

**SCHOOL OF MEDICAL AND ALLIED SCIENCES
DEPARTMENT OF PHARMACY**

PhD ENTRANCE EXAM SYLLABUS

UNIT 1: PHYSICAL CHEMISTRY

1. Composition & physical states of matter, 2. Colligative Properties, 3. Thermodynamics 4. Refractive index: Refractive index, specific refractivity, molar refractivity, refractometers. 5. Solutions: 6. Electrochemistry:

UNIT 2: PHYSICAL PHARMACY

1. States of Matter
2. Micromeritics and powder rheology
3. Surface and interfacial phenomenon
4. Viscosity and rheology
5. Dispersion systems
6. Complexation
7. Buffer
8. Solubility

UNIT 3: ORGANIC CHEMISTRY

1. General principles: A brief review of classification & sources of organic compounds, sp^3 , sp^2 , sp hybridization, sigma & pi- bonds, bond lengths, bond angles & bond energies along with their significance in reactions should be carried out. An overview of bond polarization, hydrogen bonds, inductive effects, resonance, and hyperconjugation be taken. Concept of homolytic & heterolytic bond fission, acidity & basicity with different theories should be covered briefly. Ease of formation & order of stabilities of electron deficient & electron rich species along with the reasons for the same should be covered. Relationships between energy content, stability, reactivity & their importance in chemical reactions should be covered. Calculations for determining empirical & molecular formula should be covered.
2. Different classes of compounds: IUPAC / systematic nomenclature, industrial [wherever applicable] & laboratory methods of preparations, physical properties & chemical reactions with emphasis on reaction mechanisms & stereochemistry of Alkanes, Alkenes, Alkynes, Aliphatic hydroxyl compounds, Alkyl halides, Aldehydes & Ketones, Carboxylic acids, All functional derivatives of carboxylic acids.
3. Protection & deprotection of groups
4. Aromaticity & chemistry of aromatic compounds
5. Different aromatic classes of compounds: IUPAC / systematic nomenclature, industrial & laboratory methods of preparations, physical properties & chemical reactions with emphasis on reaction mechanisms [arrow based] & stereochemistry of Aromatic hydrocarbons. Phenolic compounds. Aromatic & aliphatic amines. Diazonium salts. Aromatic nitro- compounds, aryl halides, & ethers.
6. Polycyclic aromatic hydrocarbons
7. Carbonyl Chemistry: Carbonyl chemistry involving group conversions & their reaction mechanisms along with stereochemistry wherever applicable
8. Heterocyclic Chemistry: IUPAC Nomenclature of heterocyclic rings [3-10 membered] containing O, S, & N atoms. Syntheses & reactions of three to six-membered rings in detail. Syntheses of five & six-



membered rings containing mono- or any di- heteroatoms [O, S, & N]. Syntheses of quinoline, isoquinoline, benzoxazole, benzothiazole, & benzimidazole, benzotriazole, and benzothiazole.

9. Stereochemistry

10. Carbohydrates

11. Amino acids & proteins

12. Pericyclic reactions

UNIT 4: PHARMACEUTICAL CHEMISTRY

I. Pharmaceutical Inorganic Chemistry

1. Pharmaceutical Impurities

2. Monographs: Study of sodium citrate, calcium carbonate, copper sulphate, light & heavy kaolin, ammonium chloride & ferrous gluconate.

3. Isotopes, Radiocontrast media, use of BaSO₄ in medicine.

4. Dentifrices, desensitizing agents, & anticaries agents.

II. Medicinal Chemistry

5. Therapeutic classes of drugs: 1. General anesthetics. 2. Local anesthetics. 3. Diagnostic agents. 4. Coagulants, anticoagulants & plasma expanders. 5. Antiseptics, disinfectants, sterilants, & astringents. 6. Purgatives, laxatives & antidiarrhoeal agents. 6. Various classes of therapeutic agents

6. a. Antimalarials. b. Antiamoebic agents. c. Anthelmintic agents. d. Antibacterial sulpha drugs [only]. e. Quinolone antibacterials. f. Antimycobacterial drugs. g. Antifungal agents. g. Antiviral agents including HIV & anti-HIV drugs. h. Thyroid & antithyroid drugs. i. Antiallergic agents. j. Antiulcer agents & Proton Pump Inhibitors. k. Hypoglycemic agents.

7. Different classes of therapeutic drugs:

I. a. Sedative-hypnotics. b. Antiepileptic agents. c. Neuroleptics. d. Anti-anxiety drugs.

II. Antibiotics. Penicillins, cephalosporins & other beta-lactam antibiotics like imipenem & aztreonam. Beta-lactamase inhibitors such as clavulanic acid & sulbactam. Chloramphenicol. Tetracyclines. Aminoglycoside antibiotics. Macrolide antibiotics. Lincosamides. Polypeptide antibiotics. Anticancer antibiotics.

III. Steroids. Corticosteroids [gluco- & mineralocorticoids] & anti-inflammatory steroids. Sex steroids. Male & female contraceptive agents. Anabolic steroids. Anticancer agents.

8. Different classes of therapeutic drugs

I. Narcotic [centrally acting] analgesics [analgetics]. Morphine & all its structural modifications [peripheral & nuclear]. Narcotic agonists & antagonists [dual & pure]. Non-narcotic analgesics [NSAIDs]. Difference between narcotic & non-narcotic agents.

II. Adrenergic drugs. Neurotransmitters & their role. General & specific adrenergic agonists & antagonists [up to alpha-2 & beta-2 only].

III. Cholinergic agents. Muscarinic & nicotinic cholinergic agonists & antagonists [up to M2 & N2]. Neuronal [transmission] blockers.

IV. Drugs used in neuromuscular disorders. Drugs used in the treatment of Parkinson's disease. Central & peripheral muscle relaxants.

V. Hypertensive, antihypertensive, & antianginal agents.

VI. Diuretics.

VII. Eicosanoids. Prostaglandins, prostacyclins, & thromboxanes. Their biochemical role, biosynthesis, & inhibitors.

9. Introduction to quantitative structure-activity relationship. [QSAR].

10. Asymmetric synthesis.

11. Combinatorial chemistry.

UNIT 5: PHARMACEUTICS

1. Pharmacy Profession & Introduction to Pharmaceuticals
2. Introduction to dosage form and new drug delivery system.
3. Sources of drug information
4. Allopathic dosage form
5. Crude extract: Infusion, decoction, maceration, percolation, tincture and extract. Methods of preparations of dry, soft and liquid extract.
6. Allergenic extract: Types of allergens, preparation of extract, testing and standardization of extracts.
7. Biological products.
8. Pharmaceutical Plant, location, layout
9. Dosage Form Necessities and Additives: Antioxidants, preservatives, coloring agents, flavoring agents and diluting agents, emulsifying agents, suspending agents, ointment bases, solvents, and others.
10. Powders, effervescent granules and salts.
11. Capsules, Microencapsulation, advantages, encapsulation materials, methods of microencapsulation, I.P. formulations
12. Tablets
13. Parenterals, sterile powders, implants, emulsions, suspensions.
14. Suspensions
15. Emulsions
16. Suppositories
17. Semisolids
18. Liquids (solutions, syrups, elixirs, spirits, aromatic water, liquid for external uses)
19. Pharmaceutical Aerosols
20. Ophthalmic preparations
21. Preformulations
22. Stability of formulated products
23. Prolonged Action Pharmaceuticals
24. Novel Drug delivery system
25. GMP and Validation
26. Packaging Materials
27. Cosmetics
28. Pilot plant scale-up techniques

UNIT 6: PHARMACOLOGY

1. General Pharmacology: Introduction to Pharmacology
Pharmacokinetics, Discovery and development of new drugs-Preclinical and clinical studies.
Detailed pharmacology including classification, mechanism of action and therapeutic uses of following classes:
2. Neurohumoral transmission in ANS, CNS,: General Principle of peptide pharmacology Biosynthesis and regulation of peptides Peptide antagonists. Protein and peptide as drugs.
3. Pharmacology of peripheral nervous system
4. Pharmacology of central nervous System: General anesthetics. Sedatives, hypnotics and centrally acting muscle relaxants, Psychopharmacological agents: Antipsychotics, antidepressants, anti-anxiety agents, anti-manics and hallucinogens. Anti-epileptic drugs. Anti-parkinsonism drugs. Nootropics. Narcotic analgesics, drug addiction, drug abuse, tolerance and dependence.
5. Pharmacology of cardiovascular-system: Anti-hypertensive drugs. Anti-anginal agents, Anti-arrhythmic drugs. Drugs used in congestive heart failure. Anti-hyperlipidemic drugs. Drugs used in the therapy of

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shock. Haematinics, anticoagulants and haemostatic agents. Fibrinolytics and antiplatelet drugs. Blood and plasma volume expanders.

6. Drugs acting on urinary system: Diuretics and anti-diuretics.

7. Drugs acting on Respiratory system

8. Pharmacology of Endocrine system

9. Chemotherapy: Sulphonamides and co-trimoxazole. Antibiotics- Penicillins, cephalosporins, chloramphenicol, Macrolides, quinolones and fluoroquinolones, Tetracyclines. Aminoglycosides and miscellaneous antibiotics. Chemotherapy of tuberculosis, leprosy, fungal diseases, viral diseases, AIDS, protozoal diseases, worm infections, urinary tract infections and sexually transmitted diseases. Chemotherapy of malignancy.

10. Autacoids and their Antagonists

11. Pharmacology of drug acting on the gastrointestinal tract: Antacids, anti-secretory and antiulcer drugs. Laxatives and antidiarrheal drugs. Appetite stimulants and suppressants. Digestants and carminatives. Emetics and anti-emetics.

12. Chronopharmacology

13. Immunopharmacology: Immunostimulants and immunosuppressants.

14. Vitamins & Minerals

15. Principles of toxicology, Study of acute, sub-acute and chronic toxicity as per OECD guidelines

UNIT 7: PHARMACOGNOSY

1. Introductory Pharmacognosy

2. Alphabetical, morphological, pharmacological, chemical, taxonomical and chemotaxonomic methods
Classification of crude drugs, marine products: plant tissue culture.

3. Factors influencing quality of crude drugs, Ergastic cell inclusions, anatomical structures of both monocot and dicot stems, leaves and roots: barks, fruits and seeds.

4. Techniques in microscopy

5. Introduction to phytoconstituents: carbohydrates and their derivatives, fats and proteins, alkaloids, glycosides, flavonoids, steroids, saponins, tannins, resins, lipids and volatile oils.

6. Principles of plant classification: Algae: Rhodophyceae (Agar, Alginic acid, Diatoms). Fungi: Ergot, Yeast and penicillium. Gymnosperm: Pinaceae (Turpentine, Colophony), Gnetaceae (Ephedra). Angiosperm: Apocynaceae, Asteraceae, Lamiaceae, Rubiaceae, Rutaceae, Solanaceae, Scrophulariaceae, Leguminosae, Papaveraceae, Acanthaceae and Apiaceae. Pteridophytes: Male fern.

7. Pharmaceutical aids: Starches, acacia gum, tragacanth, sterculia, guar gum, pectin, arachis oil, castor oil, sesame oil, cottonseed oil, olive oil, cotton, silk, wool, regenerated fibers, asbestos, kaolin, prepared chalk, kieselguhr.

8. Animal products: Shellac, cochineal, cantharides, woolfat, lard, beeswax, honey, musk, lanolin, gelatin.

9. Plant products: plant bitters, sweeteners, nutraceuticals, cosmeceuticals and photosensitizing agents.

10. Toxic drugs: Study of allergens, hallucinogens, narcotics.

11. Enzymes: diastase, papain bromelain, ficin, yeast, pancreatin, urokinase, pepsin, trypsin, penicillinase, hyaluronidase and streptokinase.

12. Natural pesticides and insecticides: herbicides, fungicides, fumigants and rodenticides tobacco, pyrethrum, & neem.

13. Adulteration and evaluation of crude drugs

14. Quantitative microscopy

15. Biogenetic pathways

16. Carbohydrates & lipids: Plantago, bael, chaulmoogra oil, neem oil, shark liver oil, cod liver oil, guggul lipids.

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17. Tannins: Pale catechu, black catechu, nutgalls, Terminalia belerica, Terminalia chebula, Terminalia arjuna.
18. Volatile oils: Black pepper, turpentine, mentha, coriander, cardamom, cinnamon, cassia, lemon peel, orange peel, lemongrass, citronella, cumin, caraway, dill, spearmint, clove, anise, star anise, fennel, nutmeg, eucalyptus, chenopodium, ajowan, sandalwood.
19. Resinous drugs: benzoin, Peru balsam, tolu balsam, colophony, myrrh, asafoetida, jalap, colocynth, ginger, turmeric, capsicum, cannabis, podophyllum.
20. Glycosides: Digitalis, strophanthus, squill, thevetia, oleander, cascara, aloe, rhubarb, senna, quassia, dioscorea, quillaia, glycyrrhiza, ginseng, gentian, wild cherry, withania, bitter almond. Biosynthesis of cardiac and anthraquinone glycosides.
21. Alkaloids: Areca nut, belladonna, hyoscymous, stramonium, duboisea, coca, coffee, tea, cinchona, opium, ipecac, nux vomica, ergot, rauwolfia, vinca, kurchi, ephedra, colchicum, vasaca, pilocarpus, aconite, Solanum xanthocarpum. Biosynthesis of tropane, cinchona and opium alkaloids.
22. Extraction and Isolation Techniques of alkaloids, lipids, glycosides, flavonoids, saponins, volatile oils and resins.
23. Phytopharmaceuticals: caffeine, eugenol, digoxin, piperine, tannic acid, diosgenin, hesperidin, berberine, calcium sennosides, rutin, glycyrrhizin, menthol, ephedrine, quinine, andrographolides and guggul lipids.
24. Quality control and Standardization of herbal drugs as per WHO, AYUSH and Pharmacopoeial guidelines. Determination of heavy metals, insecticides, pesticides and microbial load in herbal preparations.
25. Herbal formulations: Ayurvedic formulations like aristas, asava, ghutika, tailia, churna, avaleha, ghrita and bhasmas: Unani formulations like majooms, Safoofs. Determination of alcohol contents in arishtas & asavas.
26. Worldwide trade of crude drugs and volatile oils
27. Herbal cosmetics: shampoos, conditioners and hair darkeners, , skin
28. Traditional herbal drugs: punarnava (Boerhaviadiffusa), shankpushpi (Convolvulus microphylla), lehsun (Allium sativum), guggul (Commiphora mukul), kalmegh (Andrographis peniculata), tulsi (Ocimum sanctum), valerian (Valerian officinalis), artemisia (Artemisia annua), chirata (Swertia chirata), ashoka (Saraca indica).
29. Plants based industries and research institutes in India
30. Patents: Indian and International patent laws
31. Ayurvedic system of medicine: asavas, arishtas, watika, churna, tailas, ghruta, lep.
32. Homeopathic system of medicine

UNIT 8: PHARMACEUTICAL ANALYSIS

1. Importance of quality control in pharmacy
2. Acid-base titrations, Standardization of strong acids & bases using primary & secondary standards. Preparation of standard solutions of & calculations of equivalent weights of oxalic acid, potassium acid phthalate, calcium chloride dihydrate, & sodium carbonate. Law of mass action, acid-base equilibria, pH scale, buffers
3. Non-aqueous titrations
4. Oxidation-reduction titrations: a) Redox titrations b) Iodimetric & iodometric titrations c) Bromometric titrations d) Iodate titrations e) Cerimetric titrations f) Bromine titrations g) Potassium dichromate titrations.
5. Precipitation titrations
6. Complexometric titrations

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4. Recombinant DNA Technology
3. Fermentation Technology and Industrial Microbiology
2. Animal Cell Culture
1. Plant Cell and Tissue Culture

UNIT 10: BIOTECHNOLOGY

9. Hereditary diseases: Elliptocytosis, spherocytosis, HNPCC, diabetes insipidus.
8. Nucleic acids
7. Enzymes
6. Biological oxidations & reductions: Oxidation-reduction systems in the body their role. Oxidative phosphorylation & Electron transport chain. Cytochromes & inhibitors of the same.
5. Vitamins
4. Lipids
3. Proteins
2. Carbohydrates
1. Cell: Revision of ultrastructure of the cell, functions of various cellular constituents. Applications of biochemical principles to the pharmacy.

UNIT 9: BIOCHEMISTRY

22. Miscellaneous: An introduction to electrophoresis. An introduction to lasers & masers. Statistical treatment to experimental data. Sampling techniques & applications in pharmaceutical industry.
21. Chromatography: thin layer chromatography [TLC], preparative TLC, paper chromatography [PC], column chromatography, gas chromatography [GC / GLC]. Qualitative & quantitative applications of the above techniques. An introduction to high performance TLC [HPTLC], comparison of TLC & HPTLC. A brief introduction to high pressure / performance liquid chromatography [HPLC].
20. Nephelometry & Turbidimetry
19. Polarography
18. Mass spectrometry: Principle. Low & high-resolution instruments. Major modes of fragmentations of hydrocarbons, hydroxyl compounds, halogen compounds, aldehydes, ketones, carboxylic acids, and amines.
17. Proton nuclear magnetic resonance spectrometry: Principle. Prediction of chemical shifts & multiplicities for all protons from simple structures containing up to 12-15 carbons. An introduction to FT-technique & its significance in ¹³C-NMR spectrometry.
16. Infrared spectrometry, Fourier transform [FT] technique, FT instruments & their comparison with dispersive instruments. Sample handling techniques. Functional group & fingerprint regions in the spectrum. Functional groups identification & their use in the characterization of compounds.
15. Flame photometry & atomic absorption spectrometry
14. Spectrofluorimetry
13. Ultraviolet-visible Spectrometry, Fieser-Woodward rules for calculations of theoretical λ_{max} values.
12. General principles of spectroscopy
11. Calibration: Calibration of instruments
10. Miscellaneous methods of analysis: Diazotization titrations. Kjeldahl nitrogen estimation. Karl Fisher titrations. Liquid gaseous methods of analysis: Determination of alcohol content in liquid gaseous. Oxygen mask combustion method.
9. Potentiometry
8. Extraction techniques
7. Gravimetry

5. Process and Applications: a) Constructing Recombinant DNA molecules. b) PCR and applications. Human gene therapy concept and applications. c) Drug delivery systems in gene therapy.
6. Biotechnology Derived Products

UNIT 11: MICROBIOLOGY

1. Introduction to Microbiology: Scope and application to pharmacy field. Whitaker's Five Kingdom concept, historical development - biogenesis Vs. abiogenesis, Germ theory of fermentation, Germ theory of disease, the contribution of Leeuwenhoek, Robert Koch, Jenner, Louis Pasteur and Ehrlich.

2. Microscopy and staining technique
3. Biology of Microorganisms
4. Fungi and Viruses: Saccharomyces Cerevisiae, Penicillium and Aspergillus, Candida Albicans, Epidermophyton, and trichophyta.

5. Aseptic Technique
6. Sterilization & Disinfection
7. Microbial spoilage: Types of spoilage, factors affecting spoilage of pharmaceutical products.

8. Vaccines & Sera: bacterial vaccines & Toxoids (Tetanus, TAB, Cholera, BCG, DPT), Viral vaccine (Polio- Salk Sabin, Rabies, MMR, Hepatitis, Chickenpox, influenza), Antisera (diphtheria, tetanus), antiviral Antisera (rabies). Preparation of allergenic extracts & diagnostics.
9. Microbial Assay:

UNIT 12: PATHOPHYSIOLOGY

1. Basic principles of cell injury and adaptation: Causes, pathogenesis and morphology of cell injury, apoptosis and necrosis.

2. Basic mechanisms of inflammation and repair
3. Disorders of fluid, electrolyte and acid-base balance
4. Disorders of homeostasis: white blood cells, lymphoid tissues, and red blood cells related diseases.

5. Immunopathology including amyloidosis
- b) Immune response, Acquired Immune Deficiency Syndrome (AIDS).
6. Infectious diseases: Hepatitis - Infective hepatitis. Sexually transmitted diseases (syphilis, gonorrhoea, HIV). Pneumonia, typhoid, urinary tract infections. Tuberculosis. Leprosy. Malaria. Dysentery (Bacterial and amoebic).

7. Neoplastic diseases: cancer. Environmental carcinogenesis.
8. Pathophysiology of common diseases: Parkinsonism, Schizophrenia. Depression and mania. Stroke (ischemic and hemorrhagic). Hypertension. Angina. Myocardial infarction, CCF. Atherosclerosis. Diabetes mellitus. Peptic ulcer and inflammatory bowel disease. Cirrhosis and alcoholic liver diseases. Acute and chronic renal failure. Asthma and chronic obstructive airway diseases.

9. Laboratory tests for Liver function tests and kidney function tests

UNIT 13: BIOPHARMACEUTICS AND PHARMACOKINETICS

1. Bio-pharmaceutics: a) The fate of drug after drug absorption, various mechanisms for drug absorption, consideration for gastrointestinal absorption. Pharmacokinetics. Compartmental and non-compartmental pharmacokinetics. Biotransformation, drug disposition, drug distribution, drug disposition - elimination.
2. Bio-availability & Bio-equivalence
3. Bio-pharmaceutical statistics: Post Marketing Surveillance. Process Validation.

UNIT 14: CLINICAL PHARMACY AND THERAPEUTICS

1. General Principles, preparation, maintenance, analysis of observational records in clinical Pharmacy. 2. Clinical trials, type and phases of clinical trials, placebo, ethical and regulatory issues including Good

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clinical practice in clinical trials. 3. Therapeutic drug monitoring, adverse drug reaction (ADR), types of ADR, Mechanism of ADR. Drug interaction, Monitoring and reporting of ADR and its significance. 4. Drug information services, Drug interactions. 5. Drug interaction in pediatric and geriatric patients, drug treatment during pregnancy, lactation and menstruation. 6. Pharmacovigilance, Therapeutic drug monitoring, Neutraceuticals, essential drugs and rational drug usage. 7. Age-related drug therapy: concept of posology, drug therapy for neonates, pediatrics and geriatrics. Drugs used in pregnancy and lactation. 8. Drug therapy in gastrointestinal, hepatic, renal, cardiovascular and respiratory Disorders. 9. Drug therapy for neurological and psychological disorders. 10. Drug therapy in infections of respiratory system, urinary system, infective meningitis, TB, HIV, malaria and filaria. 11. Drug therapy for thyroid and parathyroid disorders, diabetes mellitus, menstrual cycle disorders, menopause and male sexual dysfunction. 12. Drug therapy for malignant disorders like leukemia, lymphoma and solid tumors. 13. Drug therapy for rheumatic, eye and skin disorders.

UNIT 15: HUMAN ANATOMY & PHYSIOLOGY

1. Cell physiology
2. The Blood: Composition and functions of blood, RBC, WBC, platelets. Homeostasis, blood groups, mechanism of clotting. Introduction to disorders of the blood.
3. Gastrointestinal tract
4. Respiratory System
5. Autonomic nervous system
6. Sense organs: Structure and physiology of eye (vision), ear (hearing), taste buds, nose (smell) and skin.
7. Skeletal System
8. Central Nervous system
9. Urinary System
10. Endocrine Glands
11. Reproductive System
12. Cardiovascular system
13. Lymphatic system

UNIT 16: PHARMACEUTICAL ENGINEERING

1. Fluid flow
2. Heat transfer
3. Evaporation
4. Distillation
5. Drying
6. Size reduction and size separation
7. Extraction
8. Mixing
9. Crystallization
10. Filtration and Centrifugation
11. Dehumidification and humidity control
12. Refrigeration and air conditioning
13. Material of constructions: stainless steel, glass, ferrous metals, cast iron, non ferrous metals, copper and alloys, aluminum and alloys, lead, tin, silver, nickel and alloys, chromium and non metals, stone, slate, brick, asbestos, plastics, rubber, timber, concrete. Corrosion and its prevention with reference to commonly used material in pharmaceutical plants.
14. Automated process control systems, Elements of computer-aided manufacturing (CAM).
15. Industrial hazards & safety precautions

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UNIT 17: PHARMACEUTICAL JURISPRUDENCE

1. Historical background Drug legislation in India, Code of Ethics for Pharmacists. 2. The Pharmacy Act 1948 (inclusive of recent amendments). 3. Drugs and Cosmetics Act 1940, Rules 1945, including New Drug applications. 4. Narcotic Drugs and Psychotropic Substances Act, and Rules thereunder. 5. Drugs and Magic Remedies (Objectionable Advertisements) Act 1954. 6. Medicinal and Toilet Preparations (Excise Duties) Act 1955, Rules 1976. 7. Medical Termination of Pregnancy Act 1970 and Rules 1975. 8. Prevention of Cruelty to Animals Act 1960. 9. Drug (Price Control) Order. 10. Shops and Establishment Act. 11. Factory Act. 12. Consumer Protection Act. 13. Indian Pharmaceutical Industry- An Overview. 14. Industrial Development and Regulation act 1951. 15. Introduction to Intellectual Property Rights and Indian Patent Act 1970. 16. An Introduction to Standard Institutions and Regulatory Authorities such as BIS, ASTM, ISO, TGA, USFDA, MHRA, ICH, WHO. 17. Minimum Wages Act 1948. 18. Prevention of Food Adulteration Act 1954 and Rules.

UNIT 18: DISPENSING & HOSPITAL PHARMACY

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. 8. 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. Inhalations. 9. Reading and counseling of prescriptions from the clinical practice. Designing from mock Pharmacy: Layout and structure of retail Pharmacy, compounding, dispensing, storing, labeling, pricing, recording and counseling of prescription. Procurement of information for the given drug for drug information services. Preparation of Hospital Formulary.

RECOMMENDED STANDARD REFERENCE BOOKS

1. Remington: Essentials of Pharmaceutics, By Linda Ed Felton.
2. Pharmaceutical Dosage Forms and Drug Delivery, Second Edition, CRC Press, Pharmacy Education Series, by Ram I. Mahato, Ajit S. Narang.
3. Essentials of Physical Pharmacy, by CVS Subramanyam, Vallabh Prakashan.
4. Biopharmaceutics & Pharmacokinetics, D. M. Brahmankar.
5. Modern Pharmaceutics, Gilbert S. Banker and Christopher Rhodes.
6. Essentials of Physical Chemistry, B.S.Bahl, G.D.Tuli, S. Chand Ltd. 2000.
7. Martin's Physical Pharmacy and Pharmaceutical Sciences, Patrick J. Sinko, Lippincott Williams & Wilkins, 2011
8. Textbook of Pharmaceutics, E.A. Rawlins, Ballière, Tindall, 1977
9. Handbook of Cosmetic Science and Technology, Third Edition
10. Martindale: The Complete Drug Reference: 36 th Ad.
11. Organic Chemistry – Morrison & Boyd, 4th edn, 2011 Pearson, New Delhi.
12. Organic Chemistry – I.L. Finar, Vol- I and Vol-II.
13. Wilson and Giswolds Text Book of Organic, Medicinal & Pharmaceutical Chemistry, 12th edn. Eds- J.M. Beale Jr, and J.H. Block, Lippincott Williams and Wilkins, 2013

14. Foye's Principle of medicinal Chemistry –Eds-Thomas Lemke,D.A.Williams, , Lippincott Williams & Wilkins, New Delhi.
15. Advanced Organic Chemistry, B.S. Bahl and Arun Bahl, S Chand and Company Ltd., Ram Nagar, New Delhi, 1st Edition.
16. Stereochemistry Conformation and mechanism by P.S. Kalsi, 5th Edition, New Age International Publishers, New Delhi.
17. Heterocyclic Chemistry, 3rd Edition, Raj K Bansal, New Age International Publishers, New Delhi.
18. Indian Pharmacopoeia all editions and volumes.
19. Advanced Organic Chemistry, Jerry March, Wiley, 1992.
20. Bentley and Driver's Textbook of Pharmaceutical Chemistry, Atherden, Im
21. Burger's Medicinal Chemistry, 6 vol, Abraham, DJ
22. Indian Pharmacopoeia all editions and volumes
23. Instrumental Methods of Chemical Analysis (Analytical Chemistry) By. Dr. B.K. Sharma, Goel Publishing House, Meerut. 18th Edition (1999) (Part - Spectroscopy)
24. Instrumental Methods of Chemical Analysis (Analytical Chemistry) By. Dr. B.K. Sharma, Goel Publishing House, Meerut. 18th Edition (1999) (Part - Chromatography)
25. Instrumental Methods of Chemical Analysis (Analytical Chemistry) By. Dr. B.K. Sharma, Goel Publishing House, Meerut. 18th Edition (1999) (Part – Analytical Chemistry)
26. INSTRUMENTAL METHODS OF ANALYSIS by H.H. Willard, L.L. Merrit and J.A. Dean
27. Introduction to Spectroscopy- D.L.Pavia,G.M.Lampman,G.S.Kriz
28. Principles of Instrumental analysis- Skoog, Holler, Crouch
29. Spectrometric Identification of Organic Compounds- Silverstein, R.M. and Webster, F.X., 6th ed., Wiley, New York, 1998
30. RANG AND DALE'S Pharmacology, 7th Edition, M.M Dale, J.M Ritter, R.J Flower, G.Henderson H.P, Rang
31. Goodman & Gilman's the Pharmacological Basis of Therapeutics, Laurence L. Brunton
32. Goodman & Gilman's The Pharmacological Basis of Therapeutics
33. Lippincott's Illustrated Reviews: Pharmacology, 6th Edition, Springhouse publishers
34. Essential of Medical Pharmacology, KD Tripathi
35. Principles of Anatomy and Physiology, Gerard Tortora, 12th edition
36. Ross & Wilson, Anatomy and Physiology, 12th edition, Churchill Livingstone
37. Pharmacology and Pharmacotherapeutics –R.S.Satoskar, S.D. Bhandarkar , Popular Prakashan, Mumbai
38. Textbook of Pharmacognosy, Thomas Edward Wallis, J & A Churchill Ltd., London
39. Pharmacognosy, Tyler, 8th edition, Lea and Febiger, Philadelphia
40. Pharmacognosy 42nd Edition (Sep 2008), C.K. Kokate, A.P. Purohit, S.B. Gokhale (Nirali Prakashan)
41. Textbook of Pharmacognosy-Noel M Ferhuson
42. Textbook of Pharmacognosy-C.S.Shah and J.S.Qadry
43. Lehninger's Principles of Biochemistry, David L. Nielson, Macmillan Learning, 2012
44. Harper's Illustrated Biochemistry, 28th edition, Robert Murray, David Bender, Mcgraw-hill, 2009
45. Microbiology, Michael Pelczar, 5th edition, Tat McGraw-Hill Publishing Company Ltd.

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