Course Outcome of B. Pharm.

1st Semester	
C202.1 **Year of Study 2016-17** **Pharmaceutics I (Introduction to Pharmaceutics)** **341116(41) - T** **341126(41) - P**	**CO1:** Make student know the History of Pharmacy. They will come to know about content of Pharmacopoeia and its importance. **CO2:** The students will understand the importance of Prescription. Interpret the Prescription. Study the art and science involved in Prescription writing. Understand about Incompatibility. Types of Incompatibility and ways to overcome/correct incompatibility. **CO3:** Discuss principles and procedures involved in Pharmaceutical preparations (Liquid, Semi solid and solids). **CO4:** Apply mathematical principles to calculate the quantity of ingredients for formulation preparation. Discuss posology and various formula to calculate Child Dose. Understand various routes of drug administration with their advantages and disadvantages. **CO5:** The student will know the principles and methods involved in extraction of drugs from natural sources.

2nd Semester	
C202.2 **Year of Study 2016-17** **Pharmaceutical Chemistry-III (Organic Chemistry-2)** **341219(41) – T** **341229(41) - P**	**CO1:** All organic compounds are hydrocarbons in nature. Learning of organic chemistry means learning the chemistry of hydrocarbons. In this syllabus the students are going to learn about the chemistry of hydrocarbons, which includes their preparation, physical & chemical properties. The first module includes Alkanes and Alkenes. The important reactions of this module are Free radical substitution reaction of alkanes, oxidation of alkanes, pyrolysis or cracking of alkanes and addition reactions of alkenes (Markovnikov's Rule and Anti-Markovnikov Rules). **CO2:** The second module consists of chemistry of Alkynes and Alcohol. The important reactions are elimination reaction and substitution reactions, saytzeff's rule. **CO3:** Carbonyl group is the most important functional group of organic chemistry. This module covers the chemistry of aldehydes and ketones as well as general methods of preparation and reactions of carbonyl compounds. The important reactions are substitution reactions, Aldol condensation reaction, Cannizzaro reaction, Clemmensen reduction. **CO4:** This module includes chemistry of carboxylic acid. The important reactions are esterification reactions and substitution reactions. **CO5:** Module five deals with some common reactions *i.e.* catalytic hydrogenation, dehydrogenation, sigmatropic reaction and electrocyclic reaction.
3rd Semester	
C202.3 **Year of Study 2016-17** **Pharmaceutics IV (Physical Pharmacy-I)** **341316 (41) – T** **341326 (41) - P**	**CO-1** : To understand & classify the state of matters, & its properties. To learn about, gases, aerosol, inhalers, various heat process, factors & phenomena of state changing. **CO-2** : To understand & correctly use thermodynamic terminology, explain fundamental thermodynamic properties & process, define the concept of heat, work & energy. To understand the thermo-chemical equation & phase behaviours. **CO-3** : To understand the ideal & real solution, its properties. To learn about colligative properties & conductivity. **CO-4** : To understand the law of flow & factors influencing the flow characteristics, fundamental concept & types of flow along with their application. Estimation of viscosity by using different viscometers. **CO-5** : To learn about buffer solution Its properties & applications. To understand isotonic solution, measurement, calculation & adjustment of isotonicity. **CO-6** : To learn about basis concept of adsorption & adsorption isotherm, to understand Langmuir theory & BET equation. **CO-7** : To understand the concept of surface & interfacial tension & its method of determination, solubilisation capacity, adsorption at various interfases & learn about surface active agent , HLB classification, complex film & electrical properties.
4th Semester	
C202.4	**CO1-** To provide students with the latest information in scientific

Year of Study 2016-17 **Pharmaceutical Microbiology** **341410(41) – T** **341420(41) - P**	microbiological methods and Historical development, **CO2-Microbiological Taxonomy** Morphology. Cultural characters. Biochemical parameters of bacteriology and virology. **CO3-**. To provide advanced knowledge, understanding, of identification of bacteria and different methods including staining procedure for no. of bacteria and their cultivation schemes. **CO4-**. Define the organs commonly involved in the infection. Recall the relationship of this infection to symptoms, relapse and the accompanying pathology. Explain the methods of microorganisms control, e.g. disinfectant and antiseptics. Solve problems in the context of this understanding. **CO5-**. To understand the process of infection and factors affecting, To discuss the phenomenon of immunity and its management. **CO6-**. To explain the treatment of industrial waste and sewage disposable schemes.
5th Semester	
C202.5 **Year of Study 2016-17** **Pharmacognosy – III** **341518 (41) – T** **341528 (41) - P**	**CO1:** Students will be understand the basic knowledge of biosynthesis of secondary metabolites in plants. A radio tracer technique provides detail about the various step involved for the biosynthesis of secondary metabolites. **CO2:** After the completion of the module student will be able familiar with extraction, isolation and chemistry of Glycosides, Lignans, Quassinoids and Flavonoids. **CO3:** Students shall be able to understand theExtraction, Isolation and Chemistry of Atropine, Quinine, reserpine, morphine and Vinca Alkaloids. In addition they also aware about Extraction, Isolation and Chemistry Xanthine bases alkaloids **CO4:** This module will assist the student to have a good understanding about Extraction, Isolation and Chemistry of Terpenoids namely Camphor, Menthol, Citral, β- Carotene, α -Tocopherol, α-Pinene.They will be aware with the pharmacological activity and importance of above chemical constituents. **CO5:** This module summaries the fundamental aspects and importance of Natural Pesticides and Insecticides. Understand the pharmacognostical, properties and pharmacological activity of Toxic Drugs namely Allergens, hallucinogens, narcotics, mycotoxins, toxic mushrooms and Indian toxic plants. Make student aware about the natural plant bitters and sweeteners.
6th Semester	
C202.6 **Year of Study 2016-17** **Medicinal Chemistry – II**	**CO1:** At the end of this module students would have acquired basic knowledge of Oxidation Reduction Titrations. Understand the students to determine the quantity of drug present in different dosage form. **CO2:** Students understand about principle and application of Diazotisation titrations, Kjeldahl method of nitrogen estimation, Karl-

	Fischer titration and Oxygen flask combustion gasometry.
341617 (41) – T **341626 (41) - P**	**CO3:** Students shall be able to understand the principle and application of Conductometry, Polarography and Amperometry. Conductometric titration is carried out in order to measure the electrical conductivity of the reaction mixture. **CO4:** At the end of this module student understand about Radio immune assays, ELISA tests, Electrophoresis and Immuno electrophoresis. Student determines the antigen concentration in different antibody by using Radio immunoassays and ELISA tests. **CO5:** In this module, student will be able to know the principle, instrumentation and pharmaceutical importance of Thermogravimetry, Differential Thermal Analysis, Differential Scanning Calorimetry, ermometric titration.
7th Semester	
C202.7 **Year of Study 2016-17** **Pharmaceutics – XI (Biopharmaceutics and Pharmacokinetics)** **341717(41) – T** **341726(41) - P**	**CO1:** Make student aware of basics of Biopharmaceutics and Pharmacokinetics and their role in formulation development and clinical setting. **CO2:** To understand the mechanism of passage of drugs across biological barrier and factors influencing absorption including physicochemical, physiological and pharmaceutical. **CO3:** How the drug is distributed in the body and what is the role of plasma protein binding. To understand the different mechanism of drug metabolism in the body. **CO4:** Understanding of drug excretion through other routes than gastrointestinal and urinary such as saliva, tears, sweat, milk, semen and their subsequent effect. **CO5:** To learn about compartment models and their scope. **CO6:** To compute various pharmacokinetic parameters such as volume of distribution, distribution coefficient, half-life, absorption constant, clearance etc using various models **CO7:** To understand applications of clinical pharmacokinetics in dosage adjustment in patients with and without renal and hepatic failure **CO8:** To learn about pharmacokinetic drug interactions and their significance in combination therapy **CO9:** To estimate bioavailability and bioequivalence and different parameters such as C_{max}, t_{max} , and Area under the Curve (AUC) using both plasma and urinary data.
8th Semester	
C202.8 **Year of Study 2016-17** **Pharmaceutical Jurisprudence** **341819(41) - T**	Upon completion of the subject student shall be able to: **CO1**- The Pharmaceutical legislations and their implications in the development and marketing. **CO2**- Various Indian pharmaceutical Acts and Laws. **CO3**- The regulatory authorities and agencies governing the manufacture and sale of pharmaceuticals. **CO4** –The code of ethics during the pharmaceutical practice.

Course Outcomes	Programme Outcomes										
	1	2	3	4	5	6	7	8	9	10	11
C201.1 Pharmaceutics I (Introduction to Pharmaceutics)											
CO1: Make student know the History of Pharmacy. They will come to know about content of Pharmacopoeia and its importance.	3	1	1	1	1	3	3	2	1	2	1
CO2: The students will understand the importance of Prescription. Interpret the Prescription. Study the art and science involved in Prescription writing. Understand about Incompatibility. Types of Incompatibility and ways to overcome/correct incompatibility.	3	1	1	1	1	3	2	2	2	2	3
CO3: Discuss principles and procedures involved in Pharmaceutical preparations (Liquid, Semi solid and solids).	3	3	2	3	1	3	3	2	2	2	3
CO4: Apply mathematical principles to calculate the quantity of ingredients for formulation preparation. Discuss posology and various formulas to calculate Child Dose. Understand various routes of drug administration with their advantages and disadvantages.	3	3	3	3	1	2	3	3	2	2	3
CO5: The student will know the principles and methods involved in extraction of drugs from natural sources.	3	3	2	3	1	3	3	2	2	2	3
Average Course Outcome = 2.44 (Max 3)	3	2.2	2	3	1	2.8	2.8	2.2	1.8	2	2.6
C201.2 Pharmaceutical Chemistry – I (Inorganic)											
CO1: After the completion of the chapter student will be able to know the different types of impurities and the way in which the contaminate the pharmaceutical product and also the quantitative determination of heavy metal and other impurities by limit test as per the pharmacopeia procedure and quality control.	3	2	3	1	1	2	2	2	2	3	2
CO2: The chapter can be concluded with the students being familiar with types of acid bases and buffers and physiological buffer systems of body and importance of acid bases and buffers in pharmacy. Different inorganic compounds that find use in the treatment of gastrointestinal diseases.	3	2	2	1	1	2	2	3	2	3	3
CO3: At the end of this chapter pupils will be acquainted with the knowledge of different cations and anions, Electrolytes used for replacement therapy, acid-base balance, Trace ion elements and their systemic importance.	3	3	2	1	1	1	2	2	2	2	3
CO4: After the completion of the chapter student	3	3	2	1	1	2	3	2	1	2	2

will be able to be familiar with different topical agents oxygen Carbon dioxide and dental products in healthcare.											
CO5: After the completion of the chapter student will be able to be well-known with complexing agents, pharmaceutically important radiopharmaceuticals and radio opaque contrast media, poisons and antidotes, pharmaceutical aids.	3	3	2	1	1	2	3	2	2	3	3
Average Course Outcome = 2.35 (Max 3)	3	2.6	2.2	1	1	1.8	2.4	2.2	1.8	2.6	2.6
C201.3 Pharmacognosy - I											
CO1: Students will be understand Introduction to plant kingdom, plant cell and tissues for the study & development crude drugs.	3	2	2	3	1	2	2	2	3	3	3
CO2 : Students will be understand regarding the classification & what are the general source of drug.	3	1	2	3	1	2	3	2	2	3	3
CO3: Students will get knowledge of botanical study of various families' educational as well as commercial purpous.	3	2	1	2	1	3	2	2	2	3	3
CO4: To understand the modern concept of Adulteration & Drug evaluation. They give the broad spectrum of identity, purity & quality of crude drugs.	3	2	2	3	1	3	2	2	2	3	3
CO5: The student should be able to know the effective use of fibres in pharmacy. Pharmacognostic study, Method of preparation & wide application in pharmaceutical industries for manufacturing as well as commercial value.	3	2	3	3	1	3	2	2	2	3	3
Average Course Outcome = 2.46 (Max 3)	3	1.8	2	2.8	1	2.6	2.2	2	2.2	3	3
C201.4 Anatomy physiology & Health Education- I											
CO1: From this chapter students will understand the basic classification of animal kingdom. Students will also learn about the main aim of studying anatomy and physiology with the different anatomical terminology which are used for giving location to any organ in our body. They will be taught about the basic organization of a living being and what are the different parts which are mainly responsible for different function in a living organism.	3	2	2	3	1	2	3	2	2	3	3
CO2: It is very much important to know about the elementary tissue of the body from which our body is made. The students will learn the location and function of these tissues in various organs. They will come to know about the location and function of different bones in our body and their related disorders. They will discuss about the mechanisms of muscle contraction in our body for proper	3	2	2	3	1	2	3	2	2	3	3

movement and also the disorders associated with them.											
CO3: The students will gain knowledge about the composition and function of blood, how the coagulation takes after any cut in our body, various blood groups in our body for proper knowledge so that they can help the society for blood transfusion. Also the various disorders which are related to the haemopoetic system. They will also understand the formation, composition and function of lymph and the disorders which are mainly associated with the lymphatic system.	3	3	2	3	1	2	3	2	3	3	3
CO4: In this module the students will understand about the structure and function of different part of cardiac system. Student will get to know the basic mechanism of working of heart and various diseases associated with heart, cardiac cycle and ECG.	3	2	2	3	1	2	3	3	2	3	3
CO5: The students will learn about the gross anatomy of gastrointestinal tract and the various gastrointestinal secretions which are involved in the digestion and absorption of food that we take in. Here, the students will also learn about the various diseases of digestive system.	3	3	2	3	1	2	3	2	2	3	3
Average Course Outcome = 2.58 (Max 3)	3	2.4	2	3	1	2	3	2.2	2.2	3	3
C201.5 Pharmaceutical Chemistry- II (Organic Chemistry- 2)											
CO1: This is a conceptual part of Organic chemistry. It includes structure of atoms, orbital theory and hybridization. It will build up a strong perspective about physical and chemical properties of atoms as well as molecules. We know that drug-receptor interaction follows molecular level mechanism. It means one or two molecules of a drug interacts with a single receptor through intermolecular forces like dipole-dipole interaction, hydrogen bonding, ion-dipole interaction, vander-wall forces *etc.*	3	3	3	2	2	1	2	2	3	2	3
CO2: After completion of this lesion students will be know about the all types of organic reactions.	3	3	2	2	2	1	2	1	3	1	3
CO3: IUPAC nomenclature is the most important part of chemistry which deals with the rational naming of chemical entity. In this module students will know how to name the organic compounds. This module also includes the study of reaction intermediates like carbocations, carboanions and free radicals. Reaction intermediates play an important role to direct a reaction. Knowing about the same students will able to understand and describe a mechanism in better way.	3	3	2	3	2	2	2	1	2	2	2
CO4: Drug-receptor interaction is stereo specific. So,	3	3	3	3	2	2	2	2	3	3	3

it is very much important to know the concepts of stereoisomerism. Stereochemistry is very vast area of chemistry. After the completion of this module student will have the concepts of stereoisomerism and configuration of organic compounds. This will help them to understand the mechanism of drug-receptor interaction in better way in higher classes.											
CO5: This module is the extension of previous module. It includes E & Z forms of molecules, newman projections and conformational isomerism, which are the fundamentals of stereochemistry.	3	3	3	3	1	2	2	2	2	1	3
Average Course Outcome = 2.31 (Max 3)	3	3	2.6	2.6	1.8	1.6	2	1.6	2.6	1.8	2.8
C202.1 Pharmaceutics- II (Hospital and Community Pharmacy)											
CO1: This part of syllabus makes students aware of the design and structure of any pharmacy inside or outside any hospital, organization of a hospital and its pharmacy. Responsibilities a hospital pharmacist, etc.	3	3	2	1	3	2	3	2	3	2	3
CO2: This part provides information regarding the types of materials stocked their storage conditions. It gives idea about purchase and inventory control principles, Purchase order, its Procurement and stocking, the methods of drug distribution to outpatients and inpatients, Calculation of the dose and labeling on the container accordingly.	3	3	2	2	2	3	3	2	3	3	3
CO3: This part of the module gives information regarding the type, manufacture and storage of sterile materials. These products should be handled properly as they are ought to be kept free from the contamination. Central supply store maintains some criteria's for the packaging and manufacture of the sterile materials.	3	3	2	3	2	3	3	2	2	3	3
CO4: This part of the module contains information regarding surgical products. It defines and classifies various surgical products, their uses, manufacture and categories. The second part o this module provides information regarding different sources of information regarding various diseases, different drugs used for their treatment, dosage forms available, treatment and its procurement by various public welfare means, like organization of various medical camps, free health checkup camps, etc.	3	3	2	3	3	3	2	1	3	3	3
CO5: This part of the module contains information regarding prescription i.e. how to write and maintain the format of prescription.The second part provides information about community health care and education, Organization and maintenance of	3	3	3	3	3	2	3	1	3	3	3

community pharmacy.											
Average Course Outcome = 2.61 (Max 3)	3	3	2.2	2.4	2.6	2.6	2.8	1.6	2.8	2.8	3
C202.2 Anatomy, Physiology and Health Education- II (APHE-II)											
CO1: Controlling of human body by brain and their nerves, reflex action- to immediate defend their self from injury, different methods to diagnose neuronal disorder.	3	3	2	3	1	3	1	1	3	3	3
CO2: Autonomic Nervous System: to explain self coordinated function of our body and controlling it by neuro-signaling system. Urinary System: It explains fluid and electrolyte balance of our body	3	3	2	3	1	2	3	1	3	3	3
CO3: Reproductive System: Regeneration of human body to maintain their existence. Endocrine System: Controlling of human body by circulating chemicals.	3	3	1	2	1	3	1	2	3	3	2
CO4: Respiratory system: Mechanism of breathing and its organ. Sense Organs: To explain visualization, hearing, smelling and touch sensation.	3	3	2	3	1	1	3	1	3	2	3
CO5: Health Education: To provoke the awareness about the communicable disease.	3	3	3	3	1	2	3	1	3	3	3
Average Course Outcome = 2.5 (Max 3)	3	3	2	2.8	1	2.2	2.2	1.2	3	2.8	2.8
C202.3 Drug Storage and Business Management											
CO1: Students will be able to know about principles of management & various types o f managements.	3	2	2	3	3	3	3	3	3	1	3
CO2: They will understand the law of demand, supply, demand scheduled, demand curve and procedure of exporting and importing goods.	3	2	2	2	2	3	3	3	3	1	3
CO3: To know about the functions, buying, selling, transportation, storage, finance, feedback information and distribution of pharmaceutical products.	3	3	2	3	2	3	2	3	3	1	3
CO4: To know about principles of sales promotion, marketing, advertising, ethics of sales, recruitment, training evaluation and compensation to the pharmacist.	3	2	2	2	3	3	3	2	2	1	2
CO5: To know the principles of materials management, purchase, stores and inventory control and evaluation of materials management.	3	2	3	3	2	3	3	3	3	1	3
Average Course Outcome = 2.66 (Max 3)	3	2.2	2.2	2.6	2.4	3	2.8	2.8	2.8	1	2.8
C202.4 Pharmaceutical Chemistry-III (Organic Chemistry-2)											
CO1: All organic compounds are hydrocarbons in nature. Learning of organic chemistry means	3	3	2	3	3	1	2	1	3	3	2

learning the chemistry of hydrocarbons. In this syllabus the students are going to learn about the chemistry of hydrocarbons, which includes their preparation, physical & chemical properties. The first module includes Alkanes and Alkenes. The important reactions of this module are Free radical substitution reaction of alkanes, oxidation of alkanes, pyrolysis or cracking of alkanes and addition reactions of alkenes (Markovnikov's Rule and Anti-Markovnikov Rules).											
CO2: The second module consists of chemistry of Alkynes and Alcohol. The important reactions are elimination reaction and substitution reactions, saytzeff's rule.	3	2	2	3	3	1	2	1	3	3	3
CO3: Carbonyl group is the most important functional group of organic chemistry. This module covers the chemistry of aldehydes and ketones as well as general methods of preparation and reactions of carbonyl compounds. The important reactions are substitution reactions, Aldol condensation reaction, Cannizzaro reaction, Clemmensen reduction.	3	3	3	2	3	1	2	2	3	3	2
CO4: This module includes chemistry of carboxylic acid. The important reactions are esterification reactions and substitution reactions.	3	3	3	2	2	1	3	2	3	2	2
CO5: Module five deals with some common reactions *i.e.* catalytic hydrogenation, dehydrogenation, sigmatropic reaction and electrocyclic reaction.	3	3	3	3	3	1	3	2	3	3	2
Average Course Outcome = 2.58 (Max 3)	3	2.8	2.6	2.6	2.8	1	2.4	1.6	3	2.8	2.2
C202.5 English Communication – I											
CO1: To build competence in English grammar and vocabulary To develop reading, writing and speaking skills of students so that they may communicate effectively.	1	1	1	3	1	3	2	3	2	1	3
CO2: To enhance communication skills for better performance in professional life. To develop reading, writing and speaking skills of students so that they may communicate effectively	1	1	1	2	1	3	2	3	2	1	3
CO3: Refine personality of students with a grip over advanced techniques of language.	1	1	1	3	1	3	2	3	1	1	3
CO4: Communicate with native English speakers in a reasonably appropriate register, particularly in regard to asking questions and making requests politely.	1	1	1	3	1	3	2	3	1	1	3
CO5: Assist in learning technical aspects of communication for better performance in extra-curricular activities, recruitment process and	1	1	1	3	1	3	2	3	2	1	3

prospective jobs.											
Average Course Outcome = 2.34 (Max 3)	1	1	1	2.8	1	3	2	3	1.6	1	3
C202.6 Environmental Science											
CO1: Make student aware of basic principle of ecology and environmental science, geographical conditions of Chhattisgarh including biodiversity.	1	1	1	2	2	1	1	1	2	3	3
CO2: To understand the ecological pyramids, ecosystem functions and energy flow in an ecosystem. Factors responsible for the decline of biological diversity and how to conserve biological diversity.	1	1	1	2	2	1	1	1	2	3	3
CO3: How the pharmaceuticals affect the environment and rules and regulation to control pollution.	3	1	1	2	2	1	2	1	2	3	3
CO4: Understanding of natural resources available in Chhattisgarh and how to conserve them.	3	1	1	2	2	1	2	1	3	3	3
CO5: To learn about safe disposal of pharmaceutical products to minimize health hazards.	3	1	1	2	2	1	2	1	3	3	3
Average Course Outcome = 2.31 (Max 3)	2.2	1	1	2	2	1	1.6	1	2.4	3	3
C203.1 Pharmaceutics IV (Physical Pharmacy- I)											
CO1- Student will be able to understand the different states of states matter like solid, liquid, gas. Students will analyze the properties of a substance to determine its state of matter.	3	3	2	3	3	2	2	3	2	3	3
CO2- To be able to explain the laws of Thermodynamics. Student can explain application of laws of thermodynamic in themochemical equation. Student shall be able to explain phase rule and phase diagram.	3	3	2	3	3	2	2	3	2	2	3
CO3- Student can understand the concept of the solution. Student should be able to explain ideal and real solution and their properties.	3	2	3	3	3	2	3	2	2	3	3
CO4- Student will be familiar with the basics and chemistry of rheology. The student should get aware of fundamental theory, equipments and their application.	3	3	3	3	2	2	2	3	2	3	3
CO5- The student will be able to explain the importance of adsorption method, different theories of adsorption. Student can interprets and classify of adsorption isotherms and can explain their application.	3	3	3	3	2	1	3	2	2	3	2
CO6- Students can understand the theory of the surface tension of liquids. Student can describe the	3	2	3	3	3	2	3	3	3	3	3

causes the surface tension. Student should be able to explain HLB system and its application.											
Average Course Outcome = 2.60 (Max 3)	3.0	2.7	2.7	3.0	2.7	1.8	2.5	2.7	2.2	2.8	2.8
C203.2 Pharmaceutical Analysis-I											
CO1: Gain fundamental knowledge about the basics of Significance numbers in mathematical expression in quality control purpose & various pharmaceutical errors which helps to improve the result. Fundamentals of volumetric analysis and study about primaray standard & secondary solution. Different types of apparatus used in volumetric analysis.	3	3	3	3	2	3	2	2	3	3	2
CO2: They have able to explain about the samples which are acid or base and their chemical reaction. Determination the percentage purity of sodium carbonate, find out the normality, molarity of given known samples. They can prepared different concentration of solutions & role of buffer solution in pharmaceutical analysis.	3	3	3	3	2	2	2	2	2	3	2
CO3: Knowing about precipitating agents, precipitation reactions, determination the percentage purity of potassium chloride, sodium chloride. Various precipitation method for detection of end point like that mohar's, volhard's, Fagan's.	3	3	3	3	3	2	3	3	3	3	2
CO4 : **(a) Preparation of perchloric acid, they have able to explain about different types of solvent.** **(b) Study can able to explain complex molecule with examples, and also classification of metal, ligand molecule, preparation of EDTA solution, application of complexometric titration.**	3	3	3	3	3	2	3	3	3	2	3
CO5: Study about precipitation reaction with gravimetric techniques, solubility product, common ion effect assay of pharmaceutical drugs, Process of filtration, washing, digestion of organic samples with quantitative estimation.	3	3	3	3	3	3	2	3	3	2	3
Average Course Outcome = 2.72 (Max 3)	3	3	3	3	2.6	2.4	2.4	2.6	2.8	2.6	2.4
C203.3 Computer Application											
CO1: Student will learn to identify the components of a computer system and demonstrate basic proficiency in commonly used applications. Analyze, synthesize, and evaluate school, work, or home situations and use application software to complete information-processing tasks efficiently and effectively. Prepare, manage, and print documents	1	2	2	3	1	3	1	3	1	1	2

using application software.											
CO2: After the completion of the chapter student will be able to know the different types computers, what is hardware and software.	1	2	2	3	1	3	1	3	1	1	2
CO3: Student will learn to create, design, and produce professional documents using word processing software (i.e., MS Word). **a. To apply design options for formatting and layout.** **b. To working with tables** **c. To demonstrate strategies for working with multiple documents.**	1	2	2	3	1	3	1	3	1	1	3
CO4: Student will learn to process, manipulate, and represent data using the basic functions of spreadsheet software & presentation software (i.e., MS Excel & MS PowerPoint). **a. To demonstrate techniques for preparing a spreadsheet.** **b. To create and test formulas.** **c. To manipulate data using multiple worksheets.** **d. Working with charts.** **e. To create and manage animation in slide show for a presentation**	1	2	3	3	1	3	1	3	1	1	3
CO5: Utilize the internet to research information. Access the Internet and learn to use the browse, search, hyperlink capabilities of Web browsers, and multimedia.	1	2	2	3	1	3	1	3	1	1	3
Average Course Outcome = 2.46 (Max 3)	1	2	2.2	3	1	3	1	1	1	1	2.6
C203.4 Pharmacognosy- II											
CO1 **Cultivation, collection, processing and storage of crude drug, Plant hormones and their applications , Pest and pest management, natural pest control agents, Polypliody mutation, Hybridization.** **a) To understand the modern concept and scope of herbal drugs cultivation & the factor affecting culitivation.** **b) To acquire knowledge of soil, types of soil and common use of fertilizers.** **c) The student should be able to know the effective use of plat hormones.** **d) The student should be able to understand meaning of pest and types of pest control.** **e) Students will be able to know about gene and chromosome impact, mixing of different orbits and its outcome.**	3	3	2	3	3	3	2	2	1	3	3

CO2 Resins and Tannins **Pharmacognostic study, chemical tests & wide application in pharmaceutical scinces of Ressin and Tannins.**	3	3	2	3	3	2	2	2	2	3	3
CO3 Volatile oil **a. General method of extraction and isolation** **b. Economy and cost the oil in the market**	3	3	2	3	3	3	1	2	2	3	3
CO4 Phtochemical screening **Students will be understand that what are the different isolation and classification of chemical constitutents and properties of different chemical constitutents and aware about adulterants mixing in the plant products.**	3	2	2	3	2	3	2	2	2	3	3
CO5 Saponins, cadioactive sterols, anthroquinins cathartics and other **Students will get knowledge of biological sources of different saponins & also about commercial importance of the drug.**	3	2	2	3	2	3	2	3	2	3	3
Average Course Outcome = 2.52 (Max 3)	3	2.6	2	3	2.6	2.8	1.8	2.2	1.8	3	3
C203.5 Mathematics											
CO1: To familiarize students with matrices and develop facility with matrix multiplication, row operations, determinants, and applications including the solution of linear equations. At the end of the module students will be able to: ▪ **carry out the basic operations of matrix algebra;** ▪ **determine when a matrix has an inverse, and find it when it exists;** ▪ **determine whether a set of vectors is linearly independent;** ▪ **determine whether a specified set of vectors forms a vector subspace;** ▪ **Calculate a determinant.**	-	3	3	2	3	2	1	1	1	1	3
CO2: Students will extend their experience with functions as the study the fundamental concepts of calculus: limiting behaviours, difference quotients and the derivative. Students review and extend their knowledge of trigonometry and basic analytic geometry. Important objectives of the calculus sequence are to develop and strengthen the students' problem-solving skills and to teach to read, write, speak, and think in the language of mathematic. In	1	3	3	2	3	3	1	1	1	1	3

particular, students learn how to apply the tools of calculus to a variety of problem situations. In addition to these skills, students will learn to use technology as an integral part of the process of formulation and solution of problems, and communication of their solutions to others and work together productively and learn cooperatively.											
CO3: At the end of this unit should students will be able to: **• Organize data** **• Describe data** **• Read and interpret displays of data** **• Construct appropriate displays of data: frequency table, pictogram, bar chart, line bar chart, histogram, pie chart, line graph etc.** **• Justify the choice of display used for given data** **• Critically analyze data displays** **• State common errors in data representation** **• Illustrate methods to misrepresent data** **• Use appropriate project work in the classroom to assist the students in their learning of data representation** **Students will draw conclusions or make decisions and communicate their rationale based on understanding, analysis, and critique of self-created or reported statistical information and statistical summaries.** **Students will draw conclusions and/or make decisions based on analysis and critique of quantitative information using proportional reasoning. Students will also effectively justify and communicate their conclusions in ways appropriate to the audience.**	1	3	3	2	3	2	1	1	1	1	3
CO4: By the end of this chapter, the student should be able to: • **Discuss basic ideas of lenear regression and correlation.** • **Create and interpret a line of best fit.** • **Calculate and interpret the correlation coefficient.** • **Calculate and interpret outleirs.** • **Calculate multiple comparison tests on means.** • **Test for the goodness of fit for the regression equation.** • **Define multiple and partial correlation coefficients.** • **Analyze data using stepwise regression.** • **Test for significant fit of the logistic regression equation.**	1	3	3	2	3	2	1	1	1	1	3

CO5: The aim of the module is to give students a heuristic introduction to elementary probability and hypothesis theory, in preparation for courses on statistical analysis and advanced courses on probability and stochastic hypotheses processes. At the end of the module you should be able to: ▪ **Model simple experiments using probability theory;** ▪ **Perform standard probability calculations;** ▪ **Understand the concepts of random variables and distributions;** ▪ **Compute moments of random variables;** ▪ **Perform simple transformations of random variables.** ▪ **Set up the null and alternative hypotheses correctly.** ▪ **Choose the appropriate test statistic.** ▪ **Choose the appropriate level of significance.** ▪ **Make a statistical decision.** ▪ **State the conclusion.** ▪ **If the problem asks for a business decision based on the hypothesis test, state the appropriate decision.** **Incorporate the F-test for equality of variance in the hypothesis test for 3 means.**	1	3	3	2	3	3	1	1	1	1	3
Average Course Outcome = 2.73 (Max 3)	3	3	2	3	2.4	1	1	1	1	3	3
C203.6 English Communication- II											
MODULE 1: <u>WRITING</u> ➢ **Express ideas in clear and grammatically correct English, using appropriate punctuation and cohesion devices** ➢ **Write in a style appropriate for communicative purposes** ➢ **Plan, organize and present ideas coherently by introducing, developing and concluding a topic** ➢ **Write a clear description (e.g. of a place, a person, an object or a system)** ➢ **Write a clear account of events (e.g. process, a narrative, a trend or a cause-effect relationship)** ➢ **Compare and contrast ideas and arrive at conclusion** ➢ **Present an argument, supporting it with appropriate examples** ➢ **Monitor, check and revise written work**	1	1	1	3	3	3	2	3	2	1	3

➢ Expand notes into a piece of writing ➢ Summarize or make notes from a given text ➢ To develop reading, writing and speaking skills of students so that they may communicate effectively.											
MODULE 2: PREPARATION OF A BUSINESS REPORT ➢ To enhance communication skills for better performance in professional life. ➢ To train students in using both verbal and non-verbal communication effectively. ➢ Gain proficiency in English language for both professional and personal life. ➢ Identifying key points to make a decision or is the report for information only ➢ Identify what is within the scope of the report - what is relevant and what is not relevant to your purpose.	1	1	1	2	3	3	2	3	2	1	3
MODULE 3: PREPARING NOTES ➢ Help students to perform better in their academic and professional life. ➢ Writing business letters and E-mail messages for effective correspondence.	1	1	1	3	3	3	2	3	2	1	3
MODULE 4: DOCUMENTATION AND PUBLIC RELATION ➢ Gain self-confidence with improved command over English in relevance public relation in a business organization and handling the media. ➢ Writing references, notes and bibliographies,- Writing curriculum vitae (both chronological and functional) along with an application for a job. ➢ Communicate with native English speakers in a reasonably appropriate register, particularly in regard to asking questions and making requests politely ➢ To improve personality of students with advanced techniques in speaking and writing.	1	1	1	3	2	3	3	3	2	1	3
MODULE 5: MEETING AND PRESENTATION ➢ Assist in learning technical aspects of	1	1	1	3	2	3	3	3	2	1	3

communication for better performance in extra-curricular activities, recruitment process and prospective jobs. ➢ Refine personality of students with a grip over advanced techniques of language – organizing a meeting, preparing an agenda, chairing a meeting drafting resolutions, writing minutes and making an oral presentation in the workplace.											
Average Course Outcome = 2.70 (Max 3)	1	1	1	2.8	2.6	3.0	2.4	3.0	2.0	1	3.0
C204.1 Pharmaceutics -V (Physical Pharmacy –II)											
CO1: After completion of this chapter one should be able to understand properties of powders and small particle.	3	3	3	3	2	3	3	3	3	1	3
CO2: Student should be able to explain different phenomenon at solid liquid and liquid interface, theories of emulsification, physical stability and rheological considerations.	3	3	2	2	3	2	3	3	3	1	3
CO3: Discuss the different kinetics of reaction during its self life half life and order of reaction. Student should describe effect of various factors on stability of product.	3	3	3	2	2	3	2	2	2	1	3
CO4: One should be able to discuss different terms related to solubility and factors affecting solubility.	3	3	2	2	2	3	3	3	2	1	3
CO5: After the completion of the chapter student will be able to describe the theories of formation of complexes and methods of preparation.	3	3	3	3	3	3	2	2	2	1	2
Average Course Outcome = 2.67 (Max 3)	**3**	**3**	**2.6**	**2.4**	**2.4**	**2.8**	**2.6**	**2.6**	**2.4**	1	**2.8**
C204.2 Pharmaceutics -VI (Pharmaceutical Engineering- I)											
CO1:-This chapter provides basic information regarding different unit operations and processes.	3	3	3	3	3	2	2	3	3	3	3
CO2:- Explain the general considerations of Corrosion and its Prevention. Student can learn the concept of flow of fluid and different theorem related to flow science from this unit.	3	3	2	3	3	3	3	3	2	2	3
CO3:- This unit gives information related to different material handling system. Student may learn the concept of heat transfer and different theorem related to flow of heat along with the working mechanism of heat exchanger and interchanger from this unit.	3	3	2	3	3	3	3	2	3	3	3
CO4:- Unit explains Basic concepts humidity, measurement of humidity and its application. The Automated Process Control Systems is also discussed	3	3	3	2	3	2	2	3	3	2	3

in this unit.											
Average Course Outcome = 2.75 (Max 3)	3	3	2.5	2.75	3	2.5	2.5	2.7	2.7	2.5	3
C204.3 Pharmaceutical Chemistry-IV (Organic chemistry-3)											
Organic chemistry is a branch of chemistry that deals mainly with organic compounds like benzene, pyridine, pyrrole, imidadole, quinoline and their derivatives. In Organic chemistry-III course students will study about the heterocyclic compounds with different nomenclature and synthesis of various organic compounds which will help for development of new synthetic molecules. Study about classification, chemistry, pathway of synthesis uses of carbohydrates, proteins, and lipids with pharmaceutical applications. Study about various chemical reactions with their mechanism like mannich, Beckmann, fittining, dielders reaction. General information about polymers applied in pharmaceutical chemistry. Nucleophilic substitution reactions and Electrophilic substitution reactions and information about chemical properties and handling of organic reagent used in drug synthesis.	3	3	3	2	2	1	2	2	1	2	3
Average Course Outcome = 2.33 (Max 3)	3	3	3	2	2	1	2	2	1	2	3
C204.4 Pharmaceutical Biochemistry											
CO1: Enzymes and Coenzymes- This unit helps to know about the role of various enzymes and coenzymes in different metabolic pathway	3	3	3	2	2	3	2	3	2	3	3
CO2: Carbohydrate metabolism-Identify the pathway of carbohydrate metabolism in human body.	3	3	3	2	2	2	2	3	2	2	3
CO3: Lipid metabolism-Discuss the lipid metabolism in body. Explain how it is useful to fulfill the energy demands of major organ of the human body.	3	3	2	3	2	2	2	3	2	3	3
CO4: Biological Oxidation-Determine the pathway of energy formation, its control and mechanism.	3	3	3	3	3	3	3	3	3	2	2
CO5: Nitrogen and sulfur cycle-Explain the nitrogen fixation and sulphur activation in the environment.	3	3	3	2	3	3	2	2	3	2	2
CO6: Metabolism of Ammonia and Nitrogen Containing Monomers- Discuss about the urea cycle. How bile pigment is formed during metabolism of hemoglobin. Purine and pyrimidine synthesis occurs.	3	3	2	3	3	3	2	3	3	2	3
CO7: Biosynthesis of Nucleic acid- Gain fundamental knowledge about the DNA replication. Discuss Mutation. Explain how DNA repair occurs.	3	3	2	3	3	3	3	2	3	2	3
CO8: Genetic code and Protein synthesis- Understand Genetic code, protein synthesis and their inhibitions.	3	3	2	3	3	3	3	2	2	2	3
Average Course Outcome = 2.61 (Max 3)	3	3	3	2	2	-	2	2	1	2	3

C204.5 Pharmaceutical Microbiology											
CO1-Microbiological Taxonomy Morphology. Cultural characters.. Biochemical parameters of bacteriology and virology.	3	3	3	3	2	2	2	2	2	2	3
CO2-. To provide advanced knowledge, understanding, of identification of bacteria and different methods including staining procedure for no. of bacteria and their cultivation schemes.	3	3	2	3	2	2	2	2	2	1	3
CO3-. Define the organs commonly involved in the infection. Recall the relationship of this infection to symptoms, relapse and the accompanying pathology. Explain the methods of microorganisms control, e,g disinfectant and antiseptics. Solve problems in the context of this understanding.	3	3	3	2	2	2	2	3	2	2	3
CO4-. To understand the process of infection and factors affecting. To discuss the phenomenon of immunity and its management.	3	3	2	3	3	2	1	2	2	3	3
CO5-. To explain the treatment of industrial waste and sewage disposable schemes.	3	3	3	3	3	2	2	3	2	3	3
Average Course Outcome = 2.5 (Max 3)	3.0	3.0	2.7	2.8	2.3	2.0	1.8	2.3	2.0	2.2	3.0
C205.1 Pharmaceutical Engineering- II											
Upon completion of the course student shall be able:											
CO1:Understand the importance of size reduction and size separation in pharmacy. Describe concept of evaporation.	3	3	3	3	2	2	3	2	2	3	3
CO2:Student should be able to explain drying. Understand the various equipment used for drying. Develop concept and skill of extraction.	3	3	3	3	2	2	2	2	2	3	3
CO3:Develop knowledge and skill of mixing of solid, liquid. Understand the principle of centrifugation.	3	3	2	3	1	2	3	1	2	3	2
CO4:One should be able to discuss crystallization and filtration.Uderstand principle of crystallizer used pharmaceutical industries. Explain concept of filteration.	3	3	3	3	2	1	3	2	2	3	3
CO5:Discuss the principle of distillation for purification of substances. Understand different types of distillation.	3	3	2	3	2	2	3	2	3	2	2
Average Course Outcome = 2.49 (Max 3)	3.0	3.0	2.7	3.0	1.8	1.8	2.8	1.8	2.2	2.8	2.5
C205.2 Medicinal Chemistry – I											
CO1: This module consists of the basic principles of Medical Chemistry. After the completion of this module students will able to know about the relation between physic-chemical properties of drug with its biological action. Medicinal chemistry not only deals with the chemistry of compounds used for the treatment of various diseases but also discovery of new drug molecule through molecular modification of existing molecules/ leads or a completely new lead	3	3	3	3	3	2	3	3	2	2	3

compound. It will also cover how QSAR is used to predict and quantify the biological activity of a molecule prior to synthesis and biological screening.											
CO2: A complete knowledge of sympathetic and parasympathetic drugs is important to know the basic or fundamentals of response produce by our body. This module includes classification, mode of action, uses and structure activity relationship of drugs used in cholinergic and adrenergic system of medicine. Hypertension and Glucoma are two major diseases that affecting a huge number of population worldwide. The causative mechanisms of these two diseases are dysfunction of proper release of acetylcholine and adrenaline. The chemistry of drugs used for the treatment of Hypertension, Glucoma and others are mentioned in this module.	3	3	3	2	3	2	2	2	2	2	3
CO3: This module is the extensive part of previous module. It consists of classification, mode of action, uses and structure activity relationship of drugs used as neuromuscular blocking agents and local anesthetics. Students will be benefited by knowing the genesis of local anesthetics and its molecular modifications afterward. This module also includes the drugs used for uterine motility.	3	3	3	2	2	1	3	2	2	2	3
CO4: This module will help the student to know the chemistry of various classes of Antihistamines and NSAIDS. Autacoids are the byproducts of lipids secreted during lipid per-oxidation results many physiological changes in the body. Antihistamines and NSAIDS fall under this category of drugs.	3	3	3	3	2	2	3	3	2	2	3
CO5: This module will help in understanding the structure of some selected drugs of various categories. As we know structures influences the biological activity so it is essential for the students to know the drug structures.	3	3	3	3	2	3	3	3	1	2	3
Average Course Outcome = 2.56 (Max 3)	3	3	3	2.6	2.4	2	2.8	2.6	1.8	2	3
C205.3 Pharmacognosy - III											
CO1: Students will be understand the basic knowledge of biosynthesis of secondary metabolites in plants. A radio tracer technique provides detail about the various step involved for the biosynthesis of secondary metabolites.	3	3	3	2	3	1	3	3	2	3	3
CO2: After the completion of the module student will be able familiar withextraction, isolation and chemistry of Glycosides, Lignans, Quassinoids and Flavonoids.	3	3	3	2	2	2	3	2	1	3	3
CO3: Students shall be able to understand theExtraction, Isolation and Chemistry of Atropine,	3	3	3	2	3	2	1	2	2	3	3

Quinine, reserpine, morphine and Vinca Alkaloids. In addition they also aware about Extraction, Isolation and Chemistry Xanthine bases alkaloids.											
CO4: This module will assist the student to have a good understanding about Extraction, Isolation and Chemistry of Terpenoids namely Camphor, Menthol, Citral, β- Carotene, α -Tocopherol, α-Pinene.They will be aware with the pharmacological activity and importance of above chemical constituents.	3	3	2	3	2	2	2	2	2	3	3
CO5: This modulesummaries the fundamental aspects and importance of Natural Pesticides and Insecticides.Understand the pharmacognostical, properties and pharmacological activity of Toxic Drugs namely Allergens, hallucinogens, narcotics, mycotoxins, toxic mushrooms and Indian toxic plants. Make student aware about the natural plant bitters and sweeteners.	3	3	3	3	3	2	2	3	2	3	3
Average Course Outcome = 2.56 (Max 3)	3	3	2.8	2.4	2.6	1.8	2.2	2.4	1.8	3	3
C205.4 Pharmacology - I											
CO1: General Pharmacology- To learn basic scientific concepts and principles that will serve as the foundation for understanding the pharmacology of specific drugs. Also to understand the pharmacology and clinical use of the major class of clinically important drugs.	3	3	3	3	1	2	1	1	3	3	3
CO2: Pharmacology of drugs acting on peripheral nervous system- Understand the importance of Autonomic and somatic neurohumoral transmission. Able to answer about different receptors of adrenergic and cholinergic system and drugs acting on them. Also understand their mechanism of action.	3	3	3	3	1	2	2	2	2	3	3
CO3: Pharmacology of drugs acting on central nervous system- An understanding of the clinical physiology of central nervous system, their receptors and neurotransmitters that help in proper functioning of the CNS. Able to explain various drugs and their mechanism acting on the CNS.	3	3	3	3	2	2	2	1	2	3	3
CO4: Psychopharmacological agents- Define the role of psychopharmacology in psychotherapeutic management. Understand the pharmacokinetic and pharmacodynamic processes of drugs acting on different receptors and their mechanisms.	3	3	3	2	2	3	3	2	3	2	3
CO5: Drugs used in the management of pain- Understand the physiology of pain, standards and guidelines of pain management. Also understand the opioid misuse, abuse and diversion and drug seeking behaviors.	3	3	3	3	2	3	3	2	2	3	2

Average Course Outcome = 2.60 (Max 3)	3	3	3	2.8	1.6	2.4	2.2	1.6	2.4	2.8	2.8
C205.5 Cosmetics Technology											
CO1: After completion of this chapter, one should be able to describe the structure of the skin and hair; student should be able to understand formulation used for face.	3	3	3	2	1	3	3	1	3	2	3
CO2: one should be able to describe various solid, semi solid and liquid type of preparation for skin.	3	2	3	3	3	3	3	3	2	1	3
CO3: Discuss ideal properties, formulation consideration and evaluation of shaving formulations.	3	2	3	2	3	3	2	3	3	1	3
CO4: Explain the cleaning mechanism and and various type of shampoos.	3	2	3	3	3	2	2	3	3	1	3
CO5: One should be able to discuss various formulation of hair like hair tonic, hair spray, cream.	3	3	3	3	2	3	2	2	3	2	3
CO6: Student should understand structure of teeth and formulation and evaluation of dentifrice.	3	3	3	2	2	3	2	2	2	2	3
CO7: Explain the various formulations used for foot. CO8: Describe the formulation of nail polish, lacquers removers etc.	3	2	3	3	2	3	3	2	2	2	3
CO9: Discuss the use of herbs in formulation of various cosmetics.	3	2	3	3	1	2	2	3	3	2	3
CO10: Describe the cosmetic preparation used for babies.	3	3	3	3	3	3	2	3	3	2	3
CO11: Explain various type of colorant used for skin, lips and eye brow and eyelid.	3	3	3	3	3	2	2	1	2	2	3
Average Course Outcome = 2.60 (Max 3)	3.0	2.5	3.0	2.7	2.4	2.6	2.3	2.4	2.5	1.7	3.0
C206.1 Pharmaceutics – IX (Pharmaceutical Technology – I)											
CO1: Explain the properties and selection of excipients used in different dosage forms.	3	2	2	2	3	2	3	2	3	3	3
CO2: Describe the formulation and preparation of tablets (including coating), capsules, parenterals and ophthalmic products.	3	3	3	2	2	2	3	2	2	2	3
CO3: Explain the manufacture of suspension, emulsion, aerosols and parenterals.	3	2	2	2	3	1	2	1	3	2	3
CO4: Explain the quality control and quality analysis of dosage forms.	3	3	2	2	3	2	3	2	3	2	2
CO5: Acquire knowledge about packaging materials, their properties and uses.	3	2	3	3	2	2	3	3	2	3	3
Average Course Outcome = 2.46 (Max 3)	3	2.4	2.4	2.2	2.6	1.8	2.8	2	2.6	2.4	2.8
C206.2 Medicinal Chemistry – II											
CO1: Students have been introduced to a variety of drug classes and some pharmacological properties	3	3	3	3	2	2	3	3	2	2	3

which helps in correlating between the pharmacology of a disease and its mitigation or cure.											
CO2: Demonstrate the importance of chemistry in the development and application of therapeutic drugs.	3	3	3	3	2	3	3	3	2	2	3
CO3: Obtain a working knowledge of chemical structures and nomenclature.	3	3	3	3	2	3	2	1	2	2	3
CO4: Understand how changes in the chemical structure of drugs affect efficacy; and also develop an understanding of the physico-chemical properties of drugs.	3	3	3	3	2	2	2	2	3	1	3
CO5: Mode of action, structural correlation and use of different classes of drugs are taught to the students. This helps them in understanding the pharmacology of disease. Understand how current drugs were developed and how new scientific techniques will provide future drugs.	3	3	3	3	2	2	1	2	3	1	3
Average Course Outcome = 2.56 (Max 3)	3	3	3	3	2	2.4	2.2	2.2	2.4	1.6	3
C206.3 Pharmacology – II											
CO1: Make student aware about Pathophysiology behind congestive heart failure, hypertension, angina, arrhythmias, and hyperlepidemia classification of drugs such as cardiac glycosides, antihypertensive drugs, diuretics, antianginal etc. with their complete pharmacological actions, ADR, and uses.	3	3	2	3	3	2	2	2	3	3	3
CO2: Discussion about how a drug could become sometimes poison and general principals of treatment of poisoning with reference to barbiturates, opoids, organophsphorous, paracetamol and atropine poisoning. The students would also be made aware about adverse drug reactions, its types and their mechanisms.	3	3	2	3	3	2	1	2	2	2	3
CO3: Discussion about composition of blood with mechanism of blood coagulations and complete pharmacological study of the agents which are involved in blood formations.	3	3	1	3	2	2	2	2	3	3	3
CO4: Discussion about autacoids and its different types and their role in maintaining the homeostasis. Study complete pharmacology of histamines, 5-HT and their antagonist. Complete pharmacology of prostaglandins, thromboxanes and leukotrienes.	3	3	1	3	2	2	2	2	3	2	3
CO5: The students would be made aware about mechanism of respiration an various diseases of	3	3	1	3	3	3	2	3	3	3	3

respiratory system. Discuss pathophysiology of asthma with complete pharmacology of anti asthmatic drug, Antitussive, expectorants, bronchodilators and respiratory stimulants.											
Average Course Outcome = 2.54 (Max 3)	3	3	1.4	3	2.6	2.2	1.8	2.2	2.8	2.6	3
C206.4 Pharmaceutical Analysis – II											
CO1: This module helps students to learn basic knowledge of Oxidation Reduction Titrations. Understand the students to determine the quantity of drug present in different dosage form.	3	3	3	3	3	2	2	2	2	2	3
CO2: Students understand the principle and application of Diazotisation titrations, Kjeldahl method of nitrogen estimation, Karl-Fischer titration and Oxygen flask combustion gasometry. Student able to determine the sulphonamides by diazotization of primary aromatic amino group usually present in this class of drugs. Karl-Fischer titration used to determine the water in pharmaceutical products.	3	3	3	3	3	2	2	3	2	2	3
CO3: This module outlines the principle and application of Conductometry, Polarography and Amperometry. Conductometric titration is carried out in order to measure the electrical conductivity of the reaction mixture. Amperometry in chemistry and biochemistry is detection of ions in a solution based on electric current or changes in electric current.	3	3	3	3	3	2	2	2	3	2	3
CO4: Student understand about Radio immunoassays, ELISA tests, Electrophoresis and Immuno electrophoresis in pharmaceutical uses. Student determines the antigen concentration in different antibody by using Radio immunoassays and ELISA tests. Immuno electrophoresis is a powerful analytical technique with high resolving power as it combines separation of antigens by electrophoresis with immune diffusion against an antiserum.	3	3	3	3	2	3	2	2	3	3	3
CO5: This module discusses the principle, instrumentation and pharmaceutical importance of Thermogravimetry, Differential Thermal Analysis, Differential Scanning Calorimetry, ermometric titration. Make student to determine the physical property of pharmaceutical drug as a function of temperature while the drug is subjected to a controlled temperature programme.	3	3	3	3	3	2	3	3	3	2	3

Average Course Outcome = 2.70 (Max 3)	3.0	3.0	3.0	3.0	2.8	2.2	2.2	2.4	2.6	2.2	3.0
C206.5 Pharmaceutical Biotechnology											
CO1: Immunology for Pharmacy prepares students by providing a complete understanding of the basis of immunology and the consequences of either suppressing or enhancing immune function. It covers key subjects such as antigen and antibody reactions, and the rationale for use and mechanism of therapeutic agents. Students after learning this module will be able to understand how drugs act and side effects occur relating immune system.	3	3	3	3	2	3	2	3	3	3	3
CO2: After completion of this chapter students will be able to understand the basic concept of enzyme immobilization and techniques of immobilization. Students will also learn its applications in field of pharmacy such as in diagnostics, production of antibiotics, pin food industry, use of biosensors for determination of blood glucose, urea, cholesterol, penicilin, heavy metals and chemicals.	3	3	3	3	2	3	2	2	2	3	3
CO3: Discuss principles and procedures involved in genetic recombination, gene cloning methods. Students will enculcate the methods of production of recombinant DNA molecules and can apply for production of recombinant molecules to treat diseases in pharmaceutical science. They can apply its principles in production of human insulin, human growth hormone, chymosin, blood clotting factors, hepatitis vaccine and many more.	3	3	3	2	3	2	3	3	2	3	3
CO4: This module applies the principles and facts of microbiological biotransformation. They will understand the importance of correlating with the corresponding metabolism in animal system and in the structural modification of complex drug molecules, which are difficult to obtain synthetically. To be aware of various types of reactions mediated by microorganisms and design of biotransformation processes. Students can apply this knowledge in carrying out feasible reactions that are not likely to be carried out by simple synthetic procedures, in fermentation and steroids production.	3	2	2	3	2	3	3	3	2	3	3
CO5: This module will deal about the principles of fermentation process and design of various industrial fermenters. Students will learn about design of fermentation process for production of	3	3	2	2	2	2	3	3	3	2	3

penicillin, streptomycins, tetracyclins, vitamin B23, isolation and selection of mutatnts for fermentation process. They can implement this knoweldge for production of antibiotics, vitamins, alcohol and bakery products.											
Average Course Outcome = 2.67 (Max 3)	3	2.8	2.6	2.6	2.2	2.6	2.6	2.8	2.4	2.8	3
C207.1 Pharmaceutical Technology – II											
CO1: The objective of learning how physico chemical properties of drugs can be utilized optimally in the treatment of diseases-through the design and development of new and better therapeutic moieties, new dosage form and dosage regimen.	3	3	3	3	3	2	3	2	3	3	3
CO2: Students will be able To understand the mechanisms of drug penetration, factors influencing penetration, semisolid bases and their selection. To understand and describe the processes of formulation,, evaluation and packaging. To understand the Ideal requirements, bases, manufacturing procedure, packaging and evaluation.	3	3	3	3	3	2	3	2	2	2	3
CO3: Students will be able to describe different components of aerosol system. Its' manufacturing technique, packaging and pharmaceutical application.	3	3	3	3	2	2	3	2	2	2	2
CO4: Students will be able- to describe the Collection, processing and storage of whole human blood, concentrated human RBCs, dried human plasma, human fibrinogen, human thrombin, human normal immunoglobulin, human fibrin, foam plasma substitutes, -ideal requirements, PVP, dextran etc. for control of blood pressure as per I.P.	3	3	3	2	2	3	2	1	2	3	3
CO5: Students will be able to describe types of additives used in liquid formulations, Vehicles, stabilizers, preservatives, suspending agents, emulsifying agents, solubilizer, colors, flavours and others, manufacturing packaging and evaluation of clear liquids, suspensions and emulsions official in pharmacopoeia.	3	3	3	2	3	3	2	2	2	3	3
Average Course Outcome = 2.60 (Max 3)	3	3	3	2.6	2.6	2.4	2.6	1.8	2.2	2.6	2.8
C207.2 Biopharmaceutics and Pharmacokinetics											
CO1: Make student aware of basics of	3	3	3	3	2	3	3	2	1	3	2

Biopharmaceutics and Pharmacokinetics and their role in formulation development and clinical setting.											
CO2: To understand the mechanism of passage of drugs across biological barrier and factors influencing absorption including physicochemical, physiological and pharmaceutical.	3	3	3	3	2	2	3	3	1	3	2
CO3: How the drug is distributed in the body and what is the role of plasma protein binding. To understand the different mechanism of drug metabolism in the body.	3	3	3	3	3	3	3	2	1	3	3
CO4: Understanding of drug excretion through other routes than gastrointestinal and urinary such as saliva, tears, sweat, milk, semen and their subsequent effect.	3	2	3	3	3	3	1	3	1	2	3
CO5: To learn about compartment models and their scope.	3	3	3	3	3	3	2	1	2	3	3
CO6: To compute various pharmacokinetic parameters such as volume of distribution, distribution coefficient, half-life, absorption constant, clearance etc using various models.	3	3	2	3	2	2	1	3	3	2	3
CO7: To understand applications of clinical pharmacokinetics in dosage adjustment in patients with and without renal and hepatic failure.	3	3	3	3	3	2	1	3	3	3	2
CO8: To learn about pharmacokinetic drug interactions and their significance in combination therapy.	3	3	3	3	3	2	3	1	2	3	3
CO9: To estimate bioavailability and bioequivalence and different parameters such as C_{max}, t_{max} , and Area under the Curve (AUC) using both plasma and urinary data.	3	3	3	3	2	2	3	3	2	3	2
Average Course Outcome = 2.60 (Max 3)	3.0	2.9	2.9	3.0	2.6	2.4	2.2	2.3	1.8	2.8	2.6
C207.3 Medicinal Chemistry - III											
Upon completion of the course the student shall be able to:	3	3	3	2	3	2	2	3	2	3	3
CO1- Understand the chemistry of drugs with respect to their pharmacological activity.	3	3	3	3	3	2	3	3	2	2	3
CO2- Understand the drug metabolic pathways, adverse effect and therapeutic value of drugs.	3	3	3	3	2	2	3	2	1	3	2
CO3- Know the Structural Activity Relationship (SAR) of different class of drugs.	3	3	1	3	3	3	3	1	3	3	2
CO4- Write the chemical synthesis of some drugs.	3	3	3	3	1	1	2	2	3	3	3
Average Course Outcome = 2.60 (Max 3)	3.0	3.0	2.6	2.8	2.4	2.0	2.6	2.2	2.2	2.8	2.6
C207.4 Pharmacology - III											
Upon completion of the course the student shall be able to:											
CO1-Understand the mechanism of drug action and	3	2	2	3	3	3	3	2	3	2	3

its relevance in the treatment of different diseases.											
CO2- Demonstrate isolation of different organs/tissues from the laboratory animals by simulated experiments.	3	2	2	3	2	2	2	2	3	3	3
CO3-Demonstrate the various receptor actions using isolated tissue preparation.	3	3	3	3	2	3	2	2	2	2	3
CO4-Appreciate correlation of pharmacology with related medical sciences comprehend the principles of toxicology and treatment of various poisonings.	3	3	3	2	2	3	2	2	3	2	3
Average Course Outcome = 2.50 (Max 3)	3.0	2.5	2.5	2.8	2.3	2.8	2.3	2.0	2.8	2.3	3.0
C207.5 Pharmacognosy -IV											
CO1-To know the Common vernacular names, botanical sources, morphology, chemical nature of chief constituents, pharmacology, categories and common uses and marketed formulations of traditional herbal drugs.	3	3	3	3	3	3	2	3	2	2	3
CO2-To understand the preparation and development of herbal formulation.	3	3	2	3	2	3	2	3	2	2	3
CO3: To understand the traditionl systems of medicine and formulary/Pharmacopiea.	3	2	3	3	2	3	3	2	3	3	2
CO4-To understand the source, cultivation, collection, processing, commercial varieties, chemical constituents, substitutes, adulterants, uses, diagnostic macroscopic and microscopic features and specific chemical tests of alkaloid containing drugs.	3	3	3	3	3	2	1	2	2	3	3
CO5-To understand the Biological sources, preparation, identification tests and uses of the enzymes.	3	2	2	2	3	2	2	2	2	3	3
CO6- To know the modern separation and extraction techniques, chararcterization and identification of the herbal drugs.	3	3	2	3	3	2	1	3	2	3	3
Average Course Outcome = 2.60 (Max 3)	3.0	2.5	2.5	2.8	2.3	2.8	2.3	2.0	2.8	2.3	3.0
C208.1 Pharmaceutical Technology – III											
Upon completion of the course, the student shall be able to:											
CO1- Know the process of pilot plant and scale up of pharmaceutical dosage forms.	3	3	2	3	3	3	2	3	2	2	3
CO2- Understand the process of technology transfer from lab scale to commercial batch.2	3	3	3	3	3	3	2	2	2	2	3
CO3- To understand the criteria for selection of drugs and polymers for the development of Novel drug delivery systems, their formulation and evaluation.	3	2	3	3	2	2	2	3	2	1	3
Average Course Outcome = 2.50 (Max 3)	3.	2.	2.	3.0	2.7	2.7	2.	2.	2.0	1.7	3.

	0	7	7				0	7			0
C208.2 Pharmaceutical Analysis – III (Instrumental)											
CO1- After the completion of the course students will be able to understand the interaction of matter with electromagnetic radiations and its applications in drug analysis.	3	3	3	3	2	3	2	2	3	2	3
CO2- They will be able to understand the chromatographic separation and analysis of drugs.	3	3	3	3	2	3	2	3	2	2	3
CO3- They will be able to perform quantitative & qualitative analysis of drugs using various analytical instruments.	3	3	3	3	2	3	1	3	2	2	3
Average Course Outcome = 2.60 (Max 3)	3.0	3.0	3.0	3.0	2.0	3.0	1.7	2.7	2.3	2.0	3.0
C208.3 Pharmaceutical Analysis – IV (Quality Assurance and Drug Regulatory Affairs)											
CO1- After the completion of the course students will be able to know the regulatory authorities and agencies governing the manufacture and sale of pharmaceuticals.	3	3	2	3	3	3	3	3	2	3	3
CO2- They will be also able to know the regulatory approval process and their registration in Indian and international markets.	3	3	3	3	3	3	2	2	1	3	3
CO3- Students will be able to know the essential process like validation and documentation of pharmaceutical industry.	3	3	3	3	2	2	3	3	2	2	3
Average Course Outcome = 2.70 (Max 3)	3.0	3.0	2.7	3.0	2.7	2.7	2.7	2.7	1.7	2.7	3.0
C208.4 Pharmacognosy - V											
<u>Upon completion of the subject student shall be able to;</u> **CO1- Know WHO guidelines for quality control of herbal drugs.**	3	2	3	3	2	3	2	2	2	3	3
CO2- To Know Quality assurance in herbal drug industry.	3	3	3	3	2	2	3	3	3	3	3
CO3- To know the regulatory approval process and their registration in Indian and international markets.	3	2	3	3	3	3	3	2	3	2	3
CO4 – To appreciate WHO and ICH guidelines for quality control of herbal drugs.	3	2	3	3	2	3	2	3	2	3	3
Average Course Outcome = 2.70 (Max 3)	3.0	2.3	3.0	3.0	2.3	2.8	2.8	2.8	2.3	2.8	2.8
C208.5 Pharmaceutical Jurisprudence											
Upon completion of the subject student shall be able to: **CO1- The Pharmaceutical legislations and their implications in the development and marketing.**	3	3	2	3	2	2	3	3	3	2	3
CO2- Various Indian pharmaceutical Acts and	3	2	3	2	2	3	3	2	3	2	3

Laws.											
CO3- The regulatory authorities and agencies governing the manufacture and sale of pharmaceuticals.	3	3	3	3	2	3	3	3	3	1	2
CO4 –The code of ethics during the pharmaceutical practice.	3	3	2	3	3	3	3	3	3	2	2
Average Course Outcome = 2.60 (Max 3)	3.0	2.8	2.5	2.8	2.3	2.8	3.0	2.8	3.0	1.8	2.5
Average Course Outcome for B. Pharm Course	**3.0**	**2.8**	**2.6**	**2.7**	**2.3**	**2.4**	**2.4**	**2.3**	**2.3**	**2.5**	**2.9**
Percentage	**99**	**92**	**85**	**91**	**78**	**81**	**79**	**76**	**76**	**83**	**95**

Note: *Correlation levels 1, 2 or 3 as defined below:*
1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)
It there is no correlation, put '-'