Program Outcomes for Pharmacy Program

The following Program outcomes of the course should be achieved by acquiring an in-depth knowledge & thorough understanding, necessary skills and developing the right attitude.

PO1. Pharmacy Knowledge:

Graduates will apply knowledge of Pharmaceutical and Medicinal chemistry, Pharmaceutics, Cosmetology, Pharmacology, Pharmacognosy and herbal medicines in the career .

PO2. Problem solving skill:

Graduates will apply the demonstrations skills on practical aspects of Synthesis of medicinally important organic compounds, along with Analysis and Quality assurance of formulation and development of various pharmaceutical dosage forms, while solving problems and making decisions during daily practice.

PO3. Communication:

The graduates will acquire excellent interpersonal oral communication and writing skills. They will be able to demonstrate knowledge and proficiency with current audio-visual presentation technologies and develop an ability to communicate scientific knowledge in non-expert/lay term by adopting various modes of scientific communications (e.g., abstract, manuscripts, project reports, oral and poster presentations etc). This will allow effective exchange of professional information

PO4.The Pharmacist and society:

Graduate should develop the attitude to apply current knowledge of Pharmacy in the best interest to assess society, health, safety and legal issues and the consequent responsibilities relevant to the professional pharmacy practices to serve community better.

PO5. Modern Tool Usage:

A graduate should Learn, select, and apply appropriate methods and procedures, resources, and modern pharmaceutical tools, software, and equipments to analyze & solve problems.

PO6. Research & development:

Graduates will be able to demonstrate a high-level of understanding of the key stages in drug discovery, development, and commercialization. This will lead to the manufacturing of drugs and pharmaceuticals considering its impact on the environment and surrounding.

PO7. Environment and sustainability:

Understand the impact of the professional Pharmacy solutions in societal and enviornmental contexts, and demonstrate the knowledge of Pharmacy, and need for sustainable development.

PO8. Ethics:

Graduates will swear by a code of ethics of Pharmacy Council of India in relation to community and shall act as integral part of a health care system. They will demonstrate honesty, integrity, ethical understanding, and respect for others and will carry out their professional responsibilities by adhering to high ethical standards.

PO9. 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.

Program Specific Outcomes-

PSO1. Understand the nature and basic concept of Pharmacy, Human Anatomy and Physiology, Biochemistry Microbiology, Pharmaceutical Analysis, Drug Regulatory and Hospital Pharmacy.

PSO2. Set up procedure to develop and analyze Pharmaceutical formulation. Also validation process of formulation and production.

PSO3. Perform procedures as per standard laboratory procedures in the area of formulations, Human Anatomy and Physiology, Biochemistry, Organic and Inorganic Chemistry and Medical Chemistry

PSO4. Understand the applications of Pharmaceutical Sciences in developing of drug, its formulations and quality assurance, preclinical studies, post marketed studies of drug.

First year B. Pharm. (Sem-I &Sem-II)		
Course code	**Course name**	**Course outcomes**
1.1.1 P T	**Pharmaceutics- I**	Student should know about: 1. Different branches of pharmacy 2. Different compendia's 3. Alternative systems of medicine 4. Different types of dosage form, 5. Excipients used in pharmaceuticals & their preformulation studies 6. History of pharmacy profession. 7. Aromatic waters & Elixir. 8. Glycerites & Syrups 9. Monophasic liquid 10. Powders
1.1.2P T	**Modern Dispensing Practices**	1. Review basic requirements in the compounding and dispensing of pharmaceutical products. 2. State the parts of a typical medication container label. 3. Apply basic mathematical calculations in the compounding and dispensing. 4. Calculate the dose according to need of patient by using various formulas. 5. Generate accurate and appropriate drug information and report health care professionals regarding ADR, Idosyncrscy, Pharmacovigilance. 6. Provide consultation to patients and other health care professionals regarding various diseases 7. Analyze the prescription 8. Compound and dispense medication as per prescription. 9. Make proper label. 10. Identify Incompatibilities in prescription.
1.1.3 P T	**Pharmaceutical Inorganic Chemistry**	1. Significance of Inorganic chemistry to pharmaceutical sciences 2. Contents of official monographs in pharmacopoeias 3. Official methods of control like limit tests for pharmaceutical preparation 4. Types and use of official water, official gases 5. Different types of inorganic pharmaceuticals along with their preparation and quantification. 6. To analyze acid radicals 7. Basic radicals 8. Limit tests 9. Other qualitative tests such as swelling power, adsorption

		property etc. 10. Synthesis of inorganic compounds.
1.1.4 P T	**Pharmaceutical Organic Chemistry-I**	The students will get knowledge about 1. Basic principles and concepts of organic chemistry 2. Classification , nomenclature 3. Principles of stereochemistry 4. Reaction intermediates 5. How Addition & Elimination Reactions are performed with respect to alkenes and alkynes 6. Different reaction involved in the formation of aromatic compounds. 7. Practicals will helpful for understanding safety measures in laboratory 8. Different laboratory techniques 9. Qualitative analysis of organic compounds 10. Synthesize different organic compounds along with reaction & mechanism.
1.1.5 P T	**Human Anatomy & Physiology-I**	Student should understand 1. Human body in deep with anatomy and physiology of each organ in detail. 2. Provide study of the different disease of studied organ. 3. Subject gives the relevance and significance of Human Anatomy and Physiology to Pharmaceutical Sciences. 4. basic terminologies used in anatomy and physiology 5. Study the role of Endocrine system involve in regulation and functions of hormones to control overall activity of human body. 6. The construction, working, care and handling of various materials, instruments, glasswares. 7. Practical like complete blood count, heart rate, B.P., Pulse rate, body temperature etc. which helpful in diagnosis of disease. 8. To study structural and microscopical aspects of various organs of human system. 9. To study related various parameters are use to check and regulate the normal functions of Human body. 10. Demonstrate with the techniques for identification, counting, determination of various integral components of the body.
1.1.6 T	**Communication and soft skill development**	1. Choose career and make appropriate decision 2. Comprehend the concept of communication 3. Describe the four basic communication skills – Listening, Speaking, Reading and Writing 4. Convert the conceptual understanding of communication into everyday practice 5. Illustrate role of skills in real-life work situations with case studies, role play, etc.

		6. Identify the concept and components of personality, thereby to apply the acquired knowledge to themselves and to march towards excellence in their respective academic careers.
1.2.1 T	**Pharmaceutics- II**	1. Describe the flow of materials in a manufacturing unit by studying the plant layout design 2. Explain a technical knowhow of different operations in pharmaceutical manufacturing 3. Identify factors and equipments that lead to enhanced filtration 4. Elucidate the importance of particle size in pharmacy and suggest methods for size reduction of solids 5. Describe the mechanisms of mixing, mixing equipments and suggest measures to overcome failures during mixing operation. 6. Characterize powders in terms of their size and size distributions
1.2.2 P T	**Dosage form design**	The Students should know: 1. Different concepts of dosage form design 2. Reasons ore incorporation of drug in dosage form 3. Optimization of drug solubility 4. Therotical aspects of stability of emulsions and suspensions 5. Factors affecting solubility 6. Uses of rediochemistry in pharmacy. 7. To find corresponding marketed preparations along with the contents, name of the manufacturer. 8. Study the label and the shelf life period. 9. Evaluation parameters include organoleptic properties like colour, odour, appearance, pH, weight/ml. 10. Evaluation includes organoleptic properties Powders,Granules,Emulsions,Suspensions,Semisolids, Liquid.
1.2.3 P T	**Pharmaceutical Organic Chemistry-II**	The students will able to clarify- 1. Chemistry of organic compounds 2. method of preparation of organic compounds 3. chemical reactions of aldehyde, ketones, 4. method of preparation and chemical reactions of phenols sulphonic acid, alcohols and ethers, amines, 5. method of preparation and chemical reactions of carboxylic acid and it's derivatives 6. substitution nucleophilic reactions. 7. qualitative analysis of organic compounds 8. identification of organic compounds 9. derivative prepation 10. synthesis of different organic compounds along with reaction & mechanism.
1.2.4 P T	**Human Anatomy & Physiology-II**	The Students should know: 1. Different mechanisms that governs the normal working of various organs and systems as a whole. 2. Basic fundamentals structural features of neurons, mechanism of

		neurotransmitters along with processes of neuroconduction and neurotransmission. 3. Structure of brains parts along with role of Autonomous Nervous System involves maintaining the body's order and stability. 4. Sense organs involve in our body to maintain homeostasis. 5. Organs and mechanism involve in respiration along with clinical significance and disorders of respiratory system. 6. The essentials of Urinary systems involve in regulation of Body functions & how all parts of the human body contribute to the maintenance of homeostasis. 7. Handling of various materials, instruments and equipments. 8. Clarify structural and microscopical aspects of various organs of human system. 9. Various parameters are use to check and regulate the normal functions of Human body. 10. The techniques for identification, counting, determination of various integral components of the body.
1.2.5 P T	**Pharmacognosy**	1. Significance of biology to Pharmaceutical Sciences. 2. Clarify principles of genetics & explain how these can be applied in crop improvement process. 3. Explain basic components of cell, their functions & fundamental processes of cell division. 4. Tissues & tissue systems & apply that knowledge in understanding of anatomy of different parts of plant. 5. Explain modes of nutrition & how these influence in evolution of chemical defense in autotrophs. 6. Explain basic photosynthetic process. 7. Explain how ecosystem is composed, working & degrading. 8. Decide on staining reagents required for specific part of plant 9. Plant material sectioning, staining, mounting & focusing. 10. Decide on staining reagents required for specific part of plant
1.2.6 P T	**Pharmaceutical Analysis I**	1. Illuminate relevance & significance of Analytical Chemistry to Pharmaceutical Sciences. 2. Clarify basic principles of data treatment and data handling. 3. Explain basic concepts and principles of aqueous acid base titrations. 4. Clarify need and basic principles of non-aqueous acid base titrations. 5. Clarify different terms, types and basic principles of precipitation titrations. 6. Explain concept and reaction conditions for complexation. 7. Clarify and understand the correct use of laboratory equipments with calibration of various apparatus used in Analytical Chemistry laboratory together with safety measures to be followed. 8. Develop practical hand in titrimetric analysis by estimation of

		analyte concentration in pure form and in formulation. 9. Principle and procedure used in different titration methods such as aqueous, non-aqueous, precipitation, complexometric, redox titration methods. 10. The principle with quantitative estimation of analyte by gravimetric analysis.
Second year B. Pharm. (Sem-III & Sem-VI)		
2.3.1 P T	**Physical Pharmaceutics- I**	Student should know about: 1. Different physicochemical properties of substance or drugs. 2. Factors affecting on it with proper examples 3. Mathematical problems related to them. 4. Phase rules 5. Solubility and factors affecting it. 6. Laws of thermodynamics 7. Critical solution temperature 8. Different factors affecting solubility of drugs. 9. Evaluate conc. by conductometic titration 10. Determination of molecular weight
2.3.2PT	**Pharmaceutical Microbiology**	1. Define microbiology & classify microbes into various categories 2. Aware about historical developments and contributions of scientists in the field of microbiology. 3. Know the recent advances in microbiology. 4. Compare and contrast the various structural features, biology & characteristics of microbes. 5. Know the modes of reproduction in bacteria, growth characteristics, requirements. 6. Describe isolation & counting methods of microorganisms. 7. To prepare and sterilize nutrient broth, nutrient agar, slants, stabs and plates. 8. Maintaining aseptic condition & handling inoculating loop, its sterilization and inoculation procedure. 9. Isolate microorganism by streak plate technique & count them by pour plate technique. 10. Observe motility of bacteria by hanging drop technique
2.3.3 P T	**Pharmaceutical Biochemistry**	1. To know the metabolism process of various biomolecules like proteins, lipids, carbohydrates and nucleic acids. 2. To understand, classification, function, biological importance of them. 3. To know different qualitative tests & applications of various bio-molecules. 4. To understand the correlation of metabolism, process, steps involved in metabolism of biomolecules amongst them and 5. To understand correlation with other pharmaceutical sciences. 6. To know importance of various vitamins , enzymes and

		deficiency threats of that. 7. To identify proteins, amino acids and carbohydrates by various qualitative as well as quantitative chemical tests. 8. To separate, identify and characterize proteins from various samples like egg, milk, etc and understand principle behind the technique. 9. To determine quantity of vitamine in fruit or juice e.g. Ascorbic acid 10. To know action of salivary amylase on starch.
2.3.4 P T	**Pharmaceutical Organic Chemistry-III**	1. Molecular representations and their interconversions 2. Stereochemistry & its significance 3. Conformational analysis 4. Rearrangement 5. Pericyclic reactions 6. Chemistry of amino acids and polypeptides 7. Procedures for binary mixture separation and identification of compound by qualitative analysis 8. Synthesis of organic compounds by rearrangement reactions. 9. TLC 10. Column chromatography
2.3.5 T	**Pharmacology-I**	The subject 1. Helps to understand nature and sources of drugs and route of drug administration, 2. Process of drug discovery and development 3. Study in deep pharmacokinetic and pharmacodynamics of drugs, 4. Study varies types of receptor, drug receptor 4. Interaction, drug toxicity, drug interaction and adverse drug reactions. 5. Study rational drug treatment during pregnancy and lactation, pediatric patients & in geriatric patients
2.3.6 T	**Pharmacognosy &Phytochemistry - I**	1. Explain meaning & significance of Pharmacognostic parameters & Pharmacognostic study of crude drugs. 2. Explain the significance of secondary metabolites production in plants & other organisms & deduce their significance as medicinal molecules. 3. Explain primary metabolites its Pharmaceutical & industrial applications. 4. Define, classify, explain source, name & draw chemical structures, identify from the structure, organize the biosynthetic sequence, describe methods of extraction & underlying rationale of qualitative & quantitative analysis of Primary metabolites glycosides & tannin compounds of plant origin. 5. Decide on staining reagents required for specific part of plant 6. Draw morphological & microscopical diagrams & be able to label component / parts .

		7. Able to handle various equipments as per SOPs such as spectrophotometer. 8. Explain significance of how laboratory experiments are linked with social needs. 9. Able to judge the quality of crude drugs by different means & explain the significance of same in commerce & industry.
2.3.7 T	**Environmental sciences**	1. Know the environment like ecology, ecosystem, food chain, food web and ecological pyramids. 2. Know the different natural sources and their conservation to save the environment. 3. Know the different factors of environmental pollution and measures to minimize it 4. Aware about hazards of disposal wastes from hospitals and pharmaceutical industries. 5. Role of individual in conservation of natural resources. 6. Know the Disaster management.
2.4.1 P T	**Physical Pharmaceutics- II**	1. Understand Chemical and physical phenomena that govern the in vivo and invitro actions of pharmaceutical products. 2. Acquire sufficient knowledge of surface and interfacial tension between the surfaces. 3. Understand the different types of flow in order to identify and choose suitable flow characteristics for the formulation. 4. Understand reaction kinetics, reaction order, and discuss factors affecting the rate of the reaction 5. Describe the degradation and stabilization of medicinal agents as well as accelerated stability testing. 6. Know types, properties and applications of colloids in the formulations. 7. Evaluate viscosity, specific surface area, particle size distribution & derived properties of any material. 8. Predict surface tension of given liquid. 9. Calculate Krafft point, Cloud point, critical micelle concentration and HLB value of given surfactant. 10. Calculate energy of activation of acid hydrolysis
2.4.2 P T	**Pathophysiology & Clinical Biochemistry**	1. To understand Definitions and Terminologies of pathophysiology. 2. To gain through knowledge of the definition, epidemiology, etiology, clinical manifestations, pathophysiology, 3. Complications, diagnosis & plan of treatment for various diseases and disorders. 4. To understand the importance of different marker enzymes in body , 5. To know pathophysiological significance and estimation of various markers involved in liver, kidney and heart diseases.

		6. Student will eligible to understand clinical manifestations of diseases of different systems. 7. To understand different techniques for the estimation blood glucose, CRP etc and its clinical importance 8. Students will have idea of various instruments in pathology lab 9. Students will have knowledge of how to collect blood and method of preservations 10. They will able to know normal and abnormal constituents of urine and their biological significance.
2.4.3 P T	**Pharmaceutical Organic Chemistry-IV**	The students will know- 1. The structures of heterocyclic compounds 2. Chemistry & methods of preparation 3. Chemical reactions of heterocyclic rings 4. Synthesis schemes and reactions of drugs containing heterocyclic rings 5. Classification of carbohydrates, technique of combinatorial chemistry and it's applications in synthesis of organic compounds and peptides 6. General rules and guidelines involved in retro-synthesis of important compounds 7. Microwave assisted synthesis and it's applications in pharmaceutical research. 8. Practicals will helpful for understanding procedures for binary mixture separation 9. Identification of organic compound by qualitative analysis. 10. Synthesis of organic compounds containing heterocyclic ring.
2.4.4 P T	**Pharmaceutical Analysis II**	The students will get knowledge of various electro analytical techniques in terms of - 1. the basic principles 2. instrumentation 3. factors 4. applications 5. use in Pharmaceutical industry for quality control of chemicals, drug intermediates, APIs, excipients. 6. Pharmaceutical formulations and cosmetic products. 7. calibration 8. handling of various electro analytical instruments 9. titration using coductometer 10. titration using potentiometer
2.4.5 P T	**Pharmacognosy**	1. Student will be able to define & classify alkaloids.

	&Phytochemistry - II	2. Explain source, name & draw chemical structures. 3. Identify from the structure, organize the biosynthetic sequence in formation of major group of alkaloids, terpenoids & resins. 4. Describe methods of their extraction. 5. Explain underlying rationale of qualitative & quantitative analysis of alkaloids, terpenoids & resins . 6. Contribution of alkaloids , terpenoids & resins in modern drug discovery, & their currently marketed semisynthetic derivatives 7. Able to Judge the quality of crude drugs by different means & explain the significance of same in commerce & industry. 8. Identify the parts of plants from its morphological & microscopical features by applying experimental knowledge of morphology & anatomy obtained in theory classes. 9. Able to conduct extractions/isolations & explain significance of use of various chemicals & physical conditions. 10. Identify unorganized crude drugs using morphological, chemical, physical & microscopical characteristics.
2.4.6 T	**Pharmaceutical Engineering**	Pharmaceutical Engineering is the subject which renders knowledge related to: 1. It also deals with different factors associated with it. 2. Know various heat transfer techniques 3. Know about evaporation and its mechanism 4. Know types of crystallization 5. Study the principle, theory, mechanism, working and construction of equipments of different unit operations 6. Know about product manufacturing.
Third year B. Pharm. (Sem-V &Sem-VI)		
3.5.1 P T	**Industrial Pharmacy-I**	1. Understand the concepts of solid dosage form design & formulation strategies. 2. Explain tablets as a dosage form, physico-chemical principles guiding tablet formulation, various tablet additives, manufacture & evaluation, equipments, defects in tabletting & remedies. 3. Learn the concept, types, pharmacopoeial specifications, techniques & equipments used in tablet coating. 4. Describe capsules, types, additives, size selection, manufacturing & .evaluation, equipments, &defects. 5. To understand the concept of technology transfer. 6. State the correct use of various equipments in Pharmaceutics laboratory relevant to tablets, capsules &coating. 7. Explain formulation, evaluation and labeling of tablets &capsules.

		8. To understand rational behind use of formulation ingredients. 9. To learn the equipments and apparatus needed for the preparation as per SOP. 10. Select the suitable packaging material (container-closure) for the preparation.
3.5.2 P T	**Pharmaceutical Analysis III**	1. To understand scope and importance of subject in the pharmaceutical industry 2. To understand principles, instrumentation and applications of various instrumental methods such as UV-VIS, Flourimetry. 3. Atomic absorption, atomic emission, Spectroscopies, Flame photometry, Phosphorimetry and Nepheloturbidimetry. 4. To know various sampling techniques employed in analysis of solid, semisolid and liquids dosage forms. 5. To gain knowledge of this instrumental techniques in quality control of API. 6. To know samoling plans , Gross sample etc. 7. Independently calibrate and operate various analytical instruments 8. Assay of various APIs and formulations as per Pharmacopoeial standards. 9. To have knowledge of single point, double point estimation method. 10. Estimation of alkali metals by flame photometry
3.5.3 P T	**Medicinal Chemistry-I**	Student should understand 1. Significance of Medicinal Chemistry in Pharmaceutical Sciences. 2. Correlation of physicochemical properties affecting drug action and Pharmacokinetics. 3. The different types of receptors, forces involved in drug receptor interaction and their signal transduction mechanism. 4. General aspects of the design & development of drugs. 5. Study different classification, nomenclature, of diuretics and drugs acting on autonomic nervous system & cardiovascular system. 6. (MOA) mechanism of action structure activity relationship (SAR), adverse effects, therapeutic uses and recent developments in diuretics and drugs acting on autonomic nervous system & cardiovascular system. 7. Safety measures while working in medicinal chemistry laboratory. Use of various equipments in medicinal chemistry laboratory. Student should understand and develop skills in various purification techniques of solvents/liquids used in synthesis. 8. Prepare acid and basic salts of drugs and evaluate their physicochemical properties.

		9. Skills involved in thin layer chromatography techniques and purification of synthesized compounds by column chromatography. 10. Synthesize, recrystallize and understand reaction mechanisms involved in synthesis of medicinally important organic compounds.
3.5.4 P T	**Pharmacology-II**	1. Autonomic Nervous system it's General Considerations, Sympathetic and Parasympathetic Nervous system with neurotransmitters. 2. Cholinergic, Anti-cholinergic, Adrenergic, Anti-adrenergic system and drugs study with its Biosynthesis, Storage, Release and Metabolism. 3. Pharmacology of Ganglion Stimulating and Blocking drugs and Neuromuscular blocking. 4. Endocrine Pharmacology Functions, Receptor and mechanisms of Hormone. 5. Biosynthesis, Mechanism of Action and Pharmacology of Adreno-corticosteroids and corticosteroid antagonists, Thyroid and antithyroid drugs and Insulin, Oral hypoglycemic agents, Glucagon. 6. Study in detail with Androgens, Antiandrogens, Anabolic Steroids, Estrogens, Progestins, contraceptives, Specific Estrogen Receptor Modulators (SERMs), Aromatase Inhibitors, antiprogestin. 7. To Introduce instruments commonly used in experimental pharmacology. 8. Study the animal Care and handling of common laboratory animals, as per (CPCSEA, OECD), biochemical reference values in various Animal species and routes of drug administration. 9. Study of various methods for collection of blood, body fluids and urine from experimental animal's physiological salt solutions, drug solution and use of molar solution. 10. Recording Concentration Response Curves (CRC) of Acetylcholine, Histamine, Physostigmine and Atropine.
3.5.5 P T	**Analytical Pharmacognosy & Extraction Technology**	1. Explain principle of mass transfer process in extraction, effect of various factors, specific care in herbal material, & various approaches in extraction Processes 2. Understand & explain principle & applications of chromatographic & nonchromatographic separation methods 3. Explain source material & extraction methods of phytochemicals specified; draw schematic representation of such processes 4. Explain need of analysis of natural products & explain their significance. 5. Generate micrometric data & identify the crude drugs.

		6. Conduct successive extraction & qualitative tests to ascertain chemical nature of crude drugs 7. Extraction of phytochemical 8. Set extraction assembly. 9. Process material before extraction 10. Explain significance of use of various chemicals/solvents/ conditions; undertake extraction.
3.5.6 T	**Pharmaceutical Business Management &Disaster Management**	1. Pharmaceutical business and management strategy. 2. Marketing research, product management. 3. Communication 4. Human resource and development needs. 5. Disaster management 6. Disaster preparedness, mitigation.
3.5.7 P T	**Active Pharmaceutical Ingredients Technology**	1. Student should know overview of API and fine chemical industry & Polymorphism in APIs 2. Student should understand basics of chemical process kinetics, some classes of reactions with Examples of API for each unit process. Like Nitration, Amination by reduction, Esterification,Hydrolysis, Oxidation, Alkylation. 3. Student should understand chemical process, reaction system, equipments used in API manufacturing and layout design for API manufacturing.& Chirality in API industry 4. Student should understand basics of chemical process kinetics, some classes of reactions with Examples of API for each unit techniques and process of synthetic routes and optimization of reactions, raw material & reagent selection, scale up techniques for APIs, Quality control aspects, material safety data sheet (MSDS), Scale up techniques in API manufacturing,environmental aspects in manufacturing of APIs, green chemistry approaches, health Hazards with chemical handling. 5. Student should understand basics of chemical process kinetics, some classes of reactions with Examples of API for each unit principle, industrial process, scale up techniques, Industrial manufacturing process, flow charts of some important APIs. 6. Student should know pharmaceutical Industry department like Quality assurance (QA) and quality control (QC) of APIs and GMP , various ICH Guidelines.
3.6.1 P T	**Industrial Pharmacy-II**	1. Explain suspensions, emulsions & semi-solids types, formulation development, manufacturing, excipients used, evaluation of suspensionsetc. 2. Describe layout for manufacturing

		3. Explain disperse systems, its classification, theories of dispersesystems, 4. thermodynamic v/s kinetic stability considerations. 5. Describe emulsions, their physico-chemical properties, theory of emulsification, HLB value & phase inversion temperature, Kraft point, cloud point, excipients,formulation 6. evaluation of emulsions; cracking, coalescence, stability & Stresstesting. 7. Explain semi-solids, anatomy & physiology of skin. 8. Formulation of Suspensions, emulsions & semi-solids, 9. Prepare the labels so as to suit the regulatory requirements 10. Describe use of ingredients in formulation and category of formulation.
3.6.2 P T	**Pharmaceutical Analysis-IV**	1. To understand principles, instrumentation and applications of various chromatographic, thermal, X ray Diffraction and radio chemical techniques employed for the analysis of APIs and formulations. 2. To understand Basic theory, Types, principle of Column Chromatography. 3. To understand importance of Van Deemter equation. 4. To know theory, instrumentation, types of HPTLC plates, types of development chambers and development techniques. 5. To gain knowledge of different thermal methods. 6. To know Principles, classification, instrumentation, applications of electrophoresis. 7. To know validation of analytical instruments such as UV & methods as per ICH/USP guidelines. 8. Students will know technique of separation of amino acids by paper chromatography ascending (Ascending, Radial and two dimensional Paper chromatography) 9. To know separation & determination of Rf values of mixture of carbohydrates/amino acids by TLC. 10. Students will know how to do Column chromatographic separation
3.6.3 P T	**Medicinal Chemistry-II**	Student should understand 1. Significance of Medicinal Chemistry in Pharmaceutical Sciences. 2. Drug metabolism & its significance in drug discovery. 3. General aspects of the design & development of drugs. 4. Study different classification, nomenclature, of Local anesthetics, Oral Anti-hyperglycemics, Diagnostics nd drugs acting on Central nervous system. 5. (MOA) mechanism of action structure activity relationship (SAR), adverse effects, therapeutic uses and recent developments in Local anesthetics, Oral Anti-hyperglycemics, Diagnostics and drugs acting on Central nervous system.

		6. Various drug used for various diagnosis test. 7. How to determine molar refractivity of compounds. & Separate solvents by Steam distillation technique. 8. Mechanism and how to carry out Dean stark azeotropic water separation. 9. Synthesize, recrystallize and understand reaction mechanisms involved in synthesis of medicinally important organic compounds & microwave assisted organic synthesis. 10. How to handle FTIR & Interperating IR graph.
3.6.4 P T	**Pharmacology-III**	1. Pharmacology having 1.knowledge drug including classification, structure activity relationship (SAR), mechanism of action, adverse effects, therapeutic uses. 2. Study General Anesthesia and Local Anesthetics with Stages and Principles of Anesthesia and clinical uses of its 3. Alcohols and alcoholism including Pharmacology of Alcoho 4. to study the Psychopharmacological drugs in detail 5. Pharmacology of Non-steroidal anti-inflammatory drugs ,Rheumatoid Arthritis, Osteoartritis and Gout 6. Pharmacology of drugs used in Gastrointestinal tract disorders, Respiratory tract disorders 7. Practical use to Determine of unknown concentration of Histamine, Ach using by Matching bioassay method 8. Determine of unknown concentration of Histamine, Ach using by Bracketing bioassay method. 9. Determination of unknown concentration of Histamine, Ach using by Interpolation bioassay method. 10. To Study of analgesic activity of drugs using Eddy's hot plate analgesiometer, actophotometer ,rotarod.
3.6.5 P T	**Natural Product Chemistry**	1. Explain various physical, chemical, spectroscopic means & methods used in structural elucidation of natural products. He/she should be able to interpret data generated from above techniques. 2. Explain tools & techniques used in study of biosynthetic pathways in plants. 3. Explain source, chemistry & applications of drugs from marine origin. He/she should be able to compare & contrast marine & terrestrial sources of medicinal materials. 4. Explain difficulties in elucidation of biosynthetic pathways in plant with their merits & demerits. 5. Understand & explain underlying reasons as why natural products are appropriate material in discovering new drugs & also explain their contribution in modern drug discovery. 6. Explain source, extraction, processing, chemistry & applications of naturalproducts used in pharmaceutical & allied industry.

		7. Extract & subsequently conduct experiments to derive various physical constants required in characterization of natural products. 8. Record UV/IR spectrum of given sample & interpret them. 9. Interpret NMR/Mass spectrum 10. Able to handle various equipments as per SOPs.
3.6.6 T	**Bioorganic Chemistry Drug Design**	1. Significance of Bioorganic Chemistry 2. Establish its relevance in drug design and discovery. 3. Approaches in rational drug design. 4. Various drug targets 5. Their biochemical features, physiological & patho-physiological roles and their significance in drug design. 6. Pro-drug concept in drug design.
3.6.7 T	**Pharmaceutical Biotechnology**	1. Define Biotechnology & its state its scope in pharmacy 2. Know the basics of biotechnology techniques and the various systems used. 3. Know the method of genetic engineering for production of rDNA products including monoclonal antibodies. 4. Know the information about the application of genetic engineering in animals. 5. Have a knowhow of enzymes and their uses by immobilization. 6. Illustrate use of Fermenter for production of fermentation products and information about their purification by downstream process.
Final year B. Pharm. (Sem-VII &Sem-VIII)		
4.7.1 P T	**Sterile Products**	1. Describe the General requirements, routes of administration, significance of tonicity adjustment and sterility and Pre-formulation of sterile products. 2. Describe various packaging materials used, types, choice of containers, official quality control tests and methods ofevaluation. 3. Describe the GMP and design and layout of Parenteral Production Facility, environmental control zones, heating ventilation air conditioning (HVAC), HEPA filter and laminar area. 4. Explain Classification and formulation of SVP. 5. Explain Large Volume Parenterals (LVPs),Types, concept of formulation. 6. Describe Blood Products and Surgical Dressings

		7. Formulation development and Pharmacopoeial evaluation and labeling of SVPs, LVPs, and ophthalmic preparations. 8. Expertise in sealing of ampoules. 9. Describe use of ingredients in formulation and category of formulation. 10. Importance and validation of aseptic area
4.7.2 P T	**Pharmaceutical Analysis-V**	The students will able to get knowledge of Spectroscopic (FTIR, NIR, Raman, Atomic Emission) & Chromatography (Gas, Flash, Super critical fluid chromatography) techniques in terms of - 1. principles 2. instrumentation 3. factors 4. applications 5. use in Pharmaceutical industry Practicals will helpful for understanding 6. Spectrophotometric estimation of two-component formulations by simultaneous analysis 7. Q-Method 8. IR-Spectral interpretation of aliphatic 9. aromatic compounds.
4.7.3 P T	**Medicinal Chemistry-III**	1. General aspects of the design 2. Development of drugs including history. 3. Classification, nomenclature, 4. Structure activity relationship (SAR). 5. Mechanism of action, adverse effects, therapeutic uses and recent developments in therapeutic categories such as NSAIDs, steroidal anti-inflammatory drugs, narcotic & non-narcotic analgesics, antipyretics, autacoids and drugs acting on respiratory & GI tract. 6. Design a drug synthesis. 7. Make correct use of various equipments & take safety measures while working in medicinal chemistry laboratory. 8. Develop skills involved in thin layer chromatography techniques and purification of synthesized compounds by column chromatography. 9. Synthesize, recrystallize and understand reaction mechanisms involved in synthesis of medicinally important organic compounds. 10. To interpret the spectral characterizations made by IR and 1H-NMRs of synthesized compounds.

4.7.4 P T	**Pharmacology-IV**	1. Deep knowledge about pharmacology and pharmacotherapy of drugs used in infectious diseases, cardiovascular disorders etc. 2. Classification, mechanism of action, antibacterial spectrum, resistance, therapeutic uses, adverse effects and contraindications of various antibiotics. 3. To study the Pharmacology of Drugs acting on blood & blood forming organs. 4. Study Safety Pharmacology including Introduction, scope and study design. 5. Understand the involvement of oxidative stress and role of antioxidants along with some safety issues in pharmacology. 6. To study pharmacology of Diuretics and anti-diuretics. 7. Understand the importance of isolated preparation, mechanism of action of drugs on isolated tissues, expertise in performing bioassay of drugs. 8. Analyze the rational and irrational fixed dose combinations based on various parameters. 9. Understand the prescription pattern and rational use of drugs by performing case study or doing hospital visit. 10. Study antioxidant activity of standard drugs by any method (DPPH), Superoxide anion, hydrogen peroxide and hydroxyl radical scavenging activity.
4.7.5 P T	**Natural Drug Technology**	1. Explain various difficulties in standardization of herbal material, new approaches evolved, and steps in development of plant monograph. 2. Explain need & significance of plant material authentication, new approaches used with their merits & demerits. 3. Explain various factors affect on level of secondary metabolites, effect of post harvesting manipulations, and changes during storage etc& methods to control these modification. 4. Explain various guidelines issued by WHO in relation with cultivation, collection, storage etc. 5. Explain concept of health & pathogenesis, philosophical basis, diagnosis & treatment aspects of Ayurveda, Unani, Siddha &Homoepatic system of medicine. 6. Method of preparation of Ayurvedic dosage forms; significance of novel drug delivery of natural products; herbs used in cosmetic preparation & methods of their formulations 7. Prepare, label & evaluate herbal/TSM formulations 8. Evaluate marketed cosmetic & nutraceutical formulations 9. Conduct preformulation parameters & understand underlying rationale 10. Conduct in vitro assays for correlation with biological

		efficacy.
4.7.6 T	**Bio-pharmaceutics & Pharmacokinetics**	1. Understanding the concept of biopharmaceutics and its applications in formulation development. 2. Learning various compartmental models and non compartmental analysis methods. 3. Studying pharmacokinetic processes and their relevance in efficacy of dosage form 4. Learning various compartmental models and non compartmental analysis methods 5. Understanding concept and mechanisms of dissolution and in vitro in vivo correlation 6. Methods of assessing bioavailability.
4.7.7 T	**Pharmaceutical Jurisprudence**	1. Basic principles, purpose, significance and relevance of Pharmaceutical laws in India. 2. Study of qualifications for membership of the Board and it's responsibilities inspection method. 3. Study of various laws governing the manufacturing, sale, research & usage of drugs. 4. Knowledge about Patents and various regulatory systems. 5. Aim, Objectives and Salient features of various acts related to pharmacy.
4.8.1P T	**Advanced Drug Delivery System**	1. Describe the Fundamental Concept of Modified Drug Release and Pre requisites of drug candidates, along with various approaches and classification 2. Basic concept of optimization. 3. Describe. Introduction, formulation, merits, demerits, application and evaluation of Novel Drug Delivery Systems. 4. Explain Therapeutic Aerosols along with typical formulations from, metered dose, intranasal and topical applications. 5. Explain concept of microencapsulation, merits, demerits and application, Types of Microencapsulation and Evaluation of microcapsules. 6. Describe Polymers with respect to introduction to polymers, classification, types, selection, application and examples 7. Formulation, evaluation of sustain release, transdermal, gastroretentive formulation 8. Microencapsulation technique 9. Evaluation of marketed preparation 10. Optimizations studies by 2^3 factorial design
4.8.2 P T	**Cosmetic science**	1. Understand the concepts of cosmetics. 2. Explain formulation of cosmetics, manufacturing, equipments & evaluation. 3. Explain the concept of cosmeceuticals. 4. Explain formulation of cosmetics for hair, manufacturing & evaluation of hair shampoos, tonics.

		5. Describe formulation of cosmetics for eyes, manufacturing & evaluation of eye mascara, shadow. 6. Understand formulation of manicure products like nail lacquer, remover. 7. State the correct use of various equipments in Pharmaceutics laboratory relevant to cosmetics. 8. Perform formulation, evaluation and labelling of cosmetics 9. Describe use of ingredients in formulation and category of formulation. 10. Prepare labels as per regulatory requirements.
4.8.3 P T	**Pharmaceutical Analysis-VI**	The students will able to get knowledge of Spectroscopic (NMR, Mass and ESR) & Chromatography (HPLC) techniques in terms of – 1. Principles 2. Instrumentation 3. Factors 4. Applications 5. Use in Pharmaceutical industry 6. Calibrate various analytical instruments for the assay of various APIs and formulations as per Pharmacopoeial standards 7. Appropriate safety measures while handling instruments, chemicals and Apparatus 8. Validation of analytical methods as per ICH guidelines 9. Interpretation of UV, IR, NMR, MS spectras of simple organic compounds for structure elucidation 10. Applications of UV, IR, NMR, MS in Pharmaceutical research
4.8.4 P T	**Medicinal Chemistry-IV**	1. General aspects of the design & development of drugs including history. 2. Classification, nomenclature, 3. Structure activity relationship (SAR). 4. Mechanism of action, adverse effects, therapeutic uses and recent developments in therapeutic categories such as chemotherapeutic agents, antibiotics, hormones & anti-fertility agents. 5. Design a drug synthesis. 6. Make correct use of various equipments & take safety measures while working in medicinal chemistry laboratory. 7. Understand and develop skills in various demonstrated experiments such as High Vacuum distillation, recrystallization and pH based amino acid separation. 8. Develop skills involved in thin layer chromatography techniques and purification of synthesized compounds by

		column chromatography. 9. Synthesize, recrystallize and understand reaction mechanisms involved in synthesis of medicinally important organic compounds. 10. To interpret the spectral characterizations made by IR and 1H-NMRs of synthesized compounds.
4.8.5 P T	**Pharmacology-V (Including Biostatistics)**	Student should know about: 1. Drug-drug interactions in body 2. Mechanism of adverse drug reaction 3. Pharmacovigilance 4. Clinical trials 5. Good clinical practices. 6. Recent development in pharmacology. In practical Student should know 7. In-vivo & In-vitro experiments 8. Use of software for preclinical experiments 9. Brief idea of statistics 10. Problems related to statistics
4.8.6 T	**Natural Products: Commerce Industry & Regulations.**	1. The significance of natural products in daily life. 2. Classify different segments in market, demand & supply position; export & import potential; position of Indian herbal drug industry in global contest. 3. Government organizations & policies for promotion; their regulation in India & other countries, various regulatory guidelines, ethical issues etc 4. Explain safe use of natural products, possible toxicities & interaction, toxicities . 5. Significance of pharmacovigilance systems; WHO guidelines in this regard.
4.8.7 T	**Quality Assurance Techniques**	Student should understand 1. The significance of quality assurance techniques & quality in pharmaceutical manufacturing 2. Current Good Manufacturing Practices in pharmaceutical industry. 3. Various aspects of documentation, SOPs and records 4. The role of validation in assurance of quality in pharmaceutical industry. 5. Quality by design, QBD. 6. ICH guidelines in stability testing and QMS.

M. Pharm. – First Year (Sem-I) Subject of Specialization		
Course code	**Course name**	**Course outcomes**
M. 1. 4.T	**Advanced Pharmaceutics (Theory)**	The Student should know about- 1. The concept of preformulation, Analytical techniques to characterize physical and chemical properties of NCE. 2. Polymer sciences-Applications, Thermal characterization and Rheology of polymers, Biodegradable polymers. 3. Stability of pharmaceuticals, Understanding of statistical aspects expiry period. Degradation pathways. 4. Excipients-Factors affecting the selection, drug-excipient and excipient-package interactions, Standardization of excipients, Co processed excipients. 5. The concept of Diffusion& Dissolution - Dissolution test, Dissolution model. 6. Micro encapsulation - methods, applications and evaluation 7. Optimization - Optimization process, classification , importance of experimental design, correlation & regression analysis,
M.1.5 P	**Advanced Pharmaceutics (Practical)**	In practical's student should know the- 1. Instruction to authors of any one of the highimpact factor journal 2. Preformulation study of tablets. 3. Intrinsic and saturation solubility. 4. Effect of pHon the apparent partition coefficient of a drug, 5. Determine the best compatible additive for a tablet dosage form. 6. Accerlated stability study, 7. To characterize polymers Rheologically and Thermally. 8. Study the dissolution kinetics of IR and ER dosage form 9. To interpret DSC, IR and PXRD from any reported data
M.1.12 T	**ADVANCED QUALITY ASSURANCE TECHNIQUES (CGMP & DOCUMENTATION) (THEORY)**	1.Responsibilities and Key Personnel. 2.Design, size, location and Construction of Equipment 3.Management of Rejected and Recovered Materials 4.Components of Q.A. 5.I.P.Q.C. of different formulations 6.Study of Mix-ups and Cross Contamination

M.1.13 P	**ADVANCED QUALITY ASSURANCE TECHNIQUES (CGMP & DOCUMENTATION) (Practical)**	1.Learning different programming languages in computer, writing programmes for simple Calculation 2.Physical and Chemical Examination of plastic containers. 3.Writing a MPCR / BPCR (For sterile & non-sterile products) 4. Writing a Product complaint document
M.1.6 T	**ADVANCED PHARMACEUTICAL CHEMISTRY**	1. General aspects of Stereochemistry & Chiral Techniques. 2. Mechanisms, stereochemistry and applications of enlisted individual reactions (Molecular Rearrangements, Reactions of importance, Multi-component synthesis). 3. Definition, terms and abbreviation, rules and guidelines of synthon approach including all types of disconnections with examples. 4. Green Chemistry approach to drug synthesis. 5. Introduction to Environment protection and effluent treatment aspects
M.1.7 P	**ADVANCED PHARMACEUTICAL CHEMISTRY (Practical)**	1. Make correct use of various equipments & take safety measures while working in medicinal chemistry laboratory. 2. Understand and develop skills in various experimental techniques such Fractional distillation, Vacuum distillation, Preparative chromatography-Column and TLC. 3. Synthesize, recrystallize and understand reaction mechanisms involved in synthesis of medicinally important organic compounds. 4. To interpret the spectral characterizations made by IR and 1H-NMRs of synthesized compounds. 5. Isolation and characterization of phytochemical principles (e.g. alkaloids, steroids) from natural origin.
M. Pharm. – First Year (Sem-I) Common Subject for All		
M. 1. 1 T	**Advanced Analytical Technique (Theory)**	The Student should know about- 1. Chromophores and their interaction with UV-visible radiation and their utilization in structural, qualitative and quantitative analysis of drug molecules. 2. Woodward-Fieser rule, use of schiff reagents for elucidation of structures. 3. The basic principle, instrumentation and different attachments to FTIR for sample handling. NIR: Principle and applications 4. What is Principles of FT-NMR with reference to ^{13}C NMR, free induction decay, average time domain and frequency domain signals. Spin-spin and spin-lattice relaxation phenomenon. 5. Basic principles and instrumentation (components

		and their significance). Ionization techniques (FAB, MALDI, SELDI, APCI, APPI, ESI and DART). Mass analyzers [Quadrupole, Ion Trap, FT-ICR, TOF and tandem mass (MS-MS)]. 6. Introduction to Scanning Electron Microscopy and Travelling Electron Microscopy.
M.1.2 P	**Advanced Analytical Technique (Practical)**	1. Study effect of solvent on wavelength maxima of drugs. 2. Multicomponent analysis by UV Spectrophotometry 3. The titrimetric method include potentiometric end point determination. 4. Interpretation of UV, IR, NMR and Mass spectra of some unknown intermediates and drugs
(M.1.3)	**Research Methodology**	1. Research 2. Literature survey and documentation 3. Technical writing 4. Presentation: (Specially for oral) 5. Project [cost] management 6. Research organizations and procurement of research grants: 7. Basic Definitions And Concepts: 8. Experimental design: 9. Descriptive D ata Analysis 10. Inferential data analysis
E.1.4	**Sterile Product Formulation & Technology**	The Student should know about- 1. Pre-formulation& formulation of SVPs & LVPs, ophthalmic products , Sustained release parenteral formulations. 2. Manufacturing of Parenterals –Guidelines: Overview of GMP and regulatory guidelines.Layout of parenteral facilities, FFS and BFS technology for parenterals.Environmental control: Temperature and humidity control, air handing systemsand their validation.Industrial sterilization: Large-scale sterilization processes, process selection,specifications, development and validation of process and equipment.Hazards associated with parenteral therapy
M. Pharm. – First Year (Sem-II) **Subject of Specialization**		
Course code	**Course name**	**Course outcomes**
M. 2. 2.T	**Formulations & Development (Theory)**	The Student should know about- 1. ICH Q8 (R2) Guidelines for pharmaceutical development 2. Basics of process automation of solid dosage form production 3. Mouth dissolving formulation & taste masked formulation. 4. Phase behaviour of surfactants in binary and ternery

		systems. 5. Factors affecting phase behaviour. Micellization, micelle structure. 5. Pharmaceutical aspects of solubilisation in nonaqueous systems 6. Semisolid formulation with special reference to penetration enhancers. Emulgels, semisolids based on Liposomes, Niosomes. 7. Inhalation products 8. Regulatory perspective of selection and evaluation of Pharmaceutical packaging materials 9. Nutraceuticals 10. Veterinary Dosage Forms 11. Introduction to QBD (Quality by Design
M.2.3 P	**Formulations & Development (Practical)**	In practical's student should know the- 1. Determination of stability constant of beta-cyclodextrin complex of drug using phase solubility analysis 2. Optimization of designing of dosage forms by 3^2 factorial designs. 3. Compare the dissolution efficiency of a drug in plain and its solid dosage form. 4. Compare the dissolution profile of two marketed solid oral preparation by f1 and f2 factor. 5. Prepare and evaluate transdermal drug delivery system and compare the release of drug through treated egg membrane Or treated cellophane membrane. 6. Prepare liposome and determine particle distribution and drug entrapment efficiency. 7. Plot the ternary phase diagram in the formulation development of emulsion. 8. Interpret IVIVC for any dosage form.
M.2.14 T	**PHARMACEUTICAL VALIDATION (Theory)**	1. Write about Scope of Validation,Validation Life cycle 2. Facility Qualification and Consideration of Validation aspects during facility design 3. Media fill test and Validation of existing equipment in Pharma Industry 4. Cleaning of Equipment and it's Validation 5. Bioanalytical and stability indicating method Validation. 6. Processes Validation Following formulations - Tablet, Capsules, Ampoules & Vials, Ointment/Creams and Liquid Orals
M.2.15 P	**PHARMACEUTICAL VALIDATION (Practical)**	1. Validation of analytical method-Performance 2. Validation of equipment- Dissolution test apparatus, Powder Mixer (Dry),Tablet Compression Machine, Coating pan 3. Study of Validation of at least two analytical instruments. 4. Study of Cleaning validation of one equipment.

M.2.5 T	**ADVANCED MEDICINAL CHEMISTRY**	1. General aspects of Microorganism in drug development. 2. Molecular concept of drug-target interactions. 3. Advances in receptors of enlisted classes, SAR studies of drugs and ligands belonging to classes including mechanism of action. 4. Synthesis of drugs describing reaction conditions mechanism and strategies involved in the synthesis. 5. Introduction to gene theropy with suitable examples, scope, techniques and application. Introduction to Biomolecules (human insulin, tissue plasminogen activator (TPA), interleukins, interferons, growth harmones, monoclonal antibodies, and factor VIII etc
M.2.6 P	**ADVANCED MEDICINAL CHEMISTRY (Practical)**	1. Make correct use of various equipments & take safety measures while working in medicinal chemistry laboratory. 2. Demonstration of computer aided drug design techniques using suitable software. 3. ADMET prediction using suitable software. 4. Microwave assisted Synthesis & Synthesis based on ultrasonic technique, 5. Synthesis, recrystallize and understand reaction mechanisms involved in synthesis of medicinally important organic compounds. 6. To interpret the spectral characterizations made by IR and 1H-NMRs of synthesized compounds.
M. 2.4	**Novel Drug Delivery System**	The Student should know about- 1. Fundamentals of Controlled Release Drug Delivery 2. Oral controlled drug delivery systems 3. Parenteral controlled release system 4. Mucosal drug delivery models 5. Transdermal drug delivery system 6. Bioavailability and bioequivalence 7. Vesicular Drug Delivery System 8. Particulate Drug Delivery System 9. Site specific drug delivery system 10. Ocular Drug Delivery 11. Protein & peptide drug delivery system 12. Regulatory consideration in controlled release
M.2.16	**Quality Planning & Analysis**	1. Basic concepts of Quality 2. Quality Improvement and Cost Reduction 3. Control of Quality 4. Developing: Quality Culture 5. Manufacturing 6. Statistical Process control 7. Inspection, test and Measurement 8. Inspection and test sampling plans 9. Quality Assurance General Concepts
M.2.7	**Drug Design**	1. Role of drug design in drug discovery with its various approaches.

		2. Quantitative Structure-Activity Relationships (QSAR) with details. 3. Drug design based on antagonism and enzyme inhibition. 4. Basic concept of computational chemistry 5. Computer-Aided Drug Design: Ligand based Drug Design or Analog-based approach: 2D-QSAR, 3D-QSAR, Pharmacophore modelling. 6. Structure-based drug design or Receptor-based approach. 7. Drug metabolism based drug design. 8. Recent Advances in drug discovery
M. Pharm. – First Year (Sem-II) Common Subjects		
M.2.1	**Drug Regulatory Affairs**	1. Drug Regulatory Aspects (India) – 2. Good Manufacturing Practices (GMP) 3. D rug Regulatory Aspects (International & highly regulated markets) 4. Introduction to IPR & Patents 5. Patenting in India – 6. Patent search, Patent analysis & Patent drafting. 7. Allied Patents Related Issues: 8. Indian IP case studies-
E.1.7	**TRADITIONAL SYSTEMS OF MEDICINE & AYURVEDIC ORMULATIONS**	1. Ethnopharmacognosy - General account. 2. A brief idea about Ayurveda. Chinese systems of medicine. Unani system of medicine. Homeopathy. 3. Comparative account of drugs used in above systems of medicine. 4. Ayurvedic dosage forms-Basic idea. 5. The formulation and evaluation of Ayurvedic dosage forms: Churna, Bhasma, Kwatha Asava,Arishta, Avaleha, Gutika, Vati, Rasa, Rasayana, Taila, Ghrita, Guggulu, Arka.Ayurvedic Cosmetic formulations, 6. Standardization of Ayurvedic dosage forms using: a) Physical methods b) Chemical methods c) Biological methods.