GPAT GYAN 2026 SESSION PLANNING*

Organic Chemistry

- **General principles [June- August]**
  Classification and sources of organic compounds, sp3, sp2, sp hybridization, sigma & pi bonds, bond lengths, bond angles & bond energies along with their significance, types of bonds and their impact on properties of molecule, different types of bond polarization, hydrogen bonds, inductive effect, resonance, hyperconjugation, steric effect, Vander Waal's interactions, concept of electrophile and nucleophile, types of organic reactions, homolytic and heterolytic bond fission, curly arrow rules in representation of mechanistic steps, acidity, basicity and pKa of different types of organic compounds, concept of aromaticity and Huckel's rule, electron deficient and electron rich species, methods to determine empirical and molecular formula (combustion method, percentage composition method etc.)

- **Different classes of compounds [December- Jan]**
  Alkanes, alkenes, alkynes, aliphatic hydroxyl compounds, alkyl halides, aldehydes and ketones, carboxylic acids and their derivatives. IUPAC nomenclature, industrial and laboratory method of preparations, physical properties, reaction mechanism, stereochemistry, general tests of purity and distinction tests for different class of compounds.

- **Protection & deprotection of groups [December- Jan]**
  Protection and deprotection of amino, hydroxyl and carbonyl groups, significance of protection in synthesis.

- **Aromaticity & chemistry of aromatic compounds [September]**
  Concept of aromaticity, Huckel's rule, structure of benzene, electrophilic aromatic substitution (halogenation, nitration, sulphonation, Friedel Craft's alkylation and acylation), effect of activating and deactivating groups, directive influence, nucleophilic aromatic substitution, reactivity and orientation in electrophilic and nucleophilic substitution, benzyne mechanism.

- **Different aromatic classes of compounds [December]**
  Aromatic hydrocarbons, phenols, aromatic amines, diazonium salts, nitro compounds, aryl halides, aromatic ethers. Industrial and laboratory method of preparations, physical properties, reaction mechanism, general tests of purity and distinction tests for different class of compounds.

- **Polycyclic aromatic hydrocarbons [December]**
  Synthesis, reactions and mechanism of substituted and unsubstituted naphthalene, anthracene and phenanthrene.

- **Carbonyl Chemistry [December]**
  Wolf-Kishner reduction, Huang-Minlong reduction, Bamford Steven's reaction, DCC oxidation, Michael addition, Mannich reaction, Robinson annulation, Stobbe condensation, Darzen's glycidic ester synthesis, Beckmann rearrangement, Baeyer-Villiger rearrangement,

Curtius, Wolff, Lossen, Willgerodt reaction, pinacol-pinacolone rearrangement, Methylene transfer reactions, enol ethers and acetates, enamines.

- **Heterocyclic Chemistry [October]**
  IUPAC nomenclature of heterocyclic compounds with one or more heteroatom (O, S, N) for 3 to 10 membered rings including bicyclic and fused ring systems, laboratory method of preparations, physical properties and reaction mechanism of quinoline, isoquinoline, benzoxazole, benzothiazole and benzimidazole.

- **Bridged rings [November]**
  Nomenclature and chemistry of bridged rings with C8, C9, C11 carbon framework, bridged bicyclic alkanes, hexamine, morphan, biperiden, amantadine, 1,4-diazabicyclo[2.2.2]octane.

- **Kinetic & thermodynamic control**
  Sulphonation, enolate formation, alkylation of enamines.

- **Stereochemistry [October]**
  Concept of chirality and molecular asymmetry, enantiomers, diastereomers, epimers, erythro-threo nomenclature, R and S configuration, meso compounds, racemic modification and their resolutions, geometrical isomerism, E-Z nomenclature, optical activity, stereoselective and stereospecific reactions, conformational analysis in acyclic and cyclic compounds, conformations of cyclohexane, relative stability of different conformations, atropisomerism.

- **Carbohydrates [December- Jan]**
  Classification of carbohydrates, D and L nomenclature, mutarotation, reactions of glucose, chain extension and chain reduction of monosaccharides.

- **Amino acids & proteins [November]**
  Classification and properties of amino acids, peptide bond, Strecker synthesis, Gabriel phthalimide synthesis, protection of amino group, peptide synthesis, sequencing of peptides.

- **Pericyclic reactions [November]**
  HOMO and LUMO, Diels-Alder reaction, Retro Diels-Alder reaction.

Pharmaceutical Chemistry

I. Pharmaceutical Inorganic Chemistry

- **Pharmaceutical Impurities [NOVEMBER]**
  Impurities in pharmaceutical substances: sources, types & effects of impurities, limit test for heavy metals like lead, iron, arsenic, mercury, limit test for chloride and sulphate as per Indian Pharmacopoeia.

- **Monographs [JANUARY]**
  Importance of monographs in industry, different tests involved in monographs, methods of preparation, assay, storage condition, medicinal uses and their formulations of following compounds: sodium citrate, calcium carbonate, copper sulphate, light kaolin, heavy kaolin, ammonium chloride, ferrous gluconate.

- **Isotopes [FEBRUARY]**
  Stable and radioactive isotopes, modes of decay, half-life, radiopharmaceuticals like 125I, 32P, 51Cr, 60Co, 59Fe, 99Tc-M, radiopaque contrast media like BaSO4.

- **Dentifrices, desensitizing agents, & anticaries agents [DECEMBER]**

II. Medicinal Chemistry

- **Therapeutic classes of drugs [AUGUST]**
  General anaesthetics, local anaesthetics, diagnostic agents, coagulants and anticoagulants, plasma expanders, antiseptics and disinfectants, purgatives, laxatives and antidiarrhoeal agents.

- **Various classes of therapeutic agents [JUNE-AUGUST]**
  Antimalarial, antiamoebic, anthelmintic drugs, sulpha drugs, quinolone antibacterials, antimycobacterial drugs, antifungal, antiviral drugs (including HIV), thyroid and antithyroid drugs, antiallergic drugs, antiulcer drugs, proton pump inhibitors, oral hypoglycemic agents.

- **Different classes of therapeutic agents [SEPTEMBER]**
  Sedative-hypnotics, antiepileptic drugs, neuroleptics, anti-anxiety drugs, antibiotics like penicillins, cephalosporins, beta lactamase inhibitors, chloramphenicol, tetracyclines, aminoglycosides and macrolides, steroids like corticosteroids, sex steroids, oral contraceptives, anabolic steroids, anticancer drugs.

- **Different classes of therapeutic drugs [OCTOBER-DECEMBER]**
  Narcotic analgesics like morphine and related drugs, agonists and antagonists, non-steroidal anti-inflammatory drugs, adrenergic drugs like alpha-2 and beta-2 receptor agonists and antagonists, cholinergic drugs like M2 and N2 receptor agonists and antagonists, neuronal blocking agents, drugs for neuromuscular disorders, antiparkinsonism drugs, skeletal muscle relaxants, antihypertensive drugs, antianginal drugs, diuretics, eicosanoids like prostaglandins, prostacyclins, thromboxanes and leukotrienes.

- **Quantitative Structure Activity Relationship [JANUARY]**
  Linear free energy relationship, Hammett's equation, electronic (σ), hydrophobic (π) and steric (Es) substituent constants, physicochemical parameters, Hansch analysis and its applications.

- **Asymmetric synthesis [FEBRUARY]**
  Concept of chirality, eutomer and distomer, enantiomeric excess, diastereomeric excess, asymmetric synthesis of following drugs: captopril and propranolol.

- **Combinatorial chemistry [FEBRUARY]**
  Databases and libraries, solid phase synthesis, types of linkers like Wang linker, Rink linker, dihydropyran based linker, manual and automated combinatorial synthesis, Houghton's tea bag procedure, mix and split method, high throughput screening.

Pharmaceutical Analysis

- **Importance of quality control in pharmacy [August]**
- **Acid-base titrations [August]**
  Arrhenius concept, Bronsted-Lowry concept, Lewis concept, theory of indicators, choice of indicators, determination of normality and molarity, primary and secondary standards, standardization of acids (HCl) and bases (NaOH) with primary standards like sodium carbonate, oxalic acid, potassium hydrogen phthalate, calculations of pH for strong acid-strong base, strong acid-weak base, weak acid-strong base, weak acid-weak base, buffer solutions, buffer capacity, applications like assay of boric acid, borax, milk of magnesia.
- **Non-aqueous titrations [August]**
  Lowry-Bronsted concept, Lewis concept, types of solvents (protophilic, protogenic, amphiprotic, aprotic), titrant like perchloric acid, sodium ethoxide, standardization, assay of amines, phenols, phenobarbitone, determination of pKa.
- **Oxidation-reduction titrations [August]**
  Concept of oxidation and reduction, half reactions, equivalent weights, types of redox titrations, potassium permanganate titrations (self-indicator, assay of ferrous gluconate, H2O2), iodometric titrations (direct method like assay of ascorbic acid, indirect method like assay of sulphur ointment), bromometric titrations, iodate titrations, cerimetric titrations, potassium dichromate titrations, bromine titrations.
- **Precipitation titrations [September]**
  Solubility product, common ion effect, Mohr's method, Volhard's method, Fajan's method, standard solution like silver nitrate, ammonium thiocyanate, assay of sodium chloride, halides, thiourea.
- **Complexometric titrations [September]**
  Types of complexometric titrations, EDTA titrations, coordination compounds, stability of complexes, pH adjustment, masking and demasking agents, metal ion indicators (pM indicators), assay of calcium gluconate, milk of magnesia, zinc undecenoate.
- **Gravimetry [September]**
  Principle, supersaturation, precipitation, colloidal state, washing precipitate, drying, ignition, application like assay of barium sulphate, aluminium hydroxide.
- **Extraction techniques [October]**
  Liquid-liquid extraction, factors affecting extraction like pH, temperature, emulsion problems, Craig method of multiple extraction.
- **Potentiometry [October]**
  Principle, ion selective electrodes, determination of redox titration curves, determination of pH.
- **Miscellaneous methods of analysis [October]**
  Diazotization titrations, Kjeldahl method of nitrogen determination, Karl Fischer titrations, oxygen flask combustion, determination of alcohol content in liquid galenicals.
- **Calibration [October]**
  Calibration of instruments.

- **General principles of spectroscopy [November]**
  Wave particle duality, different regions of electromagnetic radiations, absorption and emission spectroscopy.
- **Ultra violet-visible spectrometry [November]**
  Electronic transitions, chromophores, auxochromes, bathochromic and hypsochromic shifts, Beer-Lambert's law, multicomponent analysis, single beam and double beam spectrophotometers, Woodward-Fieser rules.
- **Spectrofluorimetry [November]**
  Luminescence, fluorescence and phosphorescence, factors affecting fluorescence, quenching, instrumentation, applications.
- **Flame photometry and atomic absorption spectrometry [November]**
  Principle, instrumentation, interferences, quantitative estimation.
- **Infrared spectrometry [November]**
  Molecular vibrations, stretching and bending vibrations, Fourier transform instruments, identification of functional groups.
- **Proton nuclear magnetic resonance spectrometry [December]**
  Principle of quantized absorption, shielding and deshielding, chemical shift, spin-spin coupling, coupling constants, instrumentation of Fourier transform NMR, applications of 1H NMR, introduction to 13C NMR.
- **Mass spectrometry [December]**
  Low and high resolution mass spectrometry, chemical ionization, molecular ion, base peak, fragmentation patterns, applications, calculation of hydrogen deficiency index.
- **Polarography [December]**
  Ilkovich equation, dropping mercury electrode, current voltage curve (S-shaped), half wave potential, amperometric titrations.
- **Nephelometry and turbidimetry [December]**
  Principle, Tyndall effect, Duboscq turbidimeter, Eeel's nephelometer, applications.
- **Chromatography [Jan]**
  Rate theory, plate theory, Van Deemter equation, thin layer chromatography (TLC), preparative TLC, paper chromatography, column chromatography, gas chromatography, high performance thin layer chromatography (HPTLC), high performance liquid chromatography (HPLC).
- **Miscellaneous [Jan]**
  Electrophoresis, lasers and masers, statistical treatment of analytical data, sampling techniques.

Biochemistry

- **Cell [DECEMBER]**
  Ultra structure of cell and its biochemical applications.

- **Carbohydrates [AUGUST]**
  Types of carbohydrates, digestion and absorption of carbohydrates, aerobic and anaerobic oxidation, glycogenesis, glycogenolysis, gluconeogenesis, hexose monophosphate shunt (HMP shunt), metabolism and its disorders.

- **Proteins [SEPTEMBER]**
  Types of proteins, digestion and absorption of proteins, denaturation and renaturation, urea cycle, transamination, deamination, metabolism of amino acids, enzymes.

- **Lipids [OCTOBER]**
  Types of lipids, digestion and absorption of lipids, beta-oxidation, biosynthesis of cholesterol, adrenocorticoids, sex steroids, bile acids, ketone bodies, metabolism and its disorders.

- **Vitamins [OCTOBER]**
  Classification, structure (except vitamin B12), biochemical role, deficiency diseases, vitamins as co-factors.

- **Biological oxidations & reductions [FEBRUARY]**
  Oxidation reduction systems, respiratory chain, oxidative phosphorylation, substrate level phosphorylation, electron transport chain, role of cytochromes, inhibitors of respiratory chain.

- **Enzymes [JUNE-JULY]**
  Classification, co-enzymes, co-factors, mechanism of enzyme action, factors affecting enzyme activity, enzyme kinetics, Michaelis-Menten equation, enzyme inhibition (competitive, non-competitive).

- **Nucleic acids [NOVEMBER]**
  Composition of DNA and RNA, purine and pyrimidine bases, nucleosides, nucleotides, Watson-Crick model, replication, transcription, translation, mutations, DNA repair.

- **Hereditary diseases [JANUARY]**
  Eliptocytosis, spherocytosis, HNPCC (Hereditary non-polyposis colorectal cancer), diabetes insipidus.

GPAT_GYAN @SHEKHAR CLASS SCHEDULE

HUMAN ANATOMY AND PHYSIOLOGY [JUN, JULY & AUGUST]

- **Cell physiology**
  Cell, Cell junctions, transport mechanisms, homeostasis, ion channels, secondary messengers.
- **The Blood**
  Composition and functions of blood, RBC, WBC, platelets, homeostasis, blood groups, mechanism of clotting.
- **Gastrointestinal tract**
  Anatomy and physiology of GIT, digestion, absorption.
- **Respiratory System**
  Anatomy and physiology of respiratory organs, regulation of respiration, transport of respiratory gases.
- **Autonomic nervous system**
  Anatomy and physiology, sympathetic and parasympathetic nervous system, neurotransmitters.
- **Cardiovascular system**
  Anatomy of heart and blood vessels, cardiac cycle, cardiac output, ECG, blood pressure, regulation of blood pressure.
- **Sense organs**
  Anatomy and physiology of eye, ear, skin, tongue, nose.
- **Skeletal System**
  Structure of bone, bone formation, joints, physiology of muscle contraction.
- **Central Nervous system**
  Anatomy and physiology of brain and spinal cord, reflex action, cranial nerves, ascending and descending tracts.
- **Urinary System**
  Anatomy and physiology of kidney and urinary tract, physiology of urine formation, acid-base balance.
- **Endocrine System**
  Anatomy and physiology of pituitary, thyroid, parathyroid, pancreas, adrenal glands, gonads, local hormones.
- **Reproductive System**
  Anatomy and physiology of male and female reproductive organs, physiology of menstruation, coitus, pregnancy, parturition.
- **Lymphatic System**
  Anatomy and physiology of lymphatic organs, lymph formation, circulation, functions of lymphatic system.

PATHOPHYSIOLOGY [SEPTEMBER]

- **Basic Principles ofof Cellcell Injuryinjury and Adaptationadaptation**
  Causes of cell injury, pathogenesis, apoptosis, necrosis.
- **Basic Mechanisms of Inflammation and Repair**
  Pathogenesis of inflammation, chemical mediators of inflammation, chronic inflammation, wound healing.
- **Disorders of Fluid, Electrolytelectrolyte and Acid-base Balance**
- **Disorders of Homeostasis**: White blood cells, Lymphoid Tissues, and Red Blood Cells Related Diseases**
- **Immunopathology Includingimmunopatholgy including Amyloidosisamyloid**
  Host parasite relationships, Koch's postulates, Rivers postulates, external defense mechanisms, internal defense mechanisms, humoral immunity, cellular immunity, hypersensitivity, autoimmunity, transplantation, AIDS, amyloidosis.
- **Infectious Diseases
  Hepatitis, syphilis, gonorrhoea, HIV, pneumonia, typhoid, urinary tract infections, tuberculosis, leprosy, malaria, amoebiasis, bacillary dysentery.
- **Neoplastic Diseases**
  Disturbances in cell growth, tumor biology, benign and malignant tumors, tumor classification, metastasis, carcinogenesis.
- **Pathophysiology of Common Diseases**
  Parkinsonism, schizophrenia, depression, stroke, hypertension, angina, myocardial infarction, congestive cardiac failure, atherosclerosis, diabetes mellitus, peptic ulcer, inflammatory bowel disease, cirrhosis, acute and chronic renal failure, asthma, chronic obstructive airway diseases.
- **Laboratory Tests for Liver Function Tests and Kidney Function Tests**

PHARMACOLOGY [OCT, NOV & DEC]

- **Drugs acting on respiratory system**
  Anti-asthmatic drugs, mucolytics, nasal decongestants, antitussives, expectorants, respiratory stimulants.

- **Drugs acting on urinary system**

  Diuretics, antidiuretics

- **Chemotherapy**
  General principles of chemotherapy, sulphonamides, cotrimoxazole, penicillins, cephalosporins, chloramphenicol, macrolides, quinolones, tetracyclines, aminoglycosides, chemotherapy of tuberculosis, leprosy, fungal diseases, viral diseases, protozoal diseases, worm infestations, chemotherapy of malignancy.

BIOPHARMACEUTICS AND PHARMACOKINETICS [JANUARY & TILL 15TH FEB]

- **Biopharmaceutics**
  Mechanism of drug absorption, factors affecting drug absorption, biological factors, physicochemical factors, dosage form considerations, pH-partition hypothesis, gastrointestinal absorption of drugs, pharmacokinetics: compartmental and non-compartmental, biotransformation, distribution, plasma protein binding, elimination, variability in pharmacokinetics like body weight, age, sex, genetic factors, disease states, drug interactions, optimization of dosing regimen.

- **Bioavailability & Bioequivalence**
  Quality parameters for bioavailability, assay validation, physicochemical properties, disintegration, dissolution, bioavailability determination, bioequivalence studies, in vitro-in vivo correlation (IVIVC), scale-up and post approval changes (SUPAC), new drug application (NDA).

- **Biopharmaceutical Statistics**
  Post marketing surveillance, process validation.

MICROBIOLOGY [15TH FEB - MARCH]

- **Introduction to Microbiology**
  Scope and applications of microbiology, Whittaker's Five Kingdom concept, biogenesis versus abiogenesis, germ theory of disease, contributions of Leeuwenhoek, Koch, Jenner, Pasteur and Ehrlich.

- **Microscopy and staining technique**
  Types of microscopes like light microscope, dark field, phase contrast, fluorescence, electron microscope, resolving power, magnification, staining techniques like monochrome staining, negative staining, Gram staining, acid fast staining, capsule staining, endospore staining.

- **Biology of Microorganisms**
  Morphology of bacteria, nutritional requirements, growth and reproduction, culture media, pure culture techniques, genetic exchange, drug resistance, bacterial pathogenesis like Staphylococcus, Mycobacterium, Salmonella, actinomycetes.

- **Fungi and Viruses**
  Morphology, classification and medical significance of fungi like Saccharomyces, Penicillium, Aspergillus, Candida, Epidermophyton, morphology, classification and replication of viruses, bacteriophages, lytic and lysogenic cycles, pathogenesis of HIV, prions, tumor viruses.

- **Aseptic Technique**
  Omnipresence of microorganisms, laminar air flow, importance of aseptic technique in prevention of contamination.

- **Sterilization & Disinfection**
  Different methods like moist heat, dry heat, gamma radiation, filtration, microbial death, D-value, z-value, disinfectants, evaluation of disinfectants like RW test, Kelsey Sykes test, Chick Martin test.

- **Microbial spoilage**
  Types of spoilage, factors affecting spoilage of pharmaceutical products.

- **Vaccines & Sera**
  Vaccines like tetanus vaccine, TAB vaccine, cholera vaccine, BCG vaccine, DPT vaccine, polio vaccine, rabies vaccine, MMR vaccine, hepatitis vaccine, antisera like diphtheria antisera, tetanus antisera, gas gangrene antisera, rabies antisera, allergenic extracts.

- **Microbial Assay**
  Antibiotic assay like cup and plate method, paper disc method, turbidometric method, dilution method, antifungal assay, antiviral assay, microbial limit tests.

Pharmacology

- **General Pharmacology [June]**
  Definition and scope of pharmacology, sources of drugs, dosage forms and routes of administration, concept of receptors and classification, mechanism of drug action, pharmacodynamics, drug interactions, factors modifying drug action, pharmacokinetics (absorption, distribution, metabolism, excretion), principles of drug discovery, development, pharmacogenetics, adverse drug reactions, clinical trial phases, Good Clinical Practices, preclinical studies, bioassays.

- **Drugs acting on neurohumoral transmission [July]**
  Neurohumoral transmission in autonomic nervous system and central nervous system, nitric oxide, peptides and proteins as mediators.

- **Drugs acting on peripheral nervous system [July]**
  Parasympathomimetics, parasympatholytics, sympathomimetics, sympatholytics, ganglionic stimulants and blockers, neuromuscular blocking agents, drugs used in myasthenia gravis, local anaesthetics.

- **Drugs acting on central nervous system [aug]**
  General anaesthetics, alcohols and disulfiram, sedative hypnotics, centrally acting analgesics, antipsychotics, antidepressants, anti-anxiety drugs, anti-manics, hallucinogens, antiepileptic drugs, antiparkinsonism drugs, nootropic agents, narcotic analgesics, drug addiction and drug abuse, CNS stimulants.

- **Autacoids and their antagonists [September]**
  Histamine, 5-hydroxytryptamine (5-HT) and their antagonists, prostaglandins, thromboxanes, leukotrienes, pentagastrin, cholecystokinin, angiotensin, bradykinin, substance P, analgesics, antipyretics, anti-inflammatory and anti-gout drugs.

- **Drugs acting on cardiovascular system [sep-oct]**
  Haemodynamics and electrophysiology of heart, antihypertensive drugs, antianginal drugs, antiarrhythmic drugs, drugs used in congestive heart failure, anti-hyperlipidemic drugs, drugs used in shock, haematinics, anticoagulants, thrombolytic and antiplatelet drugs, plasma expanders.

- **Drugs acting on urinary system[oct]**
  Diuretics, antidiuretics.

- **Drugs acting on respiratory system [nov]**
  Anti-asthmatic drugs, mucolytics, nasal decongestants, antitussives, expectorants, respiratory stimulants.

- **Drugs acting on endocrine system[November-decm]**
  Hypothalamic and pituitary hormones, thyroid and antithyroid drugs, insulin, oral hypoglycemic agents, glucagon, adrenocorticosteroids and their analogues, gonadal hormones (androgens, estrogens, progestins), oral contraceptives, drugs acting on uterus.

- **Chemotherapy [December-jan]**
  General principles of chemotherapy, sulphonamides, cotrimoxazole, penicillins,

cephalosporins, chloramphenicol, macrolides, quinolones, tetracyclines, aminoglycosides, chemotherapy of tuberculosis, leprosy, fungal diseases, viral diseases, protozoal diseases, worm infestations, chemotherapy of malignancy.

- **Drugs acting on gastrointestinal tract [feb]**
  Antacids, antisecretory and antiulcer drugs, laxatives, antidiarrhoeal drugs, appetite stimulants and suppressants, digestants, carminatives, emetics, anti-emetics.

- **Chronopharmacology[feb]**
  Definition, biological clocks, rhythm and cycles, chronotherapy.

- **Immunopharmacology [feb]**
  Immunostimulants, immunosuppressants.

- **Vitamins & Minerals[march]**
  Vitamin deficiency diseases, role of minerals in the body.

- **Principles of toxicology[march]**
  Definition of poison, general principles of treatment of poisoning, treatment of heavy metal poisoning, insecticides, opioid poisoning, OECD guidelines for toxicity studies like acute oral toxicity (No. 420, 423, 425), repeated dose toxicity (No. 407, 408), carcinogenicity (No. 451, 452).

Shreyashi

Pharmacognosy

- **Introductory Pharmacognosy - JUNE**
  Historical development and scope of pharmacognosy, relevance of pharmacognosy in allopathy and traditional systems of medicine like Ayurveda, Unani, Siddha and Homeopathy.

- **Classification of crude drugs - JUNE**
  Alphabetical, morphological, taxonomical, pharmacological, chemical, chemotaxonomical, organized and unorganized drugs, official and unofficial drugs.

- **Factors influencing quality of crude drugs - JUNE**
  Exogenous factors like temperature, rainfall, humidity, light, oxygen, altitude, soil, endogenous factors like mutation, polyploidy, hybridization, production factors like collection, drying, storage, preservation.

- **Techniques in microscopy - JULY**
  Mountants, clearing agents, chemomicroscopic reagents.

- **Introduction to phytoconstituents - WOULD BE INCLUDED IN RESPECTIVE CHAPTERS**
  Carbohydrates, fats, proteins, enzymes, alkaloids, glycosides, flavonoids, steroids, saponins, tannins, resins, lipids, volatile oils.

- **Principles of plant classification - JULY**
  Algae (Rhodophyceae, Phaeophyceae, Chlorophyceae), fungi (Phycomycetes, Ascomycetes, Basidiomycetes, Deuteromycetes, ergot, yeast, penicillium), gymnosperms (Pinaceae, Ginkgoaceae, Taxaceae, Cycadaceae, Gnetaceae), pteridophytes (male fern), angiosperms (Apocynaceae, Asteraceae, Convolvulaceae, Lamiaceae, Leguminosae, Liliaceae, Ranunculaceae, Rubiaceae, Solanaceae, Umbelliferae, Scrophulariaceae, Acanthaceae, Euphorbiaceae, Moraceae, Zingiberaceae).

- **Pharmaceutical aids - WOULD BE INCLUDED IN RESPECTIVE CHAPTERS**
  Starches, acacia, tragacanth, alginates, guar gum, gelatin, cotton, rayon, silk, wool, kaolin, talc, diatomite, bentonite, chalk, arachis oil, castor oil, olive oil, sesame oil, chaulmoogra oil, spermaceti, beeswax.

- **Animal products – OCTOBER-NOVEMBER**
  Shellac, cochineal, cantharides, woolfat, beeswax, honey, musk, civet, ambergris, cod liver oil, shark liver oil, lanolin, gelatin.

- **Plant products - DECEMBER**
  Bitters, sweeteners, nutraceuticals, cosmeceuticals, photosensitizing agents.

- **Toxic drugs - DECEMBER**
  Allergens, hallucinogens, narcotics.

- **Enzymes - DECEMBER**
  Diastase, papain, bromelain, ficin, yeast, pancreatin, urokinase, pepsin, trypsin, penicillinase, hyaluronidase, streptokinase.

- **Natural pesticides and insecticides - DECEMBER**
  Herbicides, fungicides, fumigants, rodenticides, tobacco, pyrethrum, neem.

- **Adulteration and evaluation of crude drugs - JUNE**
  Different methods of adulteration, organoleptic evaluation, microscopic evaluation, physical evaluation, chemical evaluation, biological evaluation.

- **Quantitative microscopy - JUNE**
  Stomatal number, stomatal index, palisade ratio, vein islet number, vein termination number, lycopodium spore method.

- **Biogenetic pathways - JULY**
  Calvin cycle, TCA cycle, shikimic acid pathway, Embden-Meyerhof pathway, acetate pathway, isoprenoid pathway.

- **Carbohydrates & lipids – SEPTEMBER-OCTOBER**
  Agar, guar gum, sterculia, pectin, inulin, plantago, bael, acacia, tragacanth, alginates, carrageenan, honey, chaulmoogra oil, neem oil, shark liver oil, cod liver oil, guggul lipids, olive oil, arachis oil, castor oil.

- **Tannins - SEPTEMBER**
  Pale catechu, black catechu, gall, myrobalans, bahera, arjuna, ashoka, nutgalls.

- **Volatile oils – AUGUST-SEPTEMBER**
  Black pepper, turpentine, mentha, coriander, cardamom, fennel, clove, cinnamon, nutmeg, cumin, caraway, lemon peel, orange peel, lemongrass, citronella, palmarosa, vetiver, geranium, eucalyptus, chenopodium, anise, star anise, dill, celery, sandalwood, cassia, camphor, ajowan, spearmint.

- **Resinous drugs - SEPTEMBER**
  Benzoin, Peru balsam, tolu balsam, storax, myrrh, frankincense, colophony, cannabis, podophyllum, jalap, capsicum, turmeric, ginger, asafoetida, guggul.

- **Glycosides – JULY-AUGUST**
  Digitalis, strophanthus, squill, thevetia, nerium, aloe, rhubarb, cascara, senna, gentian, dioscorea, quassia, liquorice, ginseng, picrorrhiza, chirata, kalmegh, cardiac glycosides, anthraquinone glycosides, biosynthesis of glycosides.

- **Alkaloids - JULY**
  Areca nut, lobelia, tobacco, belladonna, hyoscyamus, stramonium, duboisia, cinchona, ipecac, opium, ergot, rauwolfia, vinca, nux vomica, physostigma, pilocarpus, tea, coffee, cola, cocoa, ephedra, aconite, veratrum, colchicum, vasaka, kurchi, solanum alkaloids, tropane alkaloids, cinchonine biosynthesis, opium biosynthesis.

- **Extraction and isolation techniques for phytopharmaceuticals - WOULD BE INCLUDED IN RESPECTIVE CHAPTERS**
  Extraction and isolation techniques for alkaloids, lipids, glycosides, flavonoids, volatile oils, tannins, resins, column chromatography, paper chromatography, thin layer chromatography.

- **Phytopharmaceuticals – WOULD BE INCLUDED IN RESPECTIVE CHAPTERS**
  Isolation, identification and estimation of phytopharmaceuticals like caffeine, eugenol, digoxin, piperine, tannic acid, diosgenin, hesperidin, berberine, calcium sennosides, rutin, glycyrrhizin, menthol, ephedrine.

- **Quality control and standardization of herbal drugs – JUNE-JULY**
  WHO guidelines, AYUSH guidelines, pharmacopoeial standards, extractive values, ash values, TLC, HPTLC, HPLC, estimation of heavy metals and pesticides.
- **Herbal formulations - JUNE**
  Ayurvedic formulations like aristas, asavas, gutikas, tailas, churnas, lehyas, bhasmas, Unani formulations like majooms, safoofs, alcohol content determination in formulations.
- **Worldwide trade of crude drugs and volatile oils - NOVEMBER**
  Crude drugs with high commercial value, volatile oils with high commercial value, trade regulations.
- **Herbal cosmetics - NOVEMBER**
  Shampoos (soapnut, shikakai), conditioners (amla, henna, hibiscus), fairness creams (turmeric, liquorice, kumkumadi), skin care (aloe, calendula, tea tree).
- **Traditional herbal drugs - NOVEMBER**
  Punarnava, shankhpushpi, lehsun, guggul, kalmegh, tulsi, valerian, artemisia, chirata, ashoka, brahmi, methi, shatavari, karela.
- **Plants based industries and research institutes in India - DECEMBER**
  Herbal based industry, thrust areas of research in India.
- **Patents - DECEMBER**
  Indian and international patent laws, intellectual property rights for phytoconstituents.
- **Ayurvedic system of medicine - JUNE**
  Theory, basic principles, diagnosis, treatment, ayurvedic pharmacopoeia, important ayurvedic formulations like asavas, arishtas, churnas, tailas, gutikas, bhasmas, lehyas.
- **Homeopathic system of medicine - JUNE**
  Theory, basic principles, diagnosis, treatment, source of homeopathic drugs, important homeopathic drugs.

Pharmaceutical Jurisprudence - JANUARY

- **Historical background Drug legislation in India, Code of Ethics for Pharmacists.**
- **The Pharmacy Act 1948 (inclusive of recent amendments).**
- **Drugs and Cosmetics Act 1940, Rules 1945, including New Drug applications.**
- **Narcotic Drugs and Psychotropic Substances Act, and Rules thereunder.**
- **Drugs and Magic Remedies (Objectionable Advertisements) Act 1954.**
- **Medicinal and Toilet Preparations (Excise Duties) Act 1955, Rules 1976.**
- **Medical Termination of Pregnancy Act 1970 and Rules 1975.**
- **Prevention of Cruelty to Animals Act 1960.**
- **Drug (Price Control) Order.**
- **Shops and Establishment Act.**
- **Factory Act.**
- **Consumer Protection Act.**
- **Indian Pharmaceutical Industry- An Overview.**
- **Industrial Development and Regulation act 1951.**
- **Introduction to Intellectual Property Rights and Indian Patent Act 1970.**
- **An Introduction to Standard Institutions and Regulatory Authorities such as BIS, ASTM, ISO, TGA, USFDA, MHRA, ICH, WHO.**
- **Minimum Wages Act 1948.**
- **Prevention of Food Adulteration Act 1954 and Rules.**

Physical Chemistry

- **Composition & physical states of matter [SEP]**
  Intermolecular forces & their impact on the physical properties like dipole moment, polarisability, dielectric constant, refractive index, boiling point, melting point etc. Ideal gas equation, Van Der Waal's equation, critical phenomenon, liquefaction of gases, aerosols.

- **Colligative Properties [SEP]**
  The liquid state, vapour pressure, ideal & real solutions. Raoult's law, elevation of boiling point, depression of freezing point, osmotic pressure, determination of molecular weight based on colligative properties.

- **Thermodynamics [0CT]**
  First, second & third law of thermodynamics, Thermochemical laws, Isothermic & Adiabetic process, reversible & irreversible process, work of expansion, enthalpy, entropy, heat capacity, Gibb's & Helmoholtz equation, chemical potential, variation of chemical potential with temperature & pressure, application of thermodynamics in pharmacy.

- **Refractive index [0CT]**
  Refractive index, specific refractivity, molar refractivity, refractometers.

- **Solutions [0CT]**
  Factors affecting solubility, solubility curves, Types of solutions, effect of co-solvency, pH & other factors on solubility of gases in liquids, liquids in liquids, solids in liquids, critical solution temperature (CST), Law of partitioning & its applications, solute solvent interactions. Expression of concentration of pharmaceutical solutions: molarity, molality, mole fraction, parts per million, percentage, normality.

- **Electrochemistry [NOV]**
  Properties of electrolyte solutions, electrolysis, Faraday's law of electrolysis, electron transport, electrical cell, single electrode potential, Nernst equation, salt bridge, electromotive series, concentration cells, standard potential, Standard Hydrogen Electrode (SHE), oxygen electrodes, reference & indicator electrodes, standard oxidation reduction potential.

- **Ionic equilibrium [NOV]**
  Theory of conductivity, equivalent conductance, ionic mobility, specific conductance.

- **Kinetics [NOV]**
  Order of reactions, derivation & determination of rate constant, molarities, weak & strong electrolytes.

Physical Pharmacy

- **Matter, properties of matter [JUNE]**
  States of matter, change in the state of matter, latent heat and vapor pressure, sublimation critical point, Eutectic mixtures, gases, aerosols- inhalers, relative humidity, liquid complexes, liquid crystals, glasses state, solid crystalline and amorphous polymorphism.

- **Micromeritics and powder rheology [JUNE]**
  Particle size and distribution, average particle size number and weight distribution, particle number, methods of particle size determination, optical microscopy, sieving, sedimentation, particle shape and surface area, methods for determining surface area, permeability, adsorption, derived properties of powders, porosity, packing arrangement density, bulkiness and flow properties.

- **Surface and interfacial phenomenon [JUNE]**
  Liquid interface, surface and interfacial tensions, surface free energy, measurement of surface and interfacial tension, spreading coefficient, adsorption and liquid interfaces, surface active agents, HLB classification, solubilization, detergency, absorption at solid interfaces, solid gas and solid-liquid interfaces, complex films, electrical properties of interfaces.

- **Viscosity and rheology [JULY]**
  Newtonian systems, law of flow, kinematics viscosity, effect of temperature, non-Newtonian systems, pseudoplastics, dilatant, plastic, thixotropy in formulations, determination of viscosity and thixotropy by capillary, falling ball, rotational viscometer, application of rheology in pharmacy.

- **Dispersion systems [JULY]**
  a. **Colloidal dispersions**: Definition, types, properties of colloids, protective colloids, application of colloids in pharmacy.
  b. **Suspensions and emulsions**: Interfacial properties of suspended particles, settling in suspensions, theory of sedimentation, effect of Brownian movement, sedimentation of flocculated particles, sedimentation parameters, wetting of particles, significance of electrical properties in dispersions, controlled flocculation, flocculation in structured vehicles, rheological considerations, emulsions: types, theories, physical stability.

- **Complexation [AUG]**
  Classification of complexes, methods of preparations and analysis, applications.

- **Buffer [AUG]**
  Buffer equations and buffer capacity in general. Buffers in pharmaceutical systems, preparations and stability, buffered isotonic solutions, measurements of tonicity calculations and methods of adjusting isotonicity.

- **Solubility [AUG]**
  Miscibility-influence of foreign substances; three component systems, dielectric constant and solubility, Solubility of gases in liquids, liquids in liquids and solids in liquids (ideal and non-ideal solutions), solvation and association in solutions. Solubility of salts in water, solubility of slightly soluble and weak electrolyte, calculating solubility of weak electrolytes as influenced by pH, influence of solvents on the solubility of drugs, combined effect of pH and solvents, pH based partitioning and extraction, distribution of solutes in immiscible solvents, effect of ionic dissociation and molecular association on partition, extraction, drug action and

distribution coefficient, preservative action and solubility, solubility constants of sparingly soluble salts, accelerated stability analysis and solubility, solid state manipulation for improving solubility.

Pharmaceutics

- **Pharmacy Profession & Introduction to Pharmaceuticals [June]**
  Pharmacy as a career, evaluation of pharmacy profession, earlier period, middle to modern ages, pharmacy in India, different systems of medicines with special reference to pharmaceutical industry, global scenario of pharmaceutical industry.

- **Introduction to dosage form [June]**
  Definition of drug and new drug (as per D & C act), dosage forms, need of different dosage forms, new drug delivery systems.

- **Sources of drug information [August]**
  Introduction to pharmacopoeia and monographs with special reference to I.P., B.P., U.S.P., International Pharmacopoeia, European Pharmacopoeia, Martindale, BPC, Merck Index, textbooks, reference books, journals: current and recent issues, older issues, annual reports, volumes, internet: primary sources, secondary sources, tertiary sources.

- **Allopathic dosage form [August]**

  1. **Monophasic liquid dosage forms**: Aromatic waters (concave, dill water), syrups (simple syrup, medicated, artificial syrup), elixirs, linctures, solutions (simple, Dobell's), glycerin (glycerites, glycerinoids, glycerol drops), paints, mouth washes, gargles, lotions (calamine lotion, liniments, ear drops, nasal drops (drops and sprays).

- **Crude Extracts [October]**
  Infusion (infuse, infusion), decoction, maceration (simple and modificate maceration), percolation (simple, for soft drugs, for hard drugs), tinctures (simple, compound), dry extract, semi liquid extracts, liquid extracts, direct concentrates.

- **Allergenic extracts [October]**
  Types of allergens, preparation of allergenic extracts, testing and standardization of extracts.

- **Biological Products [October]**
  Surgical products: absorbable (catgut, collagen, gelatin sponge), non-absorbable (nylon, silk, linen, polyester fibers), ligatures (catgut, nylon), processing of ligature tubes, surgical instruments, sterilization and sterility testing, storage containers, QC tests for surgical products.

- **Pharmaceutical Plant, location, selection [October]**

  1. **Layout**: Factors determining selection of plant location, types of layouts, product layout, process layout, combination of product and process layout, flow sheets, general flow sheets, flow sheet for tablets, advantages and disadvantages.

- **Dosage Form Necessities and Additives [September]**
  Antioxidants (sodium metabisulphite, sodium bisulphite), preservatives (benzoic acid, sorbic acid, methyl paraben, propyl paraben), coloring agents (amaranth, erythrosine, tartrazine, titanium dioxide), flavoring agents (orange oil, menthol, vanilla), sweetening agents (saccharin, aspartame, sucralose), emulsifying agents (acacia, tragacanth, sodium lauryl sulphate), suspending agents (bentonite, kaolin, gelatin), ointment bases (white beeswax, lanolin, PEG), solvents (water, alcohol, glycerin, propylene glycol).

- **Powders [November]**
  Advantages and limitations as dosage forms, manufacturing procedure and equipments,

special problems with powders, simple powders, compound powders, dusting powders, insufflations, effervescent granules as per I.P.

- **Capsules [July]**
  Hard gelatin capsules, advantages, limitations, manufacturing, formulation of capsules, filling and sealing, soft gelatin capsules, microencapsulation, quality control tests, I.P. formulations.

- **Tablets [June ,July]**
  Types of tablets, granulation technology, direct compression, tablet compression machine, formulation of tablets, coating of tablets (sugar coating, film coating, compression coating), defects in tablets, troubleshooting, quality control tests, I.P. formulations.

- **Parenterals - product requiring sterile packaging [August]**
  Definition, types (small volume, large volume, powder for injection, emulsions, suspensions), formulation, vehicles, production facilities, production procedures, control on raw materials and finished products, quality control tests, I.P. injections.

- **Suspensions [September]**
  Definition, advantages and disadvantages, types (flocculated, deflocculated), formulation, manufacturing procedure, quality control tests, I.P. suspensions.

- **Emulsions [September]**
  Definition, types, advantages and disadvantages, emulsifying agents, formulation, manufacturing procedure, stability problems, quality control tests, I.P. emulsions.

- **Suppositories [September]**
  Definition, advantages and disadvantages, types, suppository bases, formulation, manufacturing procedure, packaging and storage, quality control tests, I.P. suppositories.

- **Semisolids [August]**
  Definition, types (ointments, creams, pastes, gels, poultices, plasters), ointment bases, formulation, manufacturing procedure, storage, quality control tests, I.P. products.

- **Liquids [August]**
  Definition, types (solutions, syrups, elixirs, aromatic waters, spirits), formulation, manufacturing procedure, quality control tests, I.P. products.

- **Pharmaceutical Aerosols [July]**
  Definition, advantages and disadvantages, components (propellants, containers, valves, actuators), formulation, manufacturing procedure, quality control tests, environmental impact of aerosols.

- **Ophthalmic preparations [August]**
  Definition, types, requirements for formulation, containers, manufacturing procedure, storage, quality control tests, I.P. products.

- **Preformulations [June]**
  Definition, need of preformulation studies, physical properties (crystal forms, particle size, shape, solubility, dissolution, flow properties, hygroscopicity), chemical properties (hydrolysis, oxidation, racemization, polymerization), drug-excipient compatibility studies, stability studies.

- **Stability of formulated products [November]**
  Physical, chemical and microbiological instabilities, shelf life determination, overages, containers and closures, accelerated stability testing, real time stability testing.

- **Prolonged Action Pharmaceuticals [November]**
  Definition, advantages and disadvantages, benefits in oral and parenteral products, factors affecting drug absorption, prolonged action by formulation, evaluation.

- **Novel Drug delivery system [November ,December]**
  Introduction to NDDS, types (transdermal drug delivery, osmotically controlled, iontophoresis, sonophoresis, targeted drug delivery, liposomes, niosomes, nanoparticles, resealed erythrocytes, aerosols), critical fluid technology.

- **GMP and Validation [December]**
  Good manufacturing practices, quality control and quality assurance, concept of validation, validation of manufacturing process, validation of equipments, validation of analytical instruments.

- **Packaging Materials [November]**
  Introduction, types (glass, plastic, rubber, metals, paper and paper board), primary, secondary and tertiary packaging, child resistant packaging, testing of containers and closures, pilfer proof packaging.

- **Cosmetics [December]**
  Introduction, types (dentifrices, hair creams, lipsticks, face powders, shampoos, depilatories, manicure preparations), formulation, manufacturing procedure, evaluation.

- **Pilot plant scale-up techniques [November]**
  Introduction, organization and layout of pilot plant, scale-up techniques for solid dosage forms, liquid dosage forms, technology transfer, clinical evaluation.

Biotechnology

1. **Plant Cell and Tissue Culture[DEC]**
   Structure of plant cell, DNA, genes and chromosomes, callus culture, suspension culture, somatic hybridization, somatic embryogenesis, protoplast fusion, germplasm conservation, production of secondary metabolites by plant tissue culture, gene transfer in plants.

2. **Animal Cell Culture [DEC]**
   Culture media, foetal calf serum (FCS), primary culture, secondary culture, transformed animal cells, established cell lines, cloning of animal cells, organ culture, transgenic animals, xenotransplantation.

3. **Fermentation Technology and Industrial Microbiology[DEC]**
   Types of fermentation, fermenter design, control and monitoring, product recovery, scale-up.

4. **Recombinant DNA Technology [JAN]**
   Restriction endonucleases, DNA ligase, DNA polymerase, reverse transcriptase, construction of DNA clones, vectors, host cells, screening of recombinant clones.

5. **Biotechnology Derived Products [JAN]**
   Sources of biotechnology products like E.coli, yeast, fungi, transgenic animals, transgenic plants, insect cells, upstream processing, downstream processing, recombinant products like insulin, growth hormones, erythropoietin, interferons, granulocyte macrophage colony stimulating factor, hepatitis B vaccine, tissue plasminogen activator, streptokinase, monoclonal antibodies, detection of contaminants, validation of biotechnology products.

BIOSTATISTIS [FEB]

Pharmaceutical Engineering

- **Fluid Flow [December]**

  Types of flow, Reynold's number, viscosity, concept of boundary layer, basic equations of fluid flow, valves, flow meters, manometers.

- **Heat Transfer [December]**
  Concept of heat transfer, conductivity, convection, radiation, heat exchangers, heat transfer equipment.

- **Evaporation [December]**
  Basic concept of evaporation, factors affecting evaporation, evaporators, film evaporators, single effect and multiple effect evaporators.

- **Distillation [January]**
  Raoult's law, phase diagrams, volatility, simple steam and flash distillations, principles of rectification, McCabe Thiele method for calculation of number of theoretical plates, azeotropic and extractive distillation.

- **Drying [January]**
  Moisture content and mechanism of drying, rate of drying and time of drying calculations, classification and types of dryers, dryers used in pharmaceutical industries, tray dryer, fluidized bed dryer, spray dryer, freeze dryer.

- **Size Reduction [January]**
  Definition, objectives of size reduction, factors affecting size reduction, laws governing energy and power requirements of a mill, types of mills including ball mill, hammer mill, fluid energy mill.

- **Extraction [January]**
  Theory of extraction, extraction methods, equipment for extraction, solid-liquid extraction, liquid-liquid extraction.

- **Mixing [January]**
  Theory of mixing, solid-solid, solid-liquid and liquid-liquid mixing, mixing equipment.

- **Crystallization [January]**
  Characteristics of crystals like purity, size, shape, geometry, habit, forms, solubility, supersaturation, nucleation, crystal growth, classification of crystallizers, tank, Swenson Walker, agitated batch, vacuum crystallizers.

- **Filtration [February]**
  Mechanism of filtration, factors affecting filtration, filter media, filter aids, types of filters, plate and frame filter, rotary drum filter, leaf filter, meta filter, membrane filter.

- **Dehumidification and Humidity Control [February]**
  Concept of humidity, wet bulb and dry bulb temperatures, humidity charts, methods of dehumidification, equipment for dehumidification, humidifiers.

- **Refrigeration and Air Conditioning [February]**
  Principles and applications of refrigeration and air conditioning in pharmaceutical industries.

- **Materials of Construction [February]**
  General study of composition, corrosion, resistance, properties and applications of the

materials of construction with special reference to stainless steel, glass, ferrous metals, cast iron, non-ferrous metals, copper and alloys, aluminium and alloys, lead, tin, silver, nickel, chromium, non-metals, stone, slate, brick, asbestos, plastics, rubber, timber, concrete, corrosion and its prevention.

- **Automated Process Control Systems [February]**
  Process variables, temperature, pressure, flow, level and vacuum and their measurements, elements of automatic process control and introduction to automatic process control systems.

- **Industrial Hazards and Safety Precautions [February]**
  Mechanical, chemical, electrical, fire and dust hazards, accident records, safety requirements.

Pharmaceutical Management [Whole March month]

- **Introduction to management**
  Types of management. Basic concepts of management, management process, function and principles. Levels of management, pharmaceutical management art, science or profession. Social responsibilities of management, functions of management.

- **Planning and Forecasting**
  Planning: Nature, process and types of planning, steps in the planning process, planning premises. Advantages and limitations of planning. Management by objective, meaning, objective features, advantages and limitations. Forecasting: meaning, nature, importance, limitations. Techniques of forecasting.

- **Organization**
  Definition, nature, theories, functions, line and staff organization concepts.

- **Research Management**
  R & D organizations and research categories. Elements needed for an R & D organization. Technology transfer.

- **Inventory Management**
  Objective and functions of inventory control. Types of inventories. Requirements of effective inventory control.

- **Communication**
  Nature, types of communication, process, channels and barriers of communication. Limitations of communications. Importance in pharmaceutical industries.

- **Marketing Research**
  New product selection, product management, advertising.

- **Leadership and motivation**
  Leadership: meaning, nature, leadership styles. Theories of leadership. Motivation: meaning, nature, importance. Theories of motivation.

- **Human resource and development (HRD)**
  Definition, HRD methods, HRD process, HRD in Indian industry.

- **GATT**
  General Agreement on Tariff and Trade and its impact on the pharmaceutical industry. History of GATT, its impact on the pharmaceutical industry. Pharmaceutical market in India.

- **World trade organization (WTO) and trade-related intellectual property rights (TRIPS)**
  Introduction to WTO. Types of intellectual property rights: industrial property and copyrights Indian Patent Acts, 1970 with the latest amendment. Definition, types of patents.

- **Standard institutions and regulatory authorities**

  1. Bureau of Indian Standards (BIS).
  2. International Organization for Standardization (ISO).
  3. United States of Food and Drug Administration (USFDA).
  4. Central Drug Standard Control Organization (CDSCO).

5. International Conference on Harmonization (ICH).

6. World Health Organization (WHO).

Dispensing & Hospital Pharmacy [JAN]

1. **Introduction to laboratory equipment, weighing methodology, handling of prescriptions, labeling instructions for dispensed products.**
2. **Posological calculations involved in the calculation of dosage for infants. Enlarging and reducing formula, displacement value.**
3. **Preparations of formulations involving allegation, alcohol dilution, isotonic solution.**
4. **Study of current patent and proprietary products, generic products and selected brand products, indications, contraindications, adverse drug reactions, available dosage forms and packing of**
   - ☐ Antihypertensive drug
   - ☐ Antiamoebic drugs
   - ☐ Antihistaminic drugs
   - ☐ Antiemetic drugs
   - ☐ Antacids and ulcer healing drugs.
   - ☐ Antidiarrheals and laxatives
   - ☐ Respiratory drugs
   - ☐ Antibiotics
   - ☐ Analgesics and antipyretic drugs.
5. **Compounding and dispensing of following prescriptions**
   - ☐ Mixtures
   - ☐ Solutions
   - ☐ Emulsions
   - ☐ Lotions (External preparations)
   - ☐ Liniments (External preparations)
   - ☐ Powder
   - ☐ Granules
   - ☐ Suppositories
   - ☐ Ointments / Paste
   - ☐ Cream
   - ☐ Incompatibility: Prescription based on physical, chemical and therapeutic incompatibility. Tablets
6. **Reading and counseling of prescriptions from the clinical practice.**
7. **Designing from mock Pharmacy: Layout and structure of retail Pharmacy, compounding, dispensing, storing, labeling, pricing, recording and counseling of prescription.**
8. **Procurement of information for the given drug for drug information services.**
9. **Preparation of Hospital Formulary.**

CLINICAL PHARMACY AND THERAPEUTICS [FEB]

10. **General Principles, preparation, maintenance, analysis of observational records in clinical Pharmacy.**
11. **Clinical trials, type and phases of clinical trials, placebo, ethical and regulatory issues including Good clinical practice in clinical trials.**
12. **Therapeutic drug monitoring, adverse drug reaction (ADR), types of ADR, Mechanism of ADR. Drug interaction, Monitoring and reporting of ADR and its significance.**
13. **Drug information services, Drug interactions.**
14. **Drug interaction in pediatric and geriatric patients, drug treatment during pregnancy, lactation and menstruation.**
15. **Pharmacovigilance, Therapeutic drug monitoring, Neutraceuticals, essential drugs and rational drug usage.**
16. **Age-related drug therapy: concept of posology, drug therapy for neonates, pediatrics and geriatrics. Drugs used in pregnancy and lactation.**
17. **Drug therapy in gastrointestinal, hepatic, renal, cardiovascular and respiratory Disorders.**
18. **Drug therapy for neurological and psychological disorders.**
19. **Drug therapy in infections of respiratory system, urinary system, infective meningitis, TB, HIV, malaria and filaria.**
20. **Drug therapy for thyroid and parathyroid disorders, diabetes mellitus, menstrual cycle disorders, menopause and male sexual dysfunction.**
21. **Drug therapy for malignant disorders like leukemia, lymphoma and solid tumors.**
22. **Drug therapy for rheumatic, eye and skin disorders.**

* Any updates or modifications to the syllabus or related materials will be promptly communicated to all .

STANDARD REFERENCE BOOK

Physical Chemistry

- Essentials of Physical Chemistry by Arun Bahl, B.S. Bahl, and J.D. Tuli
- Physical Chemistry and its Biological Applications by W.S. Brey

Physical Pharmacy

- Martin's Physical Pharmacy and Pharmaceutical Sciences by Patrick J. Sinko
- Physical Pharmacy by Alfred Martin

Organic Chemistry

- Organic Chemistry by Morrison & Boyd
- A Textbook of Organic Chemistry by Bahl and Bahl
- Organic Chemistry by I.L. Finar (Vol. I and II)

Pharmaceutical Chemistry

- Inorganic Pharmaceutical Chemistry by G.R. Chatwal
- Modern Inorganic Pharmaceutical Chemistry by L.A. Disher
- Foye's Principles of Medicinal Chemistry by Thomas Lemke and D.A. Williams
- Wilson and Gisvold's Textbook of Organic, Medicinal & Pharmaceutical Chemistry by J.M. Beale Jr. and J.H. Block

Pharmaceutics

- The Theory and Practice of Industrial Pharmacy by Roop K. Khar, S.P. Vyas, Lachman, and Lieberman
- Remington: The Science and Practice of Pharmacy
- Pharmaceutics by Banker and Rhodes
- Pharmaceutical Engineering by C.V.S. Subrahmanyam
- Pharmaceutics: Drug Delivery and Targeting by Yvonne Perrie and Thomas Rades

Pharmacology

- Essentials of Medical Pharmacology by K.D. Tripathi
- Rang and Dale's Pharmacology by M.M. Dale and J.M. Ritter
- Basic and Clinical Pharmacology by Katzung
- Goodman & Gilman's The Pharmacological Basis of Therapeutics
- Lippincott's Illustrated Reviews: Pharmacology

Pharmacognosy

- Textbook of Pharmacognosy by E. Wallis Trease and W.C. Evans
- Pharmacognosy by C.K. Kokate

Pharmaceutical Analysis

- PAVIA

-RAVI SHANKAR

- Instrumental Methods of Chemical Analysis by Dr. B.K. Sharma
- Vogel's Textbook of Micro and Semimicro Qualitative Inorganic Analysis by G. Suchla

Biochemistry

- Biochemistry by U. Satyanarayana and U. Chakrapani
- Principles of Biochemistry by Lehninger, Nelson, and Cox
- Lippincott's Illustrated Reviews: Biochemistry

Microbiology

- Pharmaceutical Microbiology by Ashutosh Kar
- Microbiology by Prescott, Harley, and Klein

Biotechnology

- Biotechnology: A Textbook of Industrial Microbiology by Wulf Crueger and Anneliese Crueger
- Molecular Biotechnology: Principles and Applications by Bernard R. Glick and Jack J. Pasternak

Pathophysiology

- Pharmacotherapy: A Pathophysiologic Approach by Joseph T. DiPiro, Robert L. Talbert, et al.

- Pathophysiology of Disease: An Introduction to Clinical Medicine by Gary D. Hammer and Stephen J. McPhee

Biopharmaceutics and Pharmacokinetics

- Biopharmaceutics & Pharmacokinetics: A Treatise by D.M. Brahmankar and Sunil B. Jaiswal

- Applied Biopharmaceutics & Pharmacokinetics by Leon Shargel and Andrew B.C. Yu

Human Anatomy and Physiology

- Principles of Anatomy and Physiology by Gerard J. Tortora and Bryan H. Derrickson

- Ross & Wilson Anatomy and Physiology in Health and Illness by Anne Waugh and Allison Grant

- Sahana's Textbook of Anatomy

Pharmaceutical Engineering

- Pharmaceutical Engineering by C.V.S. Subrahmanyam

- Unit Operations of Chemical Engineering by Warren L. McCabe and Julian C. Smith

Pharmaceutical Management

- Principles of Management by Harold Koontz and Heinz Weihrich

- Pharmaceutical Management by R.M. Mehta

Pharmaceutical Jurisprudence

- Pharmaceutical Jurisprudence by N.K. Jain

- Textbook of Forensic Pharmacy by B.M. Mithal

Dispensing & Hospital Pharmacy

- Cooper and Gunn's Dispensing for Pharmaceutical Students

- Textbook of Hospital Pharmacy by B.M. Metha

Clinical Pharmacy and Therapeutics

- Pharmacotherapy: A Pathophysiologic Approach by Joseph T. DiPiro, Robert L. Talbert, et al.

- Clinical Pharmacy and Therapeutics by Roger Walker and Cate Whittlesea

- Essentials of Medical Pharmacology by K.D. Tripathi

END