पूज्य साने गुरूजी विद्या प्रसारक मंडळाचे
औषधनिर्माणशास्त्र महाविद्यालय
पो. बॉक्स नं. ४१
शहादा, जि. नंदुरबार,(महाराष्ट्र)४२५४०९

॥ उत्तिष्ठत जाग्रत प्राप्यवरान्निबोधत ॥

Poojya Sane Guruji Vidya Prasarak Mandal's
COLLEGE OF PHARMACY
P. O. Box. No.41
Shahada, Dist.: Nandurbar, (M.S.) 425 409

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● Fax. No. 229740 Tel. No. 02565-229168 ● E-mail: copshd@gmail.com ● Website : psgvppharmacy.ac.in

Bapusaheb Dipak Patil
(B.Com.)
President

Smt. Kamaltai P. Patil
Hon. Secretary

Dr. Sunil P. Pawar
(M.Pharm., Ph. D.)
Principal

Course Outcome B.Pharm (PCI) Syllabus

Course code / Course title	Course outcomes
First Year B. Pharm (Semester- I)	
BP101T. Human Anatomy and physiology -I (Theory)	The student should able to **CO1:** Explain various parts of human body, Structural and Functions of cell and classification of tissue. **CO2:** Understand the Structure and functions of skin, Various silent features and fuctions of bones as well as Structural and functional classification of joints **CO3:** Describe composition and functions of blood & Lymphatic organs and functions of Lymphatic system. **CO4:** Acquire the knowledge regarding Structure and functions of sympathetic and parasympathetic nervous system.as well as Structure and functions of sensory organs in human body. **CO5:** Explain anatomy of heart, Structure and functions of organs come under the CVS.
BP102T. Pharmaceutical Analysis	The student should able to **CO1:** Outline the method of expressing the concentration with preparation and standardization of variousmolar and normal solutions. Also explain the sources, type and method of minimizing the errors. **CO2:** Understand theories of acid base indicators, acidimetric and alkalimetric titration as well as estimation of Sodium benzoate and Ephedrine HCl. **CO3:** Explain the various methods like Mohr's method, Volhard's, Modified Volhard's, Fajans method, principle and steps involved in gravimetric analysis. **CO4:** Explain the Concepts of oxidation and reduction, principle & applications involved in redox titrations. **CO5:** Recall electrochemical methods of analysis like Conductometry, Potentiometry, Polarography and also understand there applications.
BP103T. Pharmaceutics- I	The student should able to **CO1:** Outline the history of profession of pharmacy in India also understands the various dosage forms, prescriptions and there part as well as calculations of dose based on age, body weight and body surface area. **CO2:** Explain the definition, classification, advantages and disadvantages of powders and liquid dossage form. **CO3:** Understand definition, advantages and disadvantages, classifications & Preparation of monophasic and biphasic liquid dossage form. **CO4:** Describe the definition, types, advantages and disadvantages of suppositories and classifications of pharmaceutical incompatibilities. **CO5:** Prepare ointments, pastes, creams and gels.

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BP104T.Pharmaceutical Inorganic chemistry	The student should able to **CO1**: Explain the sources of impurities and method of preparations of various inorganic drugs and pharmaceuticals. **CO2:** Describe the Functions of major physiological ions, Electrolytes used in the replacement therapy, buffer equations and buffer capacity, role of fluoride in the treatment of dental Caries. **CO3:** Explain Gastrointestinal agents like acidifier, antacid, cathartics and antimicrobial. **CO4:** Understand miscellaneous compounds like expectorant, emetics, haematinics, and astringents. **CO5:** Describe various Radiopharmaceuticals.
BP105T.Communicatio n skills	The student should able to **CO1:** Explain need of communication skills, barriers to communicate effectively and perspectives ofcommunication required to function effectively in areas of pharmaceutical operation **CO2:** Apply various elements, styles of communications. **CO3:** Understand basic listening skills, writing skills tocommunicate effectively and manage team as team player **CO4:** Apply Interview skills presentation skills and official giving presentations. **CO5:** Do group discussions.
BP 106RBT. Remedial biology	The student should able to **CO1:** Explain the definition and characters of living organisms & morphology of flowering plants. **CO2:** Describe the Body fluids and circulation, food digestion and absorption as well as breathing and respiration. **CO3:** Discuss the basic components of anatomy and physiology of animal with special reference tohuman & human reproductions. **CO4:** Explain photosynthesis. **CO5:** Understand plant respiration, plant growth and development as well as Cell the unit of life.
BP 106RMT. Remedial Mathematics	The student should able to **CO1:** Know the theory and their application of Partial fraction, Logarithms,Function, in PharmacyLimits and continuity. **CO2:** Solve the different types of problems by applying theory of Matrices and Determinant, **CO3:** Understand the different types of problems by applying theory of differentiation in Calculus. **CO4:** Explain and solve the different types of problems of analytical geometry. **CO5:** Describe the differential equations, application in solving pharmacokinetic equations, laplace transform & application in solving

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	chemical kinetics and pharmacokinetics equations.
BP107P. Human anatomy and physiology-I	The student should able to **CO1:** Identify, compare and contrast between the microscopy of epithelial,connective, muscular, nervous tissue & Identification different between axial & appendicular bones of human body. **CO2:** Explain the significance of determinations of white blood cell (WBC) count, bleeding time, clotting time, blood group detection, hemoglobin detection and measurement of blood pressure. **CO3:** Demonstrate procedure of determination of erythrocyte sedimentation rate (ESR), as well as heart rate and pulse rate.
BP108P. Pharmaceutical Analysis-I	The student should able to **CO1:** Perform limit test of Chloride, Sulphate, Iron, Arsenic **CO2:** Prepare and standardize of Sodium hydroxide, Sulphuric acid, Sodium thiosulfate, Potassium permanganate, Ceric ammonium sulphate. **CO3:** Perform various assays of the compounds along with standardization of titrant and determine the Normality.
BP109P. Pharmaceutics-I	The student should able to **CO1:** Formulate various conventional dosage forms in professional way. **CO2:** Emphasize on the concepts of prescription like translation, calculation and suitability
BP110P. Pharmaceutical Inorganic chemistry	The student should able to **CO1:** Perform the limit test for certain impurities like chloride, sulphate, iron, arsenic, lead and heavy metals as per the Indian Pharmacopoeia. **CO2:** Identify the Inorganic compounds through various chemical tests. Test of impurity and preparation of inorganic pharmaceuticals.
BP111P. Communication skills	The student should able to **CO1:** Demonstrate and Apply basic communication & pronunciations skills and advance learning skills. **CO 2:** Practice skills of communication, medium and presentation.

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BP112RBP. Remedial biology	The student should able to **CO1:** Demonstration of Microscope, Section cutting techniques and its significance. **CO2:** Perform blood group detection, measurement of blood pressure and tidal volume. **CO3:** Able to identify microscopy of tissues pertinent to stem, root, leaf, seed, fruit and flower.

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First Year B. Pharm (Semester-II)	
BP201T. Human anatomy and physiology –II	The student should able to **CO1:** Explain the organization of nervous system & structure and functions of brain. **CO2:** Describe anatomy and functions of stomach, formation and role of ATP. **CO3:** Discuss the anatomy of lungs and other parts of respiratory system, tidal volume, artificial respiration and resuscitation methods as well as anatomy of urinary system. **CO4:** Understand structure and functions of pituitary gland, thyroid gland, parathyroid gland, adrenal gland. **CO5:** Describe anatomy and functions of male and female reproductive system, sex hormones.
BP202T. Pharmaceutical organic chemistry-I	The student should able to **CO1:** Outline the structure, name and the type of isomerism of the organic compound. **CO2:** Describe the reaction name of the reaction & hybridization of alkanes, alkenes and conjugated dienes. **CO3:** Explain the mechanism of SN_1 and SN_2 reactions, alcohols and there quantitative test. **CO4:** Understand the structure and uses of Formaldehyde, Paraldehyde, Acetone, Chloral hydrate, Hexamine, Benzaldehyde, Vanilin, Cinnamaldehyde. **CO5:** Explain the structure and uses carboxylic acids, aliphatic amines.
BP203T. Biochemistry	The student should able to **CO1:** Describe the chemistry, biological importance and metabolism pattern of Biomolecules. **CO2:** Summaries the concept of biological oxidation emphasizing on ETC and oxidative phosphorylation and identifying related inhibitors. **CO3:** Explain Lipid metabolism, Biological significance of cholesterol and conversion of cholesterol into bile acids, steroid hormone and vitamin D. as well as general reactions of amino acid metabolism. **CO4:** Explain the genetic organization of mammalian genome and functions of DNA in synthesis of RNAs and proteins. **CO5:** Understand the therapeutic and diagnostic applications of enzymes and isoenzymes.
BP204T. Pathophysiology	The student should able to **CO1:** Explain the etiology and pathogenesis and complications of severe diseases and disorders. **CO2:** Discuss the signs and symptoms of different diseases related to CVS, renal and respiratory system and their diagnostic procedures. **CO3:** Explain the Iron deficiency, megaloblastic anemia, thyroid diseases, and disorders of sex hormones.

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	CO4: Understand Classification, etiology signs, symptoms andcomplications as well as pathogenesis of Cancer. **CO5:** Elaborate Infectious diseases & Sexually transmitted diseases.
BP205T. Computer applications in pharmacy	The student should able to **CO1:** know the various types of application of computers in pharmacy **CO2:** Understand Concept of Information Systems and Software, various types of databases likeMYSQL, MS ACCESS, Pharmacy Drug database, Number systems, Web technologies and Bioinformatics. **CO3:** Understand diagnostic System, Lab-diagnostic System, Patient Monitoring System, Pharma Information System. **CO4:** Know the various applications of databases in pharmacy. **CO5:** Understand computers as data analysis in Preclinical development & Apply computer knowledge for Chromatographic dada analysis (CDS), Laboratory Information management System (LIMS) and Text Information Management System (TIMS).
BP206T. Environmental Sciences	The student should able to **CO1:** Understand Multidisciplinary nature of environmental studies Natural Resources Renewable andnon-renewableresources, associated problems **CO2:** Understand, explain and Draw structure and function of various ecosystem. **CO3:** Understand Environmental Pollution and its remedial methods to reduce.
BP207P. Human anatomy and physiology–II	The student should able to **CO1:** Identify various tissues and organs of different systems of human body. **CO2:** Explain construction and working of spirometer for the measurement of lung volume andcapacities.
BP208P. Pharmaceutic alorganic chemistry – I	The student should able to **CO1:** Perform the systematic qualitative analysis of organic compounds **CO2:** Prepare the suitable solid derivatives from organic compounds & Construction of molecular models.
BP209P. Biochemistry	The student should able to **CO1:** Identify and characterize carbohydrates, proteins by various qualitative chemical tests in a givensample. **CO2:** Determine blood creatinine, sugar, total cholesterol, buffer solution and measurement of pH and action of salivary amylase.
BP210P. Computer applicationsin pharmacy	The student should able to **CO1:** Use MS Word, MS Access for designing questionnaire, form to record patient information, creating patient database, mailing labels, invoice table, and generate reports **CO2:** Create HTML web page, Export Tables, Queries, Forms and Reports to web pages and XML Pages

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Second Year B. Pharm (Semester- III)	
BP301T. Pharmaceutical Organic chemistry–II	The student should able to **CO1:** Describe the reaction and mechanism of Benzene, Structure and uses of DDT. **CO2:** Explain the reaction and mechanism phenols, aromatic amines and aromatic acid. **CO3:** Summarize the chemistry of fats and oils. **CO4:** Demonstrate synthesis, reactions structure and medicinal uses of polynuclear hydrocarbons. **CO5:** Understand stabilities of cycloalkanes through different theories.
BP302T. Physical Pharmaceutics-I	The student should able to **CO1:** Understand solubility expressions, mechanisms of solute solvent interactions. **CO2:** Explain various state of matter, physicochemical properties of drug molecules applicable in the designing of dosageforms. **CO3:** Summarize surface and interfacial phenomenon. **CO4:** Describe classification of complexation, applications, methods of analysis. **CO5:** Understand applications of buffers, buffer equation, buffer capacity, buffers in pharmaceutical and biological systems.
BP303T. Pharmaceutical Microbiology	The student should able to **CO1:** Explain history of microbiology, its branches, scope. **CO2:** Understand the methods of identification, cultivation and preservation of various microorganisms. **CO3:** Discuss importance and implementation of sterilization in pharmaceutical processing and industry. **CO4:** Summarize the microbiological standardization of Pharmaceuticals. **CO5:** Outline cell culture technology and its applications in pharmaceutical industries.
BP304T. Pharmaceutical engineering	The student should able to **CO1:** Explain use of various unit operations used in pharmaceutical industries. **CO2:** Perform various processes involved in pharmaceutical manufacturing process. **CO3:** Discuss principal, construction, working of mixing, drying used in Pharmaceutical industry. **CO4:** Outline the applications principles, construction, working, uses, merits and demerits of Centrifugation & filtration. **CO5:** Enumerate the various preventive methods used for corrosion control in Pharmaceutical industry.

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BP305P. Pharmaceutic alorganic chemistry-II	The student should able to **CO1:** Determine the physical constants like acid value, saponification value and Iodine value oforganic compounds. **CO2:** Synthesize certain organic compounds through acetylation, halogentaion, nitration, oxidation, hydrolysis, Perkins and claisen condensation reactions
BP306P. Physical pharmaceutics –I	The student should able to **CO1:** Determination of various physicochemical properties of drug molecules applicable in thedesigning of dosage forms. **CO2:** Analyze HLB number of a surfactant by saponification method. **CO3:** Compare and contrast between different methods used in the determination of the same physicochemical parameters.
BP307P. Pharmaceutical Microbiology	The student should able to **CO1:** Select and utilize different equipment and processing in experimental microbiology **CO2:** Identify and isolate various microorganisms **CO3:** Perform sterility testing of pharmaceutical products **CO4:** Perform microbiological standardization of Pharmaceuticals.
BP308P. Pharmaceutical Engineering	The student should able to **CO1:** Perform various unit operation process involved in pharmaceutical manufacturing **CO2:** Perform numerical involved in calculating process related determinants. **CO3:** Create graphs and illustrate actions for data representation **CO4:** Analyze and interpret the data generated from the experiments performed.

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BP401T. Pharmaceuticalorganic chemistry-III	The student should able to **CO1:** Explain the stereo chemical aspects of organic compounds and stereo chemical reactions. **CO2:** Understand the methods of determination of configuration of geometrical isomers. **CO3:** Know the medicinal uses and other applications of heterocyclic compounds **CO4:** Describe the medicinal uses and other applications of Pyrimidine, Purine, azepines and their derivatives. **CO5:** Know the reactions like Clemmensen reduction, Oppenauer-oxidation and Dakin reaction.
BP402T. MedicinalChemistry-I	The student should able to **CO1:** Correlate the physicochemical properties and metabolism of drugs with biological activity. **CO2:** Explain the chemistry of drugs acting on central nervous system like adrenergic. **CO3:** Describe the chemistry of drugs acting on central nervous system like Cholinergic. **CO4:** Explain the chemistry of drugs Benzodiazepines, Barbiturtes, Phenothiazeines. **CO5:** Describe the chemistry of drugs narcotic and non-narcotic analgesics.
BP403T. Physical pharmaceutics-II	The student should able to **CO1:** Understand colloidal based on their general properties, principles of formulation and evaluation. **CO2:** Explain and comprehend the principles of preformulations like rheology, deformation of solid and micromeretics. **CO3:** Understand course dispersion based on their general properties, principles of formulation and evaluation. **CO4:** Explain methods for determining particle size by different methods. **CO5**: Explain with illustration the principles of chemical kinetics & to use them for stability testing and determination of expiry date of formulations.
BP404T. Pharmacology I	The student should able to **CO1**: Explain various terminologies used in pharmacology like synergism, agonist, antagonist, side effect, adverse effects etc. **CO2:** Describe the pharmacodynamics & there principles and mechanisms of drug action, receptor theories and classification of receptors. **CO3:** Discuss the mechanism of drug acting on peripheral nervous system. **CO4:** Classify various drugs used for the drug acting on central nervous system. **CO5:** Describe the pharmacological actions of different categories of drugs used in Parkinsons disease and Alzheimer's disease.

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BP405T. Pharmacognosy & phytochemistry–I	The student should able to **CO1:** Explain history, scope, development of pharmacognosy, sources of drugs and different classifications of drugs. **CO2:** Comprehend and understand cultivation, collection, processing, storage of drugs of natural origin,conservation of medicinal plants. **CO3:** Explain and understand plant tissue culture including its development, applications. **CO4:** Understand morphology and anatomy of plant parts. Explain classification, properties, identification of Glycosides, Tannins, volatile oil, Flavanoids and Resins. **CO5:** Understand and explain Comprehend the biological source, chemical nature, uses of plant fibers, hallucinogens,Teratogens, Natural allergens.
BP406P. Medicinal chemistry-I	The student should able to **CO1:** Synthesize and explain reaction mechanism of medicinally important compounds by usingconventional methods. **CO2:** Perform quantitative analysis of drugs such as Chlorpromazine, Phenobarbitone, Atropine, Ibuprofen, Aspirin and Furosemide.
BP407P. Physicalpharmaceutics- II	The student should able to **CO1:** Determine physicochemical properties in the formulation development and evaluation of dosageforms. **CO2:** Make use of principles of chemical kinetics & to use them for stability testing. **CO3:** Compare and contrast between different methods used in the determination of the same physicochemical parameters. **CO4:** Demonstrate and explain the effect of different excipients and their differing concentration onphysicochemical determinants of dosage forms.

BP408P. Pharmacology I	The student should able to **CO1:** Handle the laboratory equipments and apply techniques used in experimental pharmacology. **CO2:** Identify various laboratory animals and describe CPCSEA guidelines for care and handling and care of laboratory animals. **CO3:** Explain common laboratory techniques, like blood withdrawal, serum and plasma separation,anesthetics and euthanasia used for animal studies. **CO4:** Describe the different routes of drug administration in mice/rats. **CO5:** Demonstrate the effect of drugs on animals by simulated experiments.
BP409P. Pharmacognosy & phytochemistry–I	The student should able to **CO1:** Perform analysis of crude drugs by chemical tests. **CO2:** Determine and perform stomatal number, stomatal index, vein islet number, vein islet terminationand palisade ratio of leaf drug. **CO3:** Understand and determine size of starch grains, calcium oxalate crystals, length and width of fiber by eye piece micrometer and number of starch grains by Lycopodium spore method. **CO4:** Perform Ash value, Extractive values, moisture content, swelling and foaming index of crude drug.

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Third Year B. Pharm (Semester-V)	
BP501T. Medicinal ChemistryII	The student should able to **CO1:** Understand the classification, mechanism of action, uses of drugs mentioned in the course, Structure activity relationship of selective class of drugs like Antihistaminic, gastric proton pump inhibitors & anti-neoplastic agents. **CO2:** Understand the drug metabolic pathways, adverse effect and therapeutic value of drugs like anti-anginal, diuretics, anti-hypertensive Agents. **CO3:** Know the Structural Activity Relationship of different class of drugs. **CO4:** Understand the drug metabolic pathways, adverse effect and therapeutic value of drugs acting on endocrine system. **CO5:** Know the Structural Activity Relationship of antidiabetic agents, local anesthetics.
BP502T. Industrial Pharmacy I	The student should able to **CO1:** Know the various Preformulation studies of pharmaceutical dosage. **CO2:** Formulate solid, liquid and semisolid dosage forms and evaluate them for their Quality. **CO3:** Know various considerations in development of pharmaceutical dosage forms like capsules, pellets. **CO4:** Formulate parenteral and ophthalmic dosage forms and evaluate them for their quality. **CO5:** Formulate and evaluations of cosmetics and aerosol dosage forms and evaluate them for their quality.
BP503T. Pharmacology II	The student should able to **CO1:** Understand the mechanism of drug action and its relevance in the treatment of different diseases & hemodynamic and electrophysiology of heart. **CO2:** Pharmacology of drug acting on cardiovascular system. **CO3:** Explain the autocoids and related drugs. **CO4:** To Explain Pharmacology of drugs acting on Endocrine system. **CO5:** Describe the bioassay and its role in drug discovery
BP504T. Pharmacognosy andPhytochemistry II	The student should able to **CO1:**.Know the metabolic pathways in higher plants and their determination. **CO2:** Understand the composition, chemistry & chemical classes, biosources, therapeutic uses and commercial applications of various different classes of the drugs. **CO3:** Know the characterization and identification of the herbal drugs and phytoconstituents. **CO4:** Establish the characterization and identification of the herbal drugs like Forskolin, Sennoside, Artemisinin, Diosgenin, Digoxin. **CO5:** Understand Modern methods of extraction, application of latest

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	techniques like Spectroscopy,Chromatography etc.
BP505T. Pharmaceutical Jurisprudence	The student should able to **CO1:** Acquire knowledge on schedule rules, laws and regulations related to drugs and cosmetics. **CO2:** Explain detailed study of Schedule G, H, M, N, P, T, U, V, X, Y. and General labeling requirements. **CO3:** Describe the various acts pharmacy act, medicinal and toilet preparation act etc. **CO4:** Explain other acts and rules associated with magic remedies and national pharmaceutical pricing authority. **CO5:** Describe the various pharmaceutical legislations, code of pharmaceutical ethics and intellectual property rights.
BP506P. Industrial Pharmacy I	The student should able to **CO1:** Correct use of various equipment's in pharmaceutics laboratory relevant to tablets, capsules andtablet coating. **CO2:** Inculcate the knowledge of formulation, evaluation and labeling of tablets & capsules. **CO3:** Use the equipment's and apparatus needed for the preparations as per SOP. **CO4:** Describe evaluation criteria of glass containers as per IP.

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BP507P. Pharmacology II	The student should able to **CO1:** Demonstrate isolation of different organs/tissues from the laboratory animals bysimulated experiments **CO2:** Demonstrate the effect of drugs on animals by simulated experiments. **CO3:** Concepts of bioassays. Simulated bioassays using suitable software for interpolation assay
BP508P. Pharmacognosy and Phytochemistry II	The student should able to **CO1:** Describe morphological, microscopical and powder characteristics of crude drugs. **CO2:** Understanding the process behind extraction and isolation of alkaloids. **CO3:** To perform the TLC of herbal extract **CO4:** Analysis of crude drugs by chemical tests
Third Year B. Pharm (Semester-VI)	
BP601T. Medicinal Chemistry - III	The student should able to **CO1:** Understand the chemistry of drugs like β-Lactam antibiotics with respect to their pharmacological activity. **CO2:** Know the metabolism, adverse effects and therapeutic value of drugs like antibiotics and antimalarials. **CO3:** Know the Structural Activity Relationship of different class of drugs like anti-tubercular agents, quinolones & antiviral agents. **CO4:** Understand the importance of metabolism, SAR, IUPAC of sulphonamides and sulfones. **CO5:** Understand the importance of drug design and different techniques of drug design.
BP602T. Pharmacology-III	The student should able to **CO1:** Know pharmacology of drug acting on respiratory system. **CO2:** Understand general principles of chemotherapy of different drugs. **CO3:** Explain the chemotherapy of different drugs like antitubercular agents and antileprotic agents etc. **CO4:** Learn the chemotherapy of urinary tract infections and sexually transmitted diseases as well as immunopharmacology **CO5:** Understand principles of toxicology and chronopharmacology.

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BP603T. Herbal Drug Technology	The student should able to **CO1:** Understand raw material as source of herbal drugs from cultivation to herbal drug Product. **CO2:** Know the nutraceutical & general introduction to interaction and classification. **CO3:** Summarized the conventional herbal formulations like syrups, mixtures and tablets. **CO4:** Understand WHO & ICH guidelines, Farmers right, Breeder's right, Regulations in India (ASU DTAB, ASU DCC) etc. **CO5:** Learn Present scope and future of Herbal drugs industry and Schedule T.

BP604T. Biopharmaceutics and Pharmacokinetics	The student should able to **CO1:** Understand the concepts of absorption and distribution of drug Products. **CO2:** Understand the concepts of bioavailability, bioequivalence and elimination of drug Products. **CO3:** Understand various pharmacokinetic parameters, their significance. **CO4:** Elaborate the multi compartment modeling. **CO5:** Know Michaelis-menton method of estimating parameters.
BP605 T. Pharmaceutical Biotechnology	The student should able to **CO1:** Understand and describe the basic concept in biotechnology with reference to pharmaceutical Sciences. **CO2:** Able to elaborate the application of genetic engineering in medicine. **CO3:** To know about Hybridoma technology, Structure and Function of MHC, Immunoglobulins. **CO4:** Understand the basic concept behind ELISA. **CO5:** Understand and describe the basic concept in Fermentation.
BP606 T. Quality Assurance	The student should able to **CO1:** Understand the cGMP aspects in a pharmaceutical industry. **CO2:** Understand the scope of quality certifications applicable to pharmaceutical Industries. **CO3:** Understand the responsibilities of QA & QC departments **CO4:** Understand the importance of documentation. **CO5:** Understand the importance of calibration and validation.
BP607P. Medicinal Chemistry-III	The student should able to **CO1:** Preparation of drugs and their intermediates. **CO2:** Drawing structures and reactions using different softwares. **CO3:** Determination of physicochemical properties of different drugs. **CO4:** Assays of drugs.

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BP608P. Pharmacology III	The student should able to **CO1:** Perform dose calculation in pharmacological experiments **CO2:** Demonstrate the effect of drugs on animals by simulated experiments. **CO3:** Determination of different toxicity study. **CO4:** Different Biostatistics methods in experimental pharmacology.
BP609P. Herbal Drug Technology	The student should able to **CO1:** Perform preliminary phytochemical screening of crude drugs **CO2:** Understanding the process behind extraction and isolation of alkaloids. **CO3:** Analysis of herbal drugs from recent Pharmacopoeias. **CO4:** Determine Phenol content, Aldehyde content etc.

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Final Year B. Pharm (Semester-VII)	
BP701T. Instrumental Methods of Analysis	The student should able to **CO1:** Perform quantitative & qualitative analysis of drugs using various analytical instruments. **CO2:** Elaborate quantitative & qualitative analysis of drugs using IR, flame photometry, atomic absorption spectroscopy. **CO3:** Understand the chromatographic separation and analysis of drugs like TLC, Paper chromatography etc. **CO4:** Understand the chromatographic separation and analysis of drugs like HPLC, Gas chromatography etc. **CO5:** Understand the chromatographic separation and analysis of drugs like Ion exchange chromatography, Gel chromatography and Affinity chromatography etc.
BP 702 T. Industrial Pharmacy-II	The student should able to **CO1:** Know the process of pilot plant and scale up of pharmaceutical dosage forms **CO2:** Understand the process of technology transfer from lab scale to commercial batch. **CO3:** Know different Laws and Acts that regulate pharmaceutical industry. **CO4:** Understand quality management systems. **CO5:** Understand the approval process and regulatory requirements for drug products.
BP 703T. Pharmacy Practice	The student should able to **CO1:** Know hospital and its organization. **CO2:** Know various drug distribution methods in a hospital. **CO3:** Know pharmacy and therapeutic committee and Role of pharmacist in the education and training program. **CO4:** Understand Clinical Pharmacy and Over the counter (OTC) drugs. **CO5:** Understand the investigational use of drugs.
BP 704T. Novel Drug Delivery Systems	The student should able to **CO1:** Understand various approaches for development of novel drug delivery systems. **CO2:** Know various novel drug delivery like transdermal drug delivery systems, nasopulmonary drug delivery system. **CO3:** Know various approaches of mucosal drug delivery system. **CO4:** Understand various approaches for targeted drug delivery. **CO5:** Elaborate the ocular drug delivery systems.

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BP705P. Instrumental Methods of Analysis	The student should able to **CO1:** Perform absorption maxima and effect of solvents on absorption maxima of organic compounds. **CO2:** Understand various Assay by using UV- Spectrophotometry. **CO3:** Elaborate the demonstration experiment on HPLC, Gas Chromatography etc.
Final Year B. Pharm (Semester-VIII)	
BP801T. Biostatistics and Research Methodology	The student should able to **CO1:** Understand various approaches in Biostatistics & Mean, Median, Mode used in pharmaceutical field. **CO2:** Know Definition of probability, Binomial distribution, Standard, error of mean (SEM), ANOVA, Least Significance difference. **CO3:** Know the various statistical techniques to solve statistical problems. **CO4:** Learn the operation of M.S. Excel, SPSS, R and MINITAB®, DoE (Design of Experiment) **CO5:** Elaborate statistical techniques in solving the problems.
BP 802T Social and Preventive Pharmacy	The student should able to **CO1:** Understand the current issues related to health and pharmaceutical problems in the country. **CO2:** Understand the medicine which is used to prevent & cure the various diseases such as cholera, SARS, Ebola virus etc. **CO3:** Know different National health programs, its objectives and there functioning. **CO4:** Do various National health intervention programme for mother and child. **CO5:** Understand the Health promotion and education in school.
BP803ET. Pharma Marketing Management	The student should able to **CO1:** Understand the various strategies in pharmaceutical market. **CO2:** Know the classification, product line and product mix decisions. **CO3:** Know different online promotional techniques for OTC Products. **CO4:** Learn the duties of professional sales representative. **CO5:** Understand the meaning, importance, objectives of pricing and overview of DPCO, NPPA.
BP809ET. Cosmetic Science	The student should able to **CO1:** Understand the classification and definition of cosmetic and cosmetic excipients as per Indian and EU regulations **CO2:** Know the principles of formulation and building blocks of skin care products and hair care products. **CO3:** Understand the role of various herbs in cosmetics. **CO4:** Learn the principles of cosmetic evaluation. **CO5:** Understand the mechanism of action of antiperspirants and deodorants.

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Course Outcome M. Pharm Pharmaceutics 2017 (PCI) Pattern

Course code / Course title	Course outcomes
First Year M. Pharm (Semester- I)	
MPH101T Modern Pharmaceutical Analytical Techniques	The student should able to **CO1:** Understand the basic knowledge on assay of single and multiple component pharmaceuticals by using various analytical instruments such as UV-Visible, IR, and Spectroflourimetry etc. **CO2:** Develop basic practical skills using instrumentation techniques **CO3:** Expand the theoretical knowledge on principle, theory and Instrumentation of Mass Spectroscopy. **CO4:** Developed the skills in selecting the suitable chromatographic techniques for seperations of drugs and pharmaceuticals. **CO5:** Apply the knowledge learnt in developing new procedures of their own design. **CO6:** Comparing various methods of analysis and their outcomes such as RIA (Radio Immuno Assay), ELISA, Bioluminescence assays.
MPH102T Drug Delivery System	The student should able to **CO1:** Study the various approaches for development of novel drug delivery systems. **CO2:** Understand about the criteria for selection of drugs and polymers for the development ofdelivery systems. **CO3:** Study the formulation and evaluation of novel drug delivery systems such as Gastro-Retentive, Transdermal etc. **CO4:** Study the various approaches in novel drug delivery systems.
MPH103T Modern Pharmaceutics	The student should able to **CO1:** Learn the elements of preformulation studies. **CO2:** Have an idea about the active pharmaceutical ingredients and generic drug product development. **CO3:** Learn various Optimization techniques and pilot plant scale up techniques. **CO4:** Study of various Stability testing, sterilization process and packaging of dosage forms. **CO5:** Study the Industrial Management and GMP considerations.

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MPH 104T Regulatory Affairs	The student should able to **CO1**: Understand the concepts of innovator and generic drugs, drug development process. **CO2:** Study the regulatory guidance's and guidelines for filing and approval process. **CO3:** Preparation of dossiers and their submission to regulatory agencies in different countries. **CO4:** Study documentation of Post approval regulatory requirements for actives and drug products. **CO5:** Learn the submission of global documents in CTD/ eCTD formats. **CO6:** Study what are the different clinical trials requirements for approvals for conducting clinical trials. **CO7:** Learn the brief knowledge about pharmacovigilance and process of monitoring in clinical trials.
MPH 105P Pharmaceutics Practicals - I	The student should able to **CO1:** Perform In-vitro dissolution profile of CR/ SR marketed formulation **CO2:** Explain experiments based on Gas Chromatography **CO3:** Understand simultaneous estimation of multi component containing formulations by UV spectrophotometry **CO4:** Study the effect of particle size on dissolution of a tablet. **CO5:** Study the effect of compressional force on tablets disintegration time.

M. Pharm First Year (Semester-II)	
MPH 201T Molecular Pharmaceutics (NanoTechnology & Targeted DDS)	The student should able to **CO1:** Study the various approaches for development of novel drug delivery systems. **CO2:** Learn the brief knowledge about the criteria for selection of drugs and polymers for the development of NTDS **CO3:** Study the formulation and evaluation of novel drug delivery systems.
MPH202T Advanced Biopharmaceutics and pharmacokinetics	The student should able to **CO1:** Understand basic concepts in biopharmaceutics and pharmacokinetics. **CO2:** Learn the use raw data and derive the pharmacokinetic models and parameters the best describe theprocess of drug absorption, distribution, metabolism and elimination. **CO3:** Study the critical evaluation of biopharmaceutic studies involving drug product equivalency.

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	CO4: Study the design and evaluation of dosage regimens of the drugs using pharmacokinetic and biopharmaceutical parameters. **CO5:** Understand the potential clinical pharmacokinetic problems and application of basics of pharmacokinetic.
MPH203T Computer Aided Drug DeliverySystem	The student should able to **CO1:** Explain history of Computers in Pharmaceutical Research and Development **CO2:** Understand computational Modeling of Drug Disposition **CO3:** Express computers in Preclinical Development **CO4:** Understand the optimization Techniques in Pharmaceutical Formulation **CO5:** Explain computers in Market Analysis **CO6:** Know computers in Clinical Development **CO7:** Know Artificial Intelligence (AI) and Robotics and Computational fluid dynamics (CFD).
MPH204T Cosmetics and Cosmeceuticals	The student should able to **CO1:** Know about the key ingredients used in cosmetics and cosmeceuticals. **CO2:** Discussed in brief about key building blocks for various formulations. **CO3:** Study various key ingredients and basic science to develop cosmetics and cosmeceuticals **CO4:** Have scientific knowledge to develop cosmetics and with desired Safety, stability, and efficacy.
MPH205P Pharmaceutics Practical II	The student should able to **CO1:** Study the effect of temperature change , non- solvent addition, incompatible polymer addition inmicrocapsules preparation **CO2:** Understand protein binding studies of a highly protein bound drug & poorly protein bound drug. **CO3:** Explain computational Modeling Of Drug Disposition **CO4:** Develop Clinical Data Collection manual.

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Course Outcome M. Pharm PHARMACEUTICAL QUALITY ASSURANCE 2017 (PCI) Pattern

Course code / Course title	Course outcomes
First Year M. Pharm (Semester- I)	
Modern Pharmaceutical Analytical Techniques (MQA101T)	The student should able to **CO1:** Understand the basic knowledge on assay of single and multiple component pharmaceuticals byusing various analytical instruments such as UV-Visible, IR, and Spectroflourimetry etc. **CO2:** Develop basic practical skills using instrumentation techniques **CO3:** Expand the theoretical knowledge on principle, theory and Instrumentation of Mass Spectroscopy. **CO4:** Skills in selecting the suitable chromatographic techniques for seperations of drugs and pharmaceuticals. **CO5:** To apply the knowledge learnt in developing new procedures of their own design **CO6:** Comparing various methods of analysis and their outcomes such as RIA (Radio Immuno Assay), ELISA,Bioluminescence assays.
Quality Management Systems (MQA 102T)	The student should able to **CO1:** Study the various approaches for the importance of quality as a strategic decision. **CO2:** Understand about the Tools for quality improvement. **CO3:** To study the various statistical approaches for quality. **CO4:** To study the ISO management systems.
Quality Control and Quality Assurance (MQA 103T)	The student should able to **CO1:** Understand the cGMP aspects in a pharmaceutical industry. **CO2:** Understand the scope of quality certifications applicable to Pharmaceutical industries **CO3:** Understand the responsibilities of QA & QC departments. **CO4:** Appreciate the importance of documentation. **CO5:** Study the Industrial Management and GMP considerations.

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पूज्य साने गुरूजी विद्या प्रसारक मंडळाचे ॥ उत्तिष्ठत जाग्रत प्राप्यवरान्निबोधत ॥ Poojya Sane Guruji Vidya Prasarak Mandal's
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Smt. Kamaltai P. Patil Hon. Secretary
Dr. Sunil P. Pawar (M.Pharm., Ph. D.) Principal

Product Development and Technology Transfer (MQA 104T)	The student should able to **CO1**: Understand the necessary information to transfer technology from R&D to actual manufacturing by sorting out various information obtained during R&D **CO2:** Understand the new product development process **CO3:** Elucidate necessary information to transfer technology of existing products between various manufacturing places
Quality Assurance Practical - I (MQA 105P)	The student should able to **CO1:** Perform Experiments based on HPLC. **CO2:** Explain the case studies on Total Quality Management Six Sigma Change Management/ Change control. Deviations. **CO3:** Understand simultaneous estimation of multi component containing formulations by UV spectrophotometry. **CO4:** Study the Development of Stability study protocol. **CO5:** Study the Accelerated stability studies.

M. Pharm First Year (Semester-II)	
Hazards and Safety Management (MQA 201T)	The student should able to **CO1:** Ensure safety standards in pharmaceutical industry. **CO2:** Understand Impart basic knowledge about the environment and its allied problems. **CO3:** Teach the method of Hazard assessment, procedure, methodology for provide safe industrial atmosphere.
Pharmaceutical Validation (MQA 202T)	The student should able to **CO1:** Understand qualification of various equipment's and instruments **CO2:** Explain Validation of analytical method for estimation of drugs **CO3:** Know Process validation of different dosage forms.

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Audits and Regulatory Compliance (MPA 203T)	The student should able to **CO1:** Understand the importance of auditing. **CO2:** Understand the methodology of auditing. **CO3:** Carry out the audit process. **CO4:** Prepare the auditing report
Pharmaceutical Manufacturing Technology (MQA 204T)	The student should able to **CO1:** Understand the common practice in the pharmaceutical industry developments,plant layout and production planning. **CO2:** Explain principles and practices of aseptic process technology, non-sterile manufacturing technology and packaging technology. **CO3:** Understanding of principles and implementation of Quality by design (QbD) and process analytical technology (PAT) in pharmaceutical manufacturing
Quality Assurance Practical – II (MQA 205P)	The student should able to **CO1:** Perform Organic contaminants residue analysis by HPLC. **CO2:** Analyse Validation of an analytical method for a drug. **CO3:** Understand Cleaning validation of one equipment. **CO4:** Explain Case study on application of QbD.

M.Pharm Second Year (Semester-III)	
Research Methodology & Biostatistics (MRM 301T)	The student should able to **CO1:** Understand General Research Methodology Its objective, requirements, practical difficulties, review of literature, study design. **CO2:** Understand Biostatistics its Definition, application, sample size, importance of sample size,factors influencing sample size, dropouts. **CO3:** Know about Medical Research its History, values in medical ethics, autonomy, beneficence,non-maleficence, double effect, conflicts between autonomy and beneficence/non-maleficence. **CO4: :** Know about CPCSEA guidelines for laboratory animal facility its Goals, veterinary care, quarantine, surveillance. **CO5:**Understand Declaration of Helsinki its History, introduction, basic principles for all medical research.

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