and an ability to relate Pharmaceutical, Health care issues to broader social context.

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PHARMACEUTICAL REGULATORY AFFAIRS

PROGRAM SPECIFIC OUTCOMES (PSO's)	
PSO1	Gain the respective background information, regulatory framework and necessary resources to understand how pharmaceutical products are regulated in different countries and how regulatory affairs professionals can help organizations navigate through regulatory obstacles.
PSO2	Apply the relevant regulations, policies, guidance documents as well as important initiatives with respect to pharmaceuticals, biologicals, natural health products and various other therapeutic products.
PSO3	The course also helps students to discuss on how regulatory affairs professionals add value to various organizations and opportunities available within the industry.
PSO4	Students able to develop and enhance communication skills, including verbal, nonverbal and written which is essential in professional environments of regulatory affairs. Students learn proper writing, editing and comprehension strategies.
PSO5	Students gain knowledge of project management processes and their application to regulatory submissions. This course equips students with skills necessary for global regulatory submissions, from selection of submission type to planning and preparing such submissions for review by respective regulatory agencies.
PSO6	Students become familiar with the legislative framework and regulations that guide the selection and designation of medical products globally. Case studies are used to provide practical experience in applying international regulations and legislations, including EU and US. Students are also introduced to softwares commonly used in the regulatory affairs field.

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Programme	:	I/II M.Pharmacy
Semester/Year of Study	:	1st Semester
Branch	:	**Pharmaceutical Regulatory Affairs**
Course Name	:	Good Regulatory Practices
Course code	:	21S11101 T (Theory)

C101.1	To recall the concepts of current Good Manufacturing Practices (cGMP) and Global Harmonization Task Force (GHTF) official guidelines for medical devices.
C101.2	To Illustrate the concepts of Good Laboratory Practices and its regulations including ISO and QCI standards.
C101.3	To make use of the Good Automated Laboratory Practices and its requirements as per US FDA and other regulatory guidelines like ISO and QCI.
C101.4	To explain the Good Distribution Practices which involves personnel, self-inspection, document handling and following its relevant guidelines as per WHO, ISO and CDSCO.
C101.5	To summarize the concepts and process of Quality Management System and its guidelines provided by ICH, ISO and CDSCO.

Programme	:	I/II M.Pharmacy
Semester/Year of Study	:	1st Semester
Branch	:	**Pharmaceutical Regulatory Affairs**
Course Name	:	Drug Regulatory Affairs
Course code	:	21S11102 T (Theory)

C102.1	To recall the documentation in pharmaceutical industries and its plan to product development and to learn preparing documents like SMF and DMF.
C102.2	To outline the process and preparation of regulatory dossier and its online submission by following ICH e-CTD guidelines and other guidelines like ACTD etc.
C102.3	To utilize the concepts of audits and its different types, preparing the reports and maintaining the audit timelines as well as referring the ISO and GHTF guidance documents.
C102.4	To evaluate the reports of Regulatory Inspections and understanding the concepts of Root cause analysis and CAPA.
C102.5	To adapt the product life cycle management and other concepts like PAS, SUPAC, CBE-30 and EIR including ISO risk management standards.

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Programme : I/II M.Pharmacy

Semester/Year of Study : 1st Semester

Branch : **Pharmaceutical Regulatory Affairs**

Course Name : Total Quality Management

Course code : 21S11103 T (Theory)

C103.1	To understand the importance of quality
C103.2	To understand ISO management systems
C103.3	To understand Tools for quality improvement
C103.4	To know Analysis of issues in quality
C103.5	To explain Quality evaluation of pharmaceuticals, Stability testing of drug and drug substances and statistical approaches for quality

Programme : I/II M.Pharmacy

Semester/Year of Study : 1st Semester

Branch : **Pharmaceutical Regulatory Affairs**

Course Name : Documentation and Regulatory writing

Course code : **21S11104** T (Theory)

C104.1	To recall the documentation in pharmaceutical industries and its plan to product development and to learn preparing documents like SMF and DMF.
C104.2	To outline the process and preparation of regulatory dossier and its online submission by following ICH e-CTD guidelines and other guidelines like ACTD etc.
C104.3	To utilize the concepts of audits and its different types, preparing the reports and maintaining the audit timelines as well as referring the ISO and GHTF guidance documents.
C104.4	To evaluate the reports of Regulatory Inspections and understanding the concepts of Root cause analysis and CAPA.
C104.5	To adapt the product life cycle management and other concepts like PAS, SUPAC, CBE-30 and EIR including ISO risk management standards.

Programme : I/II M.Pharmacy

Semester/Year of Study : 1st Semester

Branch : **Pharmaceutical Regulatory Affairs**

Course Name : Good Regulatory Practices Lab

Course code : 21S11105 L (Practical)

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C105.1	To recall the concepts of current Good Manufacturing Practices (cGMP) and Global Harmonization Task Force (GHTF) official guidelines for medical devices.
C105.2	To Illustrate the concepts of Good Laboratory Practices and its regulations including ISO and QCI standards.
C105.3	To make use of the Good Automated Laboratory Practices and its requirements as per US FDA and other regulatory guidelines like ISO and QCI.
C105.4	To explain the Good Distribution Practices which involves personnel, self-inspection, document handling and following its relevant guidelines as per WHO, ISO and CDSCO.
C105.5	To summarize the concepts and process of Quality Management System and its guidelines provided by ICH, ISO and CDSCO.

Programme : I/II M.Pharmacy

Semester/Year of Study : 1st Semester

Branch : **Pharmaceutical Regulatory Affairs**

Course Name : Drug Regulatory Affairs Lab

Course code : 21S11106 L (Practical)

C106.1	To recall the documentation in pharmaceutical industries and its plan to product development and to learn preparing documents like SMF and DMF.
C106.2	To outline the process and preparation of regulatory dossier and its online submission by following ICH e-CTD guidelines and other guidelines like ACTD etc.
C106.3	To utilize the concepts of audits and its different types, preparing the reports and maintaining the audit timelines as well as referring the ISO and GHTF guidance documents.
C106.4	To evaluate the reports of Regulatory Inspections and understanding the concepts of Root cause analysis and CAPA.
C106.5	To adapt the product life cycle management and other concepts like PAS, SUPAC, CBE-30 and EIR including ISO risk management standards.

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Programme	:	M.Pharmacy
Semester/Year of Study	:	I[st] Semester
Branch	:	**Pharmaceutical Regulatory Affairs**
Subject Name	:	Disaster Management
Subject code	:	21DAC101b T (Theory)

C101b.1	Analyze the vulnerability of an area to natural and man-made disasters/hazards as per the guidelines to solve complex problems using appropriate techniques ensuring safety, environment and sustainability.
C101b.2	Propose appropriate mitigation strategies for earthquake and tsunami impacts as per code of practice using suitable techniques ensuring safety, environment and sustainability beside communicatingeffectively in graphical form.
C101b.3	Analyze the causes and impacts of floods,cyclones and droughts using appropriate tools and techniques and suggest mitigation measures ensuring safety, environment and sustainability besides communicatingeffectively in graphical form.
C101b.4	Analyze the causes and impacts of landslides using appropriate tools and techniques and suggest mitigation measures ensuring safety, environment and sustainability.
C101b.5	Design disaster management strategies to solve pre, during and post disaster problems using appropriate tools and techniques following the

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Programme	:	I/II M.Pharmacy
Semester/Year of Study	:	2nd Semester
Branch	:	**Pharmaceutical Regulatory Affairs**
Course Name	:	Regulatory aspects of Drugs & Cosmetics
Course code	:	T (Theory)

C104.1	To recall the acts and rules related to drugs, biologicals, herbals and nutraceuticals.
C104.2	To explain the guidelines and standards for regulatory filing of Drugs & Cosmetics, Medical Devices, Biologicals & Herbals and Food & Nutraceuticals
C104.3	To compare the Indian Pharmacopoeial, BIS, ISO and other relevant standards
C104.4	To interpret the Bioavailability & Bioequivalence data, Guidelines for Drug testing in animals, humans and ICMR-DBT Guidelines for Stem Cell Research
C104.5	To discuss the concepts of intellectual property rights and comparing IPR vs Regulatory affairs

Programme	:	I/II M.Pharmacy
Semester/Year of Study	:	2nd Semester
Branch	:	**Pharmaceutical Regulatory Affairs**
Course Name	:	Regulatory aspects of Herbals and Biologicals
Course code	:	21S11202 T (Theory)

C202.1	Recognize the regulation for newly developed biologics and biosimilars.
C202.2	Explain the pre-clinical and clinical development considerations of biologics.
C202.3	Discuss the regulatory requirements of blood and/or its components including blood products and label requirements.
C202.4	Set up the quality and safety of herbal products.
C202.5	Describe the regulatory requirements for biologics and vaccines.
C202.6	Describe the regulatory requirements for the herbal products.

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Programme	:	I/II M.Pharmacy
Semester/Year of Study	:	2nd Semester
Branch	:	**Pharmaceutical Regulatory Affairs**
Course Name	:	Regulatory Aspects of Medical devices
Course code	:	21S11203 T (Theory)

C203.1	To relate the Medical Devices and its risk-based classification along with history of MD and guidance documents of IMDRF like STED andGMDN.
C203.2	To recall the ethics in clinical investigations of medical Devices and its quality related guidelines by ISO.
C203.3	To identify the regulatory approval process and marketing of medical devices in US by following US FDA official guidance documents.
C203.4	To discuss the regulatory approval process and marketing of medical devices in EU by following EMA official guidance documents
C203.5	To compare the regulatory approval process and marketing of medicaldevices in ASEAN countries like china & Japan by following their own countries guidance documents.

Programme	:	I/II M.Pharmacy
Semester/Year of Study	:	2nd Semester
Branch	:	**Pharmaceutical Regulatory Affairs**
Course Name	:	Regulatory Aspects of Food &Nutraceuticals
Course code	:	21S11204 T (Theory)

C204.1	To define the concepts related to Nutraceuticals and its opportunities in Nutraceutical market.
C204.2	To illustrate the global aspects of Nutraceuticals and its guidelines provided by WHO and NSF Internationals.
C204.3	To identify the regulatory approval process of Nutraceuticals and its market regulations in INDIA with reference to RDA.
C204.4	To explain the regulatory approval process of Nutraceuticals and its market regulations in USA with reference to RDA.
C204.5	To acquire the regulatory approval process of Nutraceuticals and its market regulations in EU with reference to RDA.

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Programme	:	I/II M.Pharmacy
Semester/Year of Study	:	2nd Semester
Branch	:	**Pharmaceutical Regulatory Affairs**
Course Name	:	Regulatory aspects of Drugs & Cosmetics
Course code	:	21S11205 P (Practical)

C205.1	To find case studies of change controls, deviations and CAPA in pharmaceutical industries.
C205.2	To Illustrate the preparation of submission through eCTD software for FDA, EMA and MHRA.
C205.3	To compare the drug registration requirements procedures for different regulatory and emerging market countries for marketing authorization.
C205.4	To assess the checklist for different pharmaceutical products for regulatory submissions.
C205.5	To design applications and clinical investigation plans for Medical devices and its facilities.

Programme	:	I/II M.Pharmacy
Semester/Year of Study	:	2nd Semester
Branch	:	**Pharmaceutical Regulatory Affairs**
Course Name	:	Regulatory Aspects of Medical devices Lab
Course code	:	21S11206 P (Practical)

C206.1	To relate the Medical Devices and its risk-based classification along with history of MD and guidance documents of IMDRF like STED andGMDN.
C206.2	To recall the ethics in clinical investigations of medical Devices and its quality related guidelines by ISO.
C206.3	To identify the regulatory approval process and marketing of medical devices in US by following US FDA official guidance documents.

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C206.4	To discuss the regulatory approval process and marketing of medical devices in EU by following EMA official guidance documents.
C206.5	To compare the regulatory approval process and marketing of medicaldevices in ASEAN countries like china & Japan by following their own countries guidance documents.

Programme : M.Pharmacy

Semester/Year of Study : II[nd] Semester

Branch : **Pharmaceutical Regulatory Affairs**

Subject Name : Pedagogy Studies

Subject code : 21DAC201a T (Theory)

C201a.1	Recognize the theories underlyingmethodology, searching, and learning.
C201a.2	Describe the pedagogical approaches of teachers in formal and informal classrooms in developing countries practice.
C201a.3	Analysis of pedagogical practices effectiveness.
C201a.4	Describe the teacher's classroom professionaldevelopment in detail.
C201a.5	Determine and fill research gaps for futureresearch actions.

Programme : M.Pharmacy

Semester/Year of Study : III[rd] Semester

Branch : **Pharmaceutical Regulatory Affairs**

Subject Name : Research Methodology and Intellectual Property Rights

Subject code : 21DRM101 T (Theory)

CM101.1	Understand Research Problem formulation.
CM101.2	Analyze research Related information.
CM101.3	Follow research ethics.
CM101.4	Understand that today's world is controlled by computer, Information technology, but tomorrow world will be ruled by ideas, concept, and creativity.
CM101.5	Understand that when IPR would take suchimportant place in growth of individuals &nation, it is needless to emphasis the need of information about Intellectual Property Rightto be promoted among students in general &engineering in particular.
CM101.6	Understand that IPR protection provides an incentive to inventors for further research workand investment in R & D, which leads to creation of new and better products, and in turn brings about, economic growth and social benefits.

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Programme	:	II/II M.Pharmacy
Semester/Year of Study	:	3rd Semester
Branch	:	**Pharmaceutical Regulatory Affairs**
Course Name	:	Stability of drugs and dosage forms
Course code	:	21S0E301fT (Theory)

E301.1	Evaluation of stability of solutions , solids and formulations against adverse conditions
E301.2	Suggest the measures to retain stability ans storage conditions for retaining the efficacy of the products.

Course Name: ASSIGNMENTS Year of Study: 1stM.Pharmacy 1st and 2nd Semester	
C.1	To recall the fundamentals of proposed topic and carry out literature review.
C.2	To classify / compare, interpret the various methods and techniques.
C.3	To organize the collected data in chronological order and develop writing skills.
C.4	To analyze the data and interpret the relationships.
C.5	To evaluate and conclude the given topic.
C.6	To propose, design research in given concept and improve presentation skills.

Course Name: ASSIGNMENTS Year of Study: 1stM.Pharmacy 1st and 2nd Semester	
C.1	To recall the fundamentals of proposed topic and carry out literature review.
C.2	To classify / compare, interpret the various methods and techniques.
C.3	To organize the collected data in chronological order and develop writing skills.
C.4	To analyze the data and interpret the relationships.
C.5	To evaluate and conclude the given topic.
C.6	To propose, design research in given concept and improve presentation skills.

Course Name: SEMINARS Year of Study: 1stM.Pharmacy 1st and 2nd Semester	
C.1	To recall the fundamentals of proposed topic and carry out literature review.
C.2	To classify / compare, interpret the various methods and techniques.
C.3	To organize the collected data in chronological order and develop writing skills.
C.4	To analyze the data and interpret the relationships.
C.5	To evaluate and conclude the given topic.
C.6	To propose, design research in given concept and improve presentation skills.

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Course Name: Journal club Year of Study: 2nd M.Pharmacy 3rd Semester	
C.1	To select the scientific concept based on literature and define the objectives of research.
C.2	To outline the hypothesis and summarize the concept for presentation.
C.3	To plan for a meeting, discuss SOWT analysis, the design and methods used in concept.
C.4	To analyze the variables and their inter relationships.
C.5	To conclude the results and to discuss its significance.
C.6	To appraise the concept for societal needs, acknowledge and improve presentation skills.

Course Name: PROJECT WORK Year of Study: 2nd M.Pharmacy 4th Semester	
C.1	To recall the fundamentals, carry out literature review on proposed research topic and identify research problem.
C.2	To outline the requirements toperform the proposed research.
C.3	To construct the research hypothesis.
C.4	To take part in research experiments meticulously and documentation as per format.
C.5	To evaluate and conclude the results using statistical analysis.
C.6	To appraise societal application and appreciation.

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