



SNJBs
SHRIMAN SURESHDADA JAIN COLLEGE OF PHARMACY

(Jain Gurukul), Neminagar,
Chandwad, Dist. Nashik-423 101.

NBA Accredited UG Program (2019-2022, 2022-2025)
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2018-2019 FIRST YEAR SEM-I

Human Anatomy & Physiology-I

BP101 is in the first semester, **101** is the Course code for Human Anatomy & Physiology-I

and CO BP 101.1 to CO BP 101.6 are the outcomes of this course.

Statement	
The students should be able to:	
CO BP 101.1	Understand compounding, dispensing & counseling of pharmaceutical product.
CO BP 101.2	Report various information to health care professional regarding ADR, idiosyncrasy & Pharmacovigilance.
CO BP 101.3	Community pharmacist - Role of pharmacist in health care system and patient counseling regarding safe use of medicine.
CO BP 101.4	Compounding & dispensing of various dosage form like Mouthwash, Gargle, Liniment, Emulsion, Suspension etc.
CO BP 101.5	Calculation of drug dose according to age, body weight and surface area.
CO BP 101.6	Remember physical, chemical & therapeutic incompatibility with respect to dosage form.

Pharmaceutical Analysis I

Statement	
The students should be able to:	
COBP102.1T	To learn the basics of analytical chemistry and the statistical treatment of analytical data.
COBP102.2T	To understand the concepts of aqueous and non-aqueous titrations
COBP102.3T	To grasp the Mohr's method for estimation of chlorides
COBP102.4T	To master the theory of complexometric titrations
COBP102.5T	To learn the redox titrations



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COBP102.6T	To become familiar with Conductometer and potentiometry
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Pharmaceutics- I

Statement	
The students should be able to:	
COBP103.1T	Know the history of profession of pharmacy.
COBP103.2T	Understand the basic concepts of dosage form design.
COBP103.3T	Understand the professional way of handling the prescription.
COBP103.4T	Calculate of drug dose according to age, body weight and surface area.
COBP103.5T	Understand types and formulation aspects of conventional dosage forms.
COBP103.6T	Remember physical, chemical & therapeutic incompatibility with respect to dosage form.

Pharmaceutical Inorganic Chemistry

Statement	
The students should be able to:	
COBP104.1T	To understand the various Pharmacopoeias
COBP104.2T	To understand the separation and qualitative analysis of liquid-liquid binary mixture.
COBP104.3T	To understand contaminants in pharmaceuticals, sources and its control.
COBP104.4T	To understand the concept of gastrointestinal agents and their properties
COBP104.5T	To understand the various electrolytes in human body and their properties



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COBP104.6T	To understand the essential trace elements and their properties
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Communication skills

Statement	
The students should be able to:	
COBP105.1	To understand the behavioral needs for a Pharmacist to function effectively in the areas of pharmaceutical operation
COBP105.2	To learn how to Communicate effectively
COBP105.3	To learn how to manage effectively team as a team player
COBP105.4	To study how to develop interview skills
COBP105.5	To learn about development of Leadership qualities and essentials
COBP105.6	To learn communication skill in group discussion

Remedial Biology

Statement	
The students should be able to:	
COBP106.1 RBT	know the classification of five kingdoms of life



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COBP106.2 RBT	know the salient features of five kingdoms of life
COBP106.3 RBT	understand the basic components of anatomy of plant
COBP106.4 RBT	understand the basic components of physiology of plant
COBP106.5 RBT	know the basic components of anatomy of animal with special reference to human
COBP106.6 RBT	know the basic components of physiology of animal with special reference to human

Remedial Mathematics

Statement	
The students should be able to:	
COBP106.1 RMT	Know the theory and their applications in Pharmacy
COBP106.2 RMT	Solve different types of problems by applying theory
COBP106.3 RMT	Appreciate the important applications of mathematics in Pharmacy.
COBP106.4 RMT	Apply mathematical concepts and principles to perform computations for Pharmaceutical Sciences.
COBP106.5 RMT	Apply the knowledge of mathematics for solving different problems related to pharmacy.
COBP106.6 RMT	Create, use and analyze mathematical representations and mathematical relationships

Human Anatomy and Physiology –Practical

Statement	
The students should be able to:	
COBP107.1P	Explain the construction, working, care and handling of various instruments and equipments for understanding the practical
COBP107.2P	Clarify significance of hematological test and hemocytometry
COBP107.3P	Identification of axial bones and appendicular bones



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COBP107.4P	Enumeration of white blood cell (WBC) count
COBP107.5P	Enumeration of total red blood corpuscles (RBC) count
COBP107.6P	Estimation of haemoglobin content and determination of blood group.

Pharmaceutical Analysis I – Practical

Statement	
The students should be able to:	
COBP108.1P	To perform the standardization of 0.1N NaOH
COBP108.2P	To perform the standardization of 0.1N Sodium thiosulphate
COBP108.3P	To perform the assay of sodium benzoate I. P. by non aqueous titration
COBP108.4P	To perform the assay of ammonium chloride by acid-base titration
COBP108.5P	To perform the assay of calcium Gluconate I. P. by complexometry
COBP108.6P	To perform the conductometric titrations of 0.1N HCl against 0.1N NaOH

Pharmaceutics I – Practical

Statement



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The students should be able to:	
COBP109.1P	State the correct use of various equipments in Pharmaceutics laboratory relevant to practicals.
COBP109.2P	Explain formulation, evaluation and labeling of syrups, elixirs, suspensions, emulsions, suppositories, ointment and powder preparations.
COBP109.3P	Perform pharmaceutical calculations to determine evaluation parameters like density, viscosity, specific gravity, angle of repose, Carr's index, Hausner ratio of preparations.
COBP109.4P	Describe use of ingredients in formulation and category of formulation.
COBP109.5P	Select the suitable packaging material (container-closure) for the preparation.
COBP109.6P	Draw the labels in neat way including all the component/parts.

Pharmaceutical Inorganic Chemistry –Practical

Statement	
The students should be able to:	
COBP110.1P	State the correct use of various equipments in Pharmaceutics laboratory relevant to practicals.
COBP110.2P	Explain formulation, evaluation and labeling of syrups, elixirs, suspensions, emulsions, suppositories, ointment and powder preparations.
COBP110.3P	Perform pharmaceutical calculations to determine evaluation parameters like density, viscosity, specific gravity, angle of repose, Carr's index, Hausner ratio of preparations.
COBP110.4P	Describe use of ingredients in formulation and category of formulation.
COBP110.5P	Select the suitable packaging material (container-closure) for the preparation.
COBP110.6P	Draw the labels in neat way including all the component/parts.



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Communication skills – Practical

Statement	
The students should be able to:	
COBP111.1P	To learn about basic communication skill
COBP111.2P	To learn about basic pronunciation
COBP111.3P	To learn about Writing Skills
COBP111.4P	To study Interview Handling Skills
COBP111.5P	To learn E-Mail etiquette
COBP111.6P	To learn Presentation Skills

Remedial Biology – Practical

Statement	
The students should be able to:	
COBP112.1RBP	Study of cell and its inclusions
COBP112.2RBP	Study of Stem, Root, Leaf, seed, fruit, flower and their modifications
COBP112.3RBP	Identify types of bones
COBP112.4RBP	Determine of blood group
COBP112.5RBP	Determine of blood pressure
COBP112.6RBP	Determine of tidal volume



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FIRST YEAR 2018-2019 SEM-II

Human Anatomy and Physiology II

Statement	
The students should be able to:	
CO BP201.1T	Explain Basic fundamental structural and functional features of Nervous system.
CO BP201.2T	Explain anatomy and physiology of digestive system.
CO BP201.3T	Explain anatomical and physiological importance of respiratory system.
CO BP201.4T	Discuss the essentials of urinary systems involve in regulation of Body functions.
CO BP201.5T	Explain Basic fundamental structural and functional features of endocrine system.
CO BP201.6T	Explain Basic fundamental structural and functional features of reproductive system.

Pharmaceutical Organic Chemistry I

Statement	
The students should be able to:	
CO BP202.1T	1. To understand danger, and risk involved in an organic laboratory.



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CO BP202.2T	2. To learn several safety measures and first aid methods in case of accidental exposure to hazards.
CO BP202.3T	3. To be able to identify simple organic compounds based on their physical and chemical properties.
CO BP202.4T	4. To learn laboratory techniques used in organic chemistry laboratory as vacuum filtration, distillation, crystallization, and drying of synthesized compounds.
CO BP202.5T	5. To learn skills involved in scaling down of requirements for synthesizing simple organic compounds.
CO BP202.6T	6. To learn techniques for purifying compounds synthesized in an organic chemistry laboratory.

Biochemistry

Statement	
The students should be able to:	
CO BP203.1T	To understand the role of organic chemistry in human physiology.
CO BP203.2T	Able to appreciate the chemistry of different nutrients.
CO BP203.3T	To understand the role and chemistry of biocatalysts and micronutrients like enzymes, vitamins and minerals.
CO BP203.4T	To be able to co-relate different physiological changes with the metabolic reactions.
CO BP203.5T	To be able to draw structures of amino acids as building blocks and perform theoretical peptide synthesis.
CO BP203.6T	To extend the chemistry of building blocks to genetic material.

Pathophysiology



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Statement	
The students should be able to:	
CO BP204.1T	Describe the etiology and pathogenesis of the selected disease states.
CO BP204.2T	Name the signs and symptoms of the diseases.
CO BP204.3T	Mention the complications of the diseases.
CO BP204.4T	Know the basic mechanism involved in the process of inflammation and repair:
CO BP204.5T	Know the various cardiovascular diseases like Hypertension, congestive heart failure, ischemic heart disease
CO BP204.6T	Know the infectious diseases like Meningitis, Typhoid, Leprosy, Tuberculosis Urinary tract infections and sexually transmitted diseases: AIDS, Syphilis, Gonorrhoea

Computer Applications in Pharmacy

Statement	
The students should be able to:	
CO BP205.1T	To understand different types of databases, applications of computers and databases in pharmacy.
CO BP205.2T	To illustrate the concept of number system in computers



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CO BP205.3T	To make use of web technologies such as HTML, XML, CSS, Programming languages, Web servers and pharmacy drug database.
CO BP205.4T	To appraise the applications of computers in pharmacy such as drug information services, pharmacokinetics, mathematical model in drug design, hospital and clinical pharmacy etc.,
CO BP205.5T	To explain about bioinformatics and its impact in vaccine discovery.
CO BP205.6T	To elaborate the applications of computers for data analysis in Preclinical development.

Environmental sciences

Statement	
The students should be able to:	
CO BP206.1T	Create the awareness about environmental problems among learners.
CO BP206.2T	Impart basic knowledge about the environment and its allied problems.
CO BP206.3T	Develop an attitude of concern for the environment.
CO BP206.4T	Motivate learner to participate in environment protection and environment improvement.
CO BP206.5T	Acquire skills to help the concerned individuals in identifying and solving environmental problems.
CO BP206.6T	Strive to attain harmony with Nature.



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Human Anatomy and Physiology II –PR

Statement	
The students should be able to:	
CO BP207.1P	Demonstrate various parameters are use to check and regulate the normal functions of Human body.
CO BP207.2P	Explain structural and microscopical aspects of various organs of human system
CO BP207.3P	Enumeration of differential white blood cell count (TLC)
CO BP207.4P	Perform the arneth index.
CO BP207.5P	Demonstrate the function of olfactory nerve, different types of taste, visual acuity
CO BP207.6P	Determine the tidal volume and vital capacity.

Pharmaceutical Organic Chemistry I–PR

Statement	
The students should be able to:	
CO BP208.1P	To understand danger, and risk involved in an organic laboratory.
CO BP208.2P	To learn several safety measures and first aid methods in case of accidental exposure to hazards.
CO BP208.3P	To be able to identify simple organic compounds based on their physical and chemical properties.
CO BP208.4P	To learn laboratory techniques used in organic chemistry laboratory as vacuum filtration, distillation, crystallization, and drying of synthesized compounds.
CO BP208.5P	To learn skills involved in scaling down of requirements for synthesizing simple organic compounds.
CO BP208.6P	To learn techniques for purifying compounds synthesized in an organic chemistry



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laboratory.

Biochemistry –PR

Statement	
The students should be able to:	
CO BP209.1P	To understand the role of organic chemistry in human physiology.
CO BP209.2P	Able to appreciate the chemistry of different nutrients.
CO BP209.3P	To understand the role and chemistry of biocatalysts and micronutrients like enzymes, vitamins and minerals.
CO BP209.4P	To be able to co-relate different physiological changes with the metabolic reactions.
CO BP209.5P	To be able to draw structures of amino acids as building blocks and perform theoretical peptide synthesis.
CO BP209.6P	To extend the chemistry of building blocks to genetic material.

Computer Applications in Pharmacy PR

Statement	
The students should be able to:	
CO BP210.1P	To demonstrate and make use of MS Office, MS Word, MS Excel, MS Access and MS Power point.
CO BP210.2P	To understand the paradigms of program languages and be exposed to at least one language from each model, C and SQL.
CO BP210.3P	To summarize the report and printing the report from patient Database
CO BP210.4P	To design a questionnaire using a word processing package to gather information about a particular disease.



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CO BP210.5P	To create HTML web page to show personal information
CO BP210.6P	To create mailing labels Using Label Wizard , generating label in MS WORD

2018-2019 SECOND YEAR

Physical Pharmaceutics-I

Statement	
The students should be able to:	
C231.1T	Acquire knowledge in Physical principles of states of matter and phase rule.
C231.2T	Explain various laws and theories of gases and correlate them with formation of aerosols.
C231.3T	Know about crystallization as well as various parameters of crystal like crystal forms, habits, Lattice angle, methods of crystal analysis, polymorphism.
C231.4T	Adapt knowledge of Non-electrolytic and Electrolytic solutions regarding their types and Properties mostly colligative properties.
C231.5T	Explain and apply the key physical pharmacy concepts of solubility and dissolution, partitioning phenomena, surface phenomena, etc.
C231.6T	Know applications of thermodynamics in the pharmacy.

Pharmaceutical Microbiology



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Statement	
The students should be able to:	
C232.1T	Elucidate the historical development, structural features, biology and characteristics of important microbes.
C232.2T	Understand the importance of microbial limit test, preservative efficacy testing & standardization process.
C232.3T	Explain classification, mechanism of action & effectiveness of disinfectants & sterilization process & their importance.
C232.4T	Illustrate types of immunity, basic aspects like Antigen, Antibody & their various interactions.
C232.5T	Focus on various aspects of immunology.
C232.6T	To gain knowledge about the vaccines and its classification, types of vaccines and their methods of preparation.

Pharmaceutical Biochemistry

Statement	
The students should be able to:	
C233.1T	To understand the role of organic chemistry in human physiology.
C233.2T	Able to appreciate the chemistry of different nutrients.
C233.3T	To understand the role and chemistry of biocatalysts and micronutrients like enzymes, vitamins and minerals.
C233.4T	To be able to co-relate different physiological changes with the metabolic reactions.
C233.5T	To be able to draw structures of amino acids as building blocks and perform theoretical peptide synthesis.
C233.6T	To extend the chemistry of building blocks to genetic material.

Pharmaceutical Organic Chemistry-III



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Statement	
The students should be able to:	
C234.1T	To understand the influence of stereochemistry over the course of reactions
C234.2T	To understand the importance of several heterocyclic compounds
C234.3T	To learn and remember classification of heterocyclic compounds
C234.4T	To learn the physical and chemical properties of several heterocyclic molecules
C234.5T	To appreciate the importance of heterocyclic compounds in biochemistry
C234.6T	To learn several rearrangement and name reactions

Pharmacology-I

Statement	
The students should be able to:	
C235.1T	Understand the basic pharmacology along with its scope. The nature and sources of drugs and route of drug administration.
C235.2T	To understand National drug Policy, Essential drug concept
C235.3T	Know the process of drug discovery and development
C235.4T	Understand pharmacokinetic, therapeutic drug monitoring



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C235.5T	Pharmacodynamics of drugs Understand receptor, drug receptor interaction
C235.6T	Drug toxicity, drug interaction and adverse drug reactions

Pharmacognosy & Phytochemistry – I

Statement	
The students should be able to:	
C236.1T	Explain meaning & significance of Pharmacognostic parameters & Pharmacognostic study of crude drugs.
C236.2T	Comprehend & explain underlying reason of evolutionary significance of secondary metabolites production in plants & other organisms & deduce their significance as medicinal molecules.
C236.3T	Explain evolution of Phytochemistry to current phase.
C236.4T	Comprehend & explain primary metabolites comprehensively from source to their Pharmaceutical & industrial applications.
C236.5T	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, explain general processes of preparation of semi-synthetic products, explain the properties of primary metabolites.
C236.6T	Define, classify, explain source, name & draw chemical structures, identify from the structure, organize the biosynthetic sequence, and describe methods of extraction & underlying rationale of qualitative & quantitative analysis of glycosides & tannin compounds of plant origin.

Physical Pharmaceutics- I PR

Statement	
The students should be able to:	



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C231.1P	To operate different pharmaceutical laboratory instruments used in determining various physical properties such as surface tension, viscosity, adsorption and solubility.
C231.2P	To calculate critical solution temperature & effect of addition of electrolyte on CST of phenol water system.
C231.3P	To construct of ternary phase diagram for three-component system.
C231.4P	To predict solubility and molecular weight.
C231.5P	To evaluate unknown concentration by conductometric titration.
C231.6P	To determine pKa of the given compound

Pharmaceutical Microbiology PR

Statement	
The students should be able to:	
C232.1P	Explain the principle, construction & working of various instruments & perform their operations.
C232.2P	To learn how to prepare & sterilize nutrient broth, nutrient agar, slant, stabs & plates by maintaining strictly aseptic conditions.
C232.3P	Determination of motility of bacteria by hanging drop technique.
C232.4P	Execute morphology of bacteria by simple, negative, gram & acid fast staining.
C232.5P	To study isolation of bacteria by streak plate technique & other plate technique.
C232.6P	Perform sterility testing, microbial assay & minimum inhibitory concentration techniques.

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Pharmaceutical Biochemistry PR

Statement	
The students should be able to:	
C233.1P	To be able to carry simple and common biochemical operations as preparation of buffers and several required reagents.
C233.2P	To be able to carry simple qualitative analysis on nutrients in chemistry laboratory.
C233.3P	To be able to carry simple qualitative analysis of biological matrices in chemistry laboratory.
C233.4P	To study experimental methods for analysing several normal biochemical parameters.
C233.5P	To be able to carry simple quantitative analysis of pathophysiological parameters in chemistry laboratory
C233.6P	To be able to perform quantitative analysis on biochemical substances in chemistry laboratory.

Pharmaceutical Organic Chemistry-III PR

Statement	
The students should be able to:	
C234.1P	Synthesize organic compounds by rearrangement e.g.: Benzilic acid rearrangement, pinacol-pinacolone rearrangement
C234.2P	Synthesize of organic compounds by rearrangement e.g Beckmann rearrangement, Hofmann reaction, Fries rearrangement
C234.3P	Study the techniques such as column chromatographic separation
C234.4P	Study the techniques such as thin layer chromatographic separation



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C234.5P	Separate and perform qualitative analysis of binary mixtures
C234.6P	Study the different Stereo models

Pharmacognosy & Phytochemistry – I PR

Statement	
The students should be able to:	
C236.1P	Prepare permanent slides & explain the significance of reference material such as herbarium specimen, permanent slides etc. in plant authentication.
C236.2P	Demonstrate skill of plant material sectioning, staining, mounting & focusing; decide on staining reagents required for specific part of plant.
C236.3P	Identify the parts of plants from its morphological & microscopical features by applying experimental & theoretical knowledge of morphology & anatomy obtained in theory classes.
C236.4P	Able to identify unorganized crude drugs & samples of powders of organized & unorganized crude drugs using morphological, chemical, physical & microscopical characteristics.
C236.5P	Able to handle various equipments as per SOPs (such as spectrophotometer, Tintometer, simple / compound / digital microscope, Abbe's Refractometer, Melting point apparatus) & judge the quality of material.
C236.6P	Explain significance of how laboratory experiments are linked with social needs. Able to judge the quality of crude drugs by different means & explain the significance of same in commerce & industry.

Physical Pharmaceutics II



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Statement	
The students should be able to:	
C241.1T	Acquire sufficient knowledge about surface and interfacial tension and its measurement. Describe spreading coefficient and adsorption isotherms and their significance.
C241.2T	Illustrate fundamentals and pharmaceutical applications of rheology.
C241.3T	Understand the different types of flow in order to identify and choose suitable flow characteristics for the formulation.
C241.4T	Understand the properties of particles and pharmaceutical powders, their significance in formulating pharmaceutical products, and the common methods for characterizing these properties.
C241.5T	Know types, properties and applications of colloids in the formulations.
C241.6T	Define reaction kinetics, reaction order, and discuss factors affecting the rate of the reaction. Describe the degradation and stabilization of medicinal agents as well as accelerated stability testing.

Pathophysiology & Clinical Biochemistry

Statement	
The students should be able to:	
C242.1T	Understand the basic concepts in Pathophysiology
C242.2T	Able to explain epidemiology, etiology, clinical manifestations of different diseases and disorders.
C242.3T	Understand diagnosis & plan of treatment for different diseases and disorders.
C242.4T	Able to know about pathophysiology of Anemia and leukemia
C242.5T	Understand the concept of pain and inflammation.
C242.6T	Understand the pathophysiology of CVD, respiratory and endocrine disorders.

Pharmaceutical Organic Chemistry-IV



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Statement	
The students should be able to:	
C243.1T	Know the structures with numbering of heterocyclic compounds, chemistry, methods of preparation and chemical reactions of five, six membered and fused heterocyclic rings.
C243.2T	Know schemes of synthesis and reactions of drugs containing heterocyclic rings.
C243.3T	Classify carbohydrates and understand reactions related to C5 and C6 sugars
C243.4T	Explain various techniques of combinatorial chemistry and understand applications of combinatorial chemistry in the speedy synthesis of organic compounds and peptides.
C243.5T	Understand general rules and guidelines involved in retro-synthesis and construct retrosynthesis of pharmaceutically important compounds
C243.6T	Comprehend the techniques of microwave assisted synthesis and explain applications of microwave assisted synthesis in pharmaceutical research.



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Statement	
The students should be able to:	
C244.1T	Independently operate and calibrate various analytical instruments for the separation/isolation and assay of various chemicals, drug intermediates as per Pharmacopoeial standards
C244.2T	Independently operate and calibrate various analytical instruments for the separation/isolation and assay of various APIs and formulations as per Pharmacopoeial standards
C244.3T	Independently process, interpret the data obtained through experimentation and report the results as per regulatory requirements.
C244.4T	Take appropriate safety measures while handling instruments, chemicals and apparatus.
C244.5T	Demonstrate the required level of professional competence in the planning, conducting, evaluation and reporting of the results of investigations, including the appropriate use of literature and secondary data.
C244.6T	Study principle advantages, disadvantages and applications of conductometer, Polari meter, refractometer.

Pharmacognosy & Phytochemistry – II

Statement	
The students should be able to:	
C245.1T	Comprehend & explain underlying reason of evolutionary significance of alkaloids formation in plants & other organisms & deduce their significance as medicinal molecules.
C245.2T	Explain & draw basic heterocyclic system present in alkaloids, define & classify alkaloids, explain source, name & draw chemical structures, identify from the structure, organize the biosynthetic sequence in formation of major group of alkaloids.
C245.3T	Describe methods of their extraction & explain underlying rationale of qualitative & quantitative analysis of alkaloids.
C245.4T	Explain historical significance & contribution of alkaloids in modern drug discovery, & their currently marketed semi-synthetic derivatives/ analogues.
C245.5T	Define, classify, explain source, name & draw chemical structures, identify from the structure, organize the biosynthetic sequence, and describe methods of extraction & underlying rationale of qualitative & quantitative analysis of terpenoids & resins.



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C245.6T	Explain historical significance & contribution of terpenoids / resins in modern drug discovery, & their currently marketed semi-synthetic derivatives/ analogues.
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Pharmaceutical Engineering

Statement	
The students should be able to:	
C246.1T	Know the history of profession of pharmacy.
C246.2T	Understand the basic concepts of dosage form design.
C246.3T	Understand the professional way of handling the prescription.
C246.4T	Calculate of drug dose according to age, body weight and surface area.
C246.5T	Understand types and formulation aspects of conventional dosage forms.
C246.6T	Remember physical, chemical & therapeutic incompatibility with respect to dosage form.

Physical Pharmaceutics II PR

Statement	
The students should be able to:	
C241.1P	Predict surface tension of given liquid.
C241.2P	Execute relative strength of two acids.
C241.3P	Calculate energy of activation of acid hydrolysis.



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C241.4P	Determine order of any reaction.
C241.5P	Find out composition of binary mixture by viscosity method.
C241.6P	Evaluate specific surface area, particle size distribution & derived properties of any material.

Pathophysiology & Clinical Biochemistry PR

Statement	
The students should be able to:	
C242.1P	Explain the application, maintenance and uses of various instruments in clinical biochemistry Laboratory.
C242.2P	To know the techniques of biological fluid collection and separation and its significance.
C242.3P	Understand the importance and estimation of various markers for liver diseases.
C242.4P	Understand the importance and estimation of various markers for kidney diseases.
C242.5P	Understand the importance and estimation of various markers for heart diseases.
C242.6P	Understand different techniques for the estimation blood glucose and its importance.

Pharmaceutical Organic Chemistry-IV PR



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Statement

The students should be able to:

C243.1P	Separate and perform qualitative analysis of binary mixtures of solid-liquid & liquid liquid.
C243.2P	Synthesize drugs & drug intermediates containing heterocyclic rings. e.g.: 4-Methyl 7-hydroxy coumarin (Coumarin derivative), Amino Pyridine (Pyridine derivative),
C243.3P	Synthesize drugs & drug intermediates containing heterocyclic rings. e.g.: 2, 3 - Diphenylquinoxaline (quinoxaline), Benzotriazole, Benzimidazole, Benzthiazole, etc.
C243.4P	Study microwave assisted reaction of organic compounds
C243.5P	Perform quantitative determination of reactive groups e.g. Phenolic hydroxyl, ester, carboxyl groups.
C243.6P	Perform quantitative determination of reactive groups e.g. carbonyl, primary amine, amide and nitro groups.

Pharmaceutical analysis-II PR

Statement

The students should be able to:

C244.1P	Calibrate pH meter, Conductometer, Refractometer and Polarimeter.
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C244.2P	Determine purity of Pharmaceutical substances by potentiometric titrations. (e.g. SA v/s SB, WA v/s SB, WB v/s SA)
C244.3P	Determine pKa of some monobasic, dibasic or tribasic acids of pharmaceutical importance.
C244.4P	Determine purity of some pharmaceutical substances by conductometric titrations. (e.g. SA v/s SB, WA v/s SB, WB v/s SA)
C244.5P	Measure Refractive Index (RI) and Molar Refraction of pharmaceutically important vegetable oils, glycerin-water mixture and organic solvents
C244.6P	Measure optical rotation and specific optical rotation of some sugars

Pharmacognosy & Phytochemistry – II PR

Statement	
The students should be able to:	
C245.1P	Identify the parts of plants from its morphological & microscopical features by applying experimental.
C245.2P	Conduct extractions/isolations & explain significance of use of various chemicals & physical conditions.
C245.3P	Identify unorganized crude drugs using morphological, chemical, physical & microscopical characteristics.
C245.4P	Conduct various analytical parameters of volatile oils & judge the quality of volatile oils.
C245.5P	Judge the quality of crude drugs by different means & explain the significance of same in commerce & industry.
C245.6P	Listen carefully, raise logical query, draw information, understand rationale during field visits & prepare brief report for evaluation



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Industrial Pharmacy-I

Statement	
The students should be able to:	
C351.1T	Understand the concepts of solid dosage form design & formulation strategies & evaluation.
C351.2T	To study Tablet as a dosage form, manufacturing, processing problems and their evaluation
C351.3T	Learn the concept, types, pharmacopoeial specifications & equipments used in tablet coating.
C351.4T	Learn about capsules, types, additives, size selection, manufacturing & evaluation, equipments, & defects.
C351.5T	Understand Concept of Scale up and technology transfer of solid dosage form.
C351.6T	Acquire knowledge about packaging materials, their properties and uses.

Pharmaceutical Analysis-III

Statement	
The students should be able to:	
C352.1T	To understand principle, instrumentation and applications of UV-VIS spectrophotometer.
C352.2T	To learn the principle, instrumentation, and applications of atomic absorption spectroscopy
C352.3T	To learn the principle, instrumentation, and applications of atomic emission spectroscopy



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C352.4T	To understand the principle, instrumentation and applications of flame photometry.
C352.5T	To be familiar with Fluorimetry and Phosporimetry
C352.6T	To study the mechanism of and Nepheloturbidimetry

Medicinal Chemistry-I

Statement	
The students should be able to:	
C353.1T	Understand the importance of medicinal chemistry in healthcare sector of the society
C353.2T	Realize the role of organic chemistry, anatomy and physiology, natural chemistry, and biochemistry to learn medicinal chemistry. Appreciate the history of medicines and their development from medieval age to the modern era.
C353.3T	Understand the receptor concept, their types and classifications, mechanism of activation, locations in the human body.
C353.4T	Comprehend the chemistry of neurotransmitters, their biosynthesis, release, pharmacology and fate, in the body
C353.5T	Grasp the aetiology, cure, mechanism of actions, of following therapeutic classes of drugs: Cholinergic, adrenergic, and cardiovascular.
C353.6T	Co-relate the organoleptic properties of drugs with their pharmacodynamics and



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	pharmacokinetic parameters.
C353.7T	Empathise to associate the observed pharmacologic activities with the molecular structure of drugs from categories listed in point 5.
C353.8T	To acquire logic towards using synthetic schemes of organic reactions to generate target structure of molecules that probably would be of medicinal importance.

Pharmacology-II

Statement	
The students should be able to:	
C354.1T	Understand and explain the pharmacology of drugs acting on autonomic nervous system.
C354.2T	Understand the poisoning of drugs and their management.
C354.3T	Explain the pharmacology of drugs used as skeletal muscle relaxants and neuromuscular blockers.
C354.4T	Get in-depth knowledge of Pharmacology of drugs used in the management of CVDs.
C354.5T	Understand the Mechanism and pharmacology of various diuretic and antidiuretic drugs,
C354.6T	Explain the pharmacology of drugs used in various respiratory disorders.

Analytical Pharmacognosy & Extraction Technology

Statement	
The students should be able to:	
C355.1T	Comprehend & explain underlying principle of mass transfer process in extraction, effect of various factors, specific care in herbal material, & various approaches in extraction processes.
C355.2T	Understand & explain principle & applications of chromatographic & nonchromatographic separation methods.
C355.3T	Explain source material & extraction methods of Phytochemical specified; draw schematic representation of such processes.
C355.4T	Explain need of analysis of natural products & explain their significance; Understand & explain various parameters with their principles, significance & applications.



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C355.5T	Understand Good practices for pharmaceutical quality control laboratories' (as perWHO).
C355.6T	Know current approaches in standardization like Biology approaches and DNA fingerprinting.

Pharmaceutical Business Management & Disaster Management

Statement	
The students should be able to:	
C356.1T	Learn the Pharmaceutical business and management strategy.
C356.2T	Ggain knowledge of marketing research, product management.
C356.3T	know important steps in planning, types of planning, planning process, advantages and limitations.
C356.4T	Study organizational structure, basic principles of organization, departmentalization, delegation, decentralization, staffing, line& staff organization with respect to production and QC/QA department.
C356.5T	Learn about human resource and development needs.
C356.6T	Learn about the disaster management and preparedness ,mitigation



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Active Pharmaceutical Ingredients Technology

Statement	
The students should be able to:	
C357.1T	Understand overview of API
C357.2T	Understand basics of chemical process kinetics
C357.3T	Understand chemical process, reaction system, equipments used in API manufacturing
C357.4T	Get detail knowledge of Quality control aspects, material safety data sheet (MSDS), Scale up techniques in API manufacturing
C357.5T	Industrial manufacturing process, flow charts of some important APIs.
C357.6T	Study ICH Q7 and Q11 guidelines

Industrial Pharmacy-I PR

Statement	
The students should be able to:	
C351.1P	Learn about different granulation methods and parts of compression machine and compression of tablets.
C351.2P	To learn the IPQC as per pharmacopoeial standards for formulation and evaluation of Tablet as per SOP.
C351.3P	To learn the IPQC as per pharmacopoeial standards for formulation and evaluation of capsule as per SOP.
C351.4P	In-vitro Dissolution test for at least one type of Tablet or Capsule formulation.
C351.5P	To study different packaging and its labeling materials of solid dosage forms and to perform leak test for Blister/strip pack



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C351.6P	To learn about survey of any one drug, its different solid dosage forms (Tablets and capsules) and rational behind designing of different dosage forms of same drug.
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Pharmaceutical Analysis-III PR

Statement	
The students should be able to:	
C352.1P	Independently operate UV-Vis Spectrophotometer and to perform its calibration
C352.2P	To perform the assay of Paracetamol API and tablet by calibration curve method
C352.3P	To perform the assay of Paracetamol API and tablet by calibration curve method
C352.4P	To determine the unknown concentration of Aspirin by single and double point method
C352.5P	To determine the unknown concentration of Na by flame photometry
C352.6P	To perform the Assay of Quinine sulphate Fluorimetry

Medicinal Chemistry-I PR

Statement	
The students should be able to:	
C353.1P	To be able to operate structure-drawing software as ACDCbabs Freeware.
C353.2P	To be able to search synthetic schemes for few drugs from reference books
C353.3P	To be able to perform several laboratory operations necessary for synthesizing organic molecules by routes involving multiple steps of reactions.
C353.4P	To be able to scale-down the requirements (chemical and apparatus) for synthesis of organic molecules.
C353.5P	To be able to purify synthesized molecules using techniques as crystallization and column



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	chromatography.
C353.6P	To be able to monitor the progress of reaction from the IR spectrum of synthesized compound.

Pharmacology-II PR

Statement	
The students should be able to:	
C354.1P	Understand the CPCSEA guidelines for animal experimentations.
C354.2P	Learn Various routes of drug administration and methods for blood collection from experimental animals.
C354.3P	Composition of physiological salt solutions and the importance of the components of PSS.
C354.4P	Basic instruments used in experimental pharmacology.
C354.5P	To perform various bioassays using isolated tissue preparations.
C354.6P	Learn about in vivo screening of drugs through computerized simulated software

Analytical Pharmacognosy & Extraction Technology PR

Statement	
The students should be able to:	
C355.1P	Explain & demonstrate correct handling of inflammable solvents & corrosive chemicals.



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C355.2P	Generate micrometric data & identify the crude drugs.
C355.3P	Conduct successive extraction & qualitative tests to ascertain chemical nature of crude drugs.
C355.4P	Apply theoretical knowledge obtained for extraction of phytochemicals, set extraction assembly, process material before extraction; explain significance of use of various chemicals/solvents/ conditions; undertake extraction, verify extracted material by qualitative tests & report yield.
C355.5P	Apply theoretical knowledge of various quality control parameters studied in theory, explain significance of use of various chemicals/solvents/conditions; undertake various estimations /determinations; infer from results obtained & report evaluation results
C355.6P	Able to handle various equipments as per SOPs & learn various demonstrations (of experiments).

Industrial Pharmacy-II

Statement	
The students should be able to:	
C361.1T	To study Formulation, Preparation, Evaluation & labeling of the suspension.
C361.2T	To study Formulation, Preparation, Evaluation & labeling of the emulsion
C361.3T	To study Formulation, Preparation, Evaluation & labeling of the semisolid dosage forms
C361.4T	To study assay of dosage form as a evaluation parameter.
C361.5T	To study market survey of various pharmaceutical dosage form.
C361.6T	To study different packaging and its labeling materials of semisolid dosage forms.



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Pharmaceutical Analysis-IV

Statement	
The students should be able to:	
C362.1T	To understand the basics of chromatography, instrumentation and applications.
C362.2T	To understand the separation using TLC, paper chromatography, HPTLC.
C362.3T	To understand electrophoresis and various developments.
C362.4T	To understand the basics behind TGA, DSC, DTA and their instrumentation and applications.
C362.5T	To learn the principle and instrumentation of X-ray diffraction
C362.6T	To understand the radiochemical methods and their pharmaceutical application

Medicinal Chemistry-II

Statement	
The students should be able to:	
C363.1T	1. To understand the cellular mechanism underlying precipitating of ailments in CNS and ANS.



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C363.2T	2. To understand the factors involved in ADMET of the drugs effective in treatment of ailments arising in CNS and ANS.
C363.3T	3. To understand the chemistry (SAR) of drugs effective in treatment of ailments arising in CNS and ANS.
C363.4T	4. To be able to remember structures of few drugs, along with their individual target for pharmacodynamic effects, of drugs used in ailments arising in CNS and ANS.
C363.5T	5. To be able to understand newer futuristic and recent strategies evolving to treat ailments arising in CNS and ANS.
C363.6T	6. To remember synthetic pathways of few drugs from each category included in treatment of ailments arising in CNS and ANS.
C363.7T	7. To understand the need, process, reactions of metabolism of drugs.

Pharmacology-III

Statement	
The students should be able to:	
C364.1T	To perform isolated experiments using various isolated preparation and the effect of different drugs on the concentration response curves.
C364.2T	To learn acute oral toxicity and OECD guidelines.
C364.3T	To perform interpolation bioassays using isolated tissue preparations.
C364.4T	To perform matching bioassays using isolated tissue preparations.
C364.5T	To perform bracketing bioassays using isolated tissue preparations.
C364.6T	Understand and perform various in vivo screening using computer simulated software.

Natural Product Chemistry



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Statement	
The students should be able to:	
C365.1T	Understand & explain tools & techniques used in study of biosynthetic pathways in plants.
C365.2T	Explain source, chemistry & applications of drugs from marine origin and also to compare & contrast marine & terrestrial sources of medicinal materials.
C365.3T	Explain difficulties in elucidation of biosynthetic pathways in plant & explain approaches used with their merits & demerits.
C365.4T	Understand & explain underlying reasons as why natural products are appropriate material in discovering new drugs & also explain their contribution in modern drug discovery.
C365.5T	Explain source, extraction, processing, chemistry & applications of natural products used in pharmaceutical & allied industry such as coloring, sweetening agents & polymers.
C365.6T	Compare & contrast nutraceuticals & functional foods & understand & explain their significance

Bioorganic Chemistry & Drug Design

Statement	
The students should be able to:	
C366.1T	Explain the significance of Bioorganic Chemistry and establish its relevance in drug design and discovery.
C366.2T	Describe various approaches in rational drug design.
C366.3T	Explain various drug targets and their biochemical features, physiological & pathophysiological roles and their significance in drug design.
C366.4T	Explain pro-drug concept in drug design.



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C366.5T	Know the general biochemical features, physiological role, their substrates/antagonists of Enzymes: a. Oxidoreductases: Monoamine Oxidase and Cyclooxygenase-1 and 2, HMGCoA reductase, DHFR (Human), DHFR (Bacterial), b. Transferase: Tyrosine Kinase (Leishmanial, Bacterial and Human). 10
C366.6T	Study various receptors like GABAA, Cholinergic, Adrenergic, Adenosine, Angiotensin, Dopamine, Glucagon, GLP-1, Serotonin, Glucocorticoid, Estrogen, PPAR- γ , Thyroid Hormone, Insulin receptors

Pharmaceutical Biotechnology

Statement	
The students should be able to:	
C367.1T	Able to explain Concept of Biotechnology & its state its scope in pharmacy
C367.2T	Understand Know the method of genetic engineering for production of rDNA products including monoclonal antibodies
C367.3T	Get in-depth knowledge of application about the application of genetic engineering in animals



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C367.4T	A knowhow of enzymes and their uses by immobilization
C367.5T	Fermenter for production of fermentation products and information
C367.6T	Fermenter process in production of vitamins and antibiotics.

Industrial Pharmacy-II PR

Statement	
The students should be able to:	
C361.1P	To study Formulation, Preparation, Evaluation & labeling of the suspension.
C361.2P	To study Formulation, Preparation, Evaluation & labeling of the emulsion
C361.3P	To study Formulation, Preparation, Evaluation & labeling of the semisolid dosage forms
C361.4P	To study assay of dosage form as a evaluation parameter.
C361.5P	To study market survey of various pharmaceutical dosage form.
C361.6P	To study different packaging and its labeling materials of semisolid dosage forms.

Pharmaceutical Analysis-IV PR

Statement	
The students should be able to:	



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C362.1P	Separation & determination of R _f values of mixture of glycine and l-alanine by TLC
C362.2P	Separation & determination of R _f values of mixture of glycine and l-alanine by paper chromatography
C362.3P	To perform calibration of UV-VIS Spectrophotometer
C362.4P	To perform the range and linearity of UV-Spectrophotometric assay method as per ICH guidelines
C362.5P	To learn the column chromatographic separation technique
C362.6P	To perform the interpretation of XRD spectrum

Medicinal Chemistry-II PR

Statement	
The students should be able to:	
C363.1P	To be able to operate structure-drawing software as ACDLabs Freeware.
C363.2P	To be able to search synthetic schemes for few drugs from reference books
C363.3P	To be able to perform several laboratory operations necessary for synthesizing organic molecules by routes involving multiple steps of reactions.
C363.4P	To be able to scale-down the requirements (chemical and apparatus) for synthesis of organic molecules.
C363.5P	To be able to purify synthesized molecules using techniques as crystallization and column chromatography.
C363.6P	To be able to assess the purity of synthesized compounds at laboratory level using simple techniques as TLC and determining melting points.



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Pharmacology-III PR

Statement	
The students should be able to:	
C364.1P	To perform isolated experiments using various isolated preparation and the effect of different drugs on the concentration response curves.
C364.2P	To learn acute oral toxicity and OECD guidelines.
C364.3P	To perform interpolation bioassays using isolated tissue preparations.
C364.4P	To perform matching bioassays using isolated tissue preparations.
C364.5P	To perform bracketing bioassays using isolated tissue preparations.
C364.6P	Understand and perform various in vivo screening using computer simulated software.

Natural Product Chemistry PR

Statement	
The students should be able to:	
C365.1P	Extract and isolate phytoconstituents a. Volatile oils- i) Camphor ii) Eugenol iii) Menthol iv) Citral
C365.2P	Estimate phytoconstituents e.g i) Estimation of Eugenol by I.P method ii) Estimation of Menthol by I. P. method iii) Estimation of Caffeine by HPLC
C365.3P	Isolate Phytoconstituents by column chromatography
C365.4P	Evaluate isolated phytoconstituents by chemical tests, chromatography and spectral analysis (UV and/IR) from above isolated compounds
C365.5P	Determine M. P., solubility, Optical rotation, Refractive Index, Spectral analysis of pure natural compound
C365.6P	Extract and isolate phytoconstituents Natural Colorants- (Min. 2Expts) i) Lycopine ii) Bixin iii) Curcumin iv) Henna



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Sterile Products

Statement	
The students should be able to:	
C471.1T	Able to explain the Preformulation and formulation parameters of sterile products.
C471.2T	Understand packaging materials used, official quality control tests for sterile products.
C471.3T	Get in-depth knowledge Classification and formulation of SVP
C471.4T	Get in-depth knowledge Classification and formulation of LVP
C471.5T	Understand formulation and evaluation of ophthalmic products
C471.6T	Get in depth knowledge of blood products and surgical dressing

Pharmaceutical Analysis-V

Statement	
The students should be able to:	
C472.1T	To Remember the physical aspects of electromagnetic radiations



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C472.2T	To Understand principles of spectral analyses and their application to structure elucidation on organic molecules.
C472.3T	To Apply the principles to different forms of spectral analyses in correlation with molecular structure
C472.2T	To Correlate molecular structure with the corresponding spectra
C472.2T	To Detail the principle, instrumentation and applications of Advanced Chromatographic techniques.
C472.2T	To Maximize knowledge on automated methods of analysis

Medicinal Chemistry-III

Statement	
The students should be able to:	
C473.1T	Summarize and explain various synthetic Antibacterial and Antiprotozoal with respect to structure, IUPAC nomenclature, SAR, MOA, metabolism, synthesis and rational development.
C473.2T	Distinguish and explain various Antibiotics with respect to structure, IUPAC nomenclature, SAR, mode of action, metabolism, synthesis and rational development.
C473.3T	Understand and explain Anticancer and antiviral drugs with respect to structure, IUPAC nomenclature, SAR, mode of action, metabolism, synthesis and rational development.



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C473.4T	Explain and write structure, IUPAC nomenclature, SAR, MOA, metabolism and synthesis of steroids and hormones.
C473.5T	Understand and explain Antiviral drugs with respect to structure, IUPAC nomenclature, SAR, mode of action, metabolism, synthesis and rational development
C473.6T	Illustrate the Synthetic schemes of various drugs

Pharmacology-IV

Statement	
The students should be able to:	
C474.1T	Study classification, mechanism of action, antibacterial spectrum, resistance, therapeutic uses, adverse effects and contraindications of various antibiotics
C474.2T	Know various endocrine hormones, its types, receptors involved and mechanisms involved.
C474.3T	Know biosynthesis, Mechanism of action, Pharmacology and regulation of Thyroid, antithyroid drugs and Parathyroid hormones.
C474.4T	Study biosynthesis, Secretion, Mechanism of action, Pharmacology of insulin and glucagon and Pharmacotherapy of Diabetes Mellitus.
C474.5T	Study pharmacology of Androgens, Estrogens, Progestin and oral contraceptives.
C474.6T	Understand drugs acting on Uterus: Pharmacology of uterine stimulants and relaxants

Natural Drug Technology



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Statement	
The students should be able to:	
C475.1T	Comprehend & explain various factors affect on level of secondary metabolites, how these can be minimized to ensure quality in raw material, effect of post harvesting manipulations, and changes during storage etc & methods to control these modification.
C475.2T	Explain various guidelines issued by WHO in relation with cultivation, collection, storage etc.
C475.3T	Understand & explain concept of health & pathogenesis, philosophical basis, diagnosis & treatment aspects of Ayurveda, Unani, Siddha & Homoeopathic system of medicine; Understand & explain method of preparation of Ayurvedic dosage forms; significance of novel drug delivery of natural products; herbs used in cosmetic preparation & methods of their formulations.
C475.4T	Understand and explain the applications of plant tissue culture for Secondary metabolite production.
C475.5T	Explain the approaches and potentials of herbal new drug delivery systems like liposomes, phytosomes, nanoparticles and vesicles.
C475.6T	Understand & 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.

Bio-pharmaceutics & Pharmacokinetics

Statement	
The students should be able to:	
C476.1T	Understand the concept of Biopharmaceutics and its applications in formulation development.
C476.2T	Study pharmacokinetic processes and their relevance in efficacy of dosage form.
C476.3T	Able to Learn the concepts of bioavailability and bioequivalence studies
C476.4T	Able to Learn various compartmental models and non compartmental analysis methods.
C476.5T	Study Biopharmaceutical Classification System and its applications.
C476.6T	Understand concept and mechanisms of dissolution and <i>In Vitro In Vivo Correlation</i> .



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Pharmaceutical Jurisprudence

Statement	
The students should be able to:	
C477.1T	Understand basic principles, purpose & dimension of pharmaceutical legislation in India.
C477.2T	Get in-depth knowledge about important rules and regulations and procedures made to execute the laws.
C477.3T	To learn the various pharmaceutical laws governing the import, manufacturing, sale, packaging & labeling of drugs.
C477.4T	Memorise & recall the law related with narcotic drugs, pharmaceutical industry, pharmacy education, drug pricing, objectionable advertisement & consumer.
C477.5T	Define & explain about patents, procedure for patent application, generic drugs (India & U.S) and IPR.
C477.6T	To understand the regulatory system for safety and effectiveness of medicine and quality of product.

Sterile Products PR

Statement	
The students should be able to:	
C471.1P	Understand Formulation development ,evaluation and labeling of SVPs, LVPs, and ophthalmic preparations



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C471.2P	Expertise in sealing of ampoules
C471.3P	Understand Pharmacopoeial evaluation of packaging materials
C471.4P	To get knowledge of Evaluation of marketed preparations
C471.5P	Understand formulation and evaluation of ophthalmic products
C471.6P	Get in depth knowledge of Accelerated stability testing of marketed samples.

Pharmaceutical Analysis-V PR

Statement	
The students should be able to:	
C472.1P	To perform the simultaneous equation method to find out unknown concentration of drug.
C472.2P	To perform the Q point method to find out unknown concentration of drug.
C472.3P	To record IR spectra of the compounds
C472.4P	To interpret IR spectra of the Aliphatic and aromatic compounds
C472.5P	To build the ability to perform various experiments on analytical instruments.
C472.6P	To Demonstrate the experiments like Gas Chromatography, Atomic Absorption Spectrophotometry, Scanning Electron Microscopy.

Medicinal Chemistry-III PR

Statement	
The students should be able to:	
C473.1P	Introduce about purification technique and characterization by TLC, IR and MP.



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C473.2P	Know principle & synthesis of various organic compounds by name reactions (Biginelli reaction, Beckmann Rearrangement)
C473.3P	Explain and perform the esterification and reversible reaction concept
C473.4P	Understand the interpretation of IR spectra of synthesized compounds
C473.5P	Demonstration of Column chromatography and GC
C473.6P	Elaborate the characterization by Proton NMR

Pharmacology-IV PR

Statement	
The students should be able to:	
C474.1P	Discuss of isolated tissue preparations for bioassay method
C474.2P	Discuss of isolated tissue preparations for pA2 and pD2 value method
C474.3P	Basic aspects to carryout neurobehavioral characterization
C474.4P	Understanding various parametric tests used in biostatistics.
C474.5P	Understanding various non-parametric tests used in biostatistics.
C474.6P	Solve statistical problems using suitable software.



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Natural Drug Technology PR

Statement	
The students should be able to:	
C475.1P	Prepare, label & evaluate herbal/TSM formulations.
C475.2P	Evaluate marketed cosmetic & nutraceutical formulations.
C475.3P	Conduct preformulation parameters & understand underlying rationale.
C475.4P	Conduct in vitro assays for correlation with biological efficacy.
C475.5P	Able to handle various equipments as per SOPs & learn various demonstrations (of experiments).
C475.6P	Listen carefully, raise logical query, draw information, understand rationale during field visits & prepare brief report for evaluation.

Advanced Drug Delivery System

Statement	
The students should be able to:	
C481.1T	Able to explain Concept of Modified Drug Release with various approaches
C481.2T	Understand Polymers ,application and examples.



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C481.3T	Get in-depth knowledge of application and evaluation of Novel Drug Delivery Systems
C481.4T	Understand formulation development of aerosols.
C481.5T	Formulation development sustain release tablets
C481.6T	Study Micro encapsulation techniques.

Cosmetic science

Statement	
The students should be able to:	
C482.1T	Understand the concepts of cosmetics, anatomy of skin v/s hair, general excipients used in cosmetics and the concept of cosmeceuticals, history, difference between cosmetics & cosmeceuticals & cosmeceuticals agents.
C482.2T	Explain formulation of cosmetics for skin, manufacturing, equipments & evaluation of creams like cold cream, vanishing cream etc. & powder cosmetics.
C482.3T	Explain formulation of cosmetics for hair, manufacturing & evaluation of hair shampoos, and describe formulation of cosmetics for eyes, manufacturing & evaluation of eye mascara, eye shadow etc.
C482.4T	Understand formulation of manicure products like nail lacquer, remover etc .
C482.5T	Learn formulation, manufacture & evaluation of baby cosmetics like baby oils, powders etc.
C482.6T	Explain the concept of cosmeceuticals, history, and difference between cosmeceutics, cosmeceuticals & cosmeceuticals agents.

Pharmaceutical Analysis VI



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Statement	
The students should be able to:	
C483.1T	To Understand the principles of spectral analysis and their application to structure elucidation on organic molecules.
C483.2T	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.
C483.3T	To Understand the principles and several modes of chromatographic techniques and their applications in pharmaceutical analysis.
C483.4T	To Remember different aspects, guidelines and parameters of validation, as per official pharmacopoeia.
C483.5T	To understand the principles and applications of modern microscopic techniques used in research.
C483.6T	To understand the spectrometric methods of analysis in determining the molecular weight of the compounds.

Medicinal Chemistry-IV

Statement	
The students should be able to:	
C484.1T	Summarize and explain various autocooids and NSAIDs with respect to structure, IUPAC nomenclature, SAR, mode of action, metabolism, synthesis and rational development.
C484.2T	Understand and explain various drugs as Antidiabetics with respect to structure, IUPAC nomenclature, SAR, mode of action, metabolism, synthesis and rational development.
C484.3T	Distinguish and explain various drugs as Steroids with respect to structure, IUPAC nomenclature, SAR, mode of action, metabolism, synthesis and rational development.
C484.4T	Explain and write structure, IUPAC nomenclature, SAR, mode of action, metabolism and synthesis of narcotic analgesic drugs.
C484.5T	Know the various Diagnostic agents and Serotonergic agents
C484.6T	Illustrate the Synthetic schemes of various drugs.



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Pharmacology V

Statement	
The students should be able to:	
C485.1T	Study important aspect, classification, mechanism of drug-drug interaction and ADRs.
C485.2T	Know the basic aspects of drug safety and Pharmacovigilance in relation to monitoring and reporting of ADRs.
C485.3T	Understand the functioning and role of hospital pharmacy and practice of rational drug therapy
C485.4T	Know the clinical trials, ethics and practice of Good Clinical Practice involved in clinical trials.
C485.5T	Understand the process, working and personnel involved in clinical data management and their roles.
C485.6T	Study the methods of assessment of patient compliance and non-compliance.

Natural Products: Commerce, Industry & Regulations

Statement	
The students should be able to:	
C486.1T	Understand & realize the significance of natural products in daily life.
C486.2T	Realize the market potential of natural products & explore entrepreneurship skills to grab these opportunities.
C486.3T	Classify different segments in market, demand & supply position; export & import potential.
C486.4T	Understand & explain safe use of natural products, possible toxicities & interaction, toxicities in most venerable group (elderly patients), need & significance of Pharmacovigilance systems; WHO guidelines in this regard.
C486.5T	Position of Indian herbal drug industry in global contest; government organizations &



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	policies for promotion; their regulation in India & other countries, various regulatory guidelines, ethical issues etc.
C486.6T	Know plant Allergens, classification, Plants causing Hay fever, allergy, Idiosyncrasy, and applications of allergens in diagnosis & treatment and method of preparation of allergenic extracts.

Quality Assurance Tech.

Statement	
The students should be able to:	
C487.1T	Describe the significance of quality in pharmaceutical manufacturing.
C487.2T	Explain Current Good Manufacturing Practices
C487.3T	Describe various aspects of documentation, SOPs and records
C487.4T	Elaborate on the role of validation in assurance of quality in pharmaceutical industry
C487.5T	Explain about quality by design
C487.6T	Explain about ICH guidelines in stability testing and QMS

Advanced Drug Delivery System PR



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Statement	
The students should be able to:	
C481.1P	To understand polymer evaluation
C481.2P	To understand formulation and evaluation of sustain release formulation
C481.3P	To understand formulation and evaluation of transdermal and gastroretentive formulation
C481.4P	To understand microencapsulation technique
C481.5P	To get knowledge of evaluation of marketed preparation
C481.6P	To understand optimization using factorial design

Cosmetic science PR

Statement	
The students should be able to:	
C482.1P	State the correct use of various equipments in Pharmaceutics laboratory relevant to cosmetics.
C482.2P	Perform formulation, evaluation & labeling of various cosmetics like moisturizing cream, vanishing cream etc.
C482.3P	Perform formulation, evaluation & labeling of various cosmetics like eye cosmetics, nail



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	lacquer & shampoo.
C482.4P	Perform formulation, evaluation & labeling of shaving cream, after shave & baby products.
C482.5P	Describe the use of ingredients in formulation & category of formulation.
C482.6P	Prepare label as per regulatory requirements.

Pharmaceutical Analysis VI PR

Statement	
The students should be able to:	
C483.1P	To remember and recall the principles involved in spectroscopy and validation and its importance in the pharmaceutical industry.
C483.2P	To experiment with selected drugs by UV Visible spectroscopy and perform its validation parameters as per ICH guidelines
C483.3P	To experiment with selected drugs by HPLC and study the system suitability parameters as per IP/BP/USP protocol.
C483.4P	To study quantitation techniques in HPLC
C483.5P	To maximize the knowledge on integration and interpretation of chromatograms and spectra.
C483.6P	To solve the numerical problems to correlate spectral data obtained from analyses (UV, Visible, IR, NMR, and Mass) to the molecular structure.

Medicinal Chemistry-IV PR

Statement	
The students should be able to:	
C484.1P	Introduce about purification technique and characterization by TLC, IR and MP.



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C484.2P	Know principle & synthesis of various organic compounds by name reactions (Biginelli reaction, Beckmann Rearrangement)
C484.3P	Explain and perform the esterification and reversible reaction concept
C484.4P	Understand the interpretation of IR spectra of synthesized compounds
C484.5P	Demonstration of Column chromatography and GC
C484.6P	Elaborate the characterization by Proton NMR

Pharmacology V PR

Statement	
The students should be able to:	
C485.1P	Discuss of isolated tissue preparations for bioassay method
C485.2P	Discuss of isolated tissue preparations for pA2 and pD2 value method
C485.3P	Basic aspects to carryout neurobehavioral characterization
C485.4P	Understanding various parametric tests used in biostatistics.
C485.5P	Understanding various non-parametric tests used in biostatistics.
C485.6P	Solve statistical problems using suitable software