

SEMESTER - VIII

PHARMACEUTICS-VII (Pharmaceutical Technology III)

PH. 8.1 THEORY

3 hours / week

UNIT -I

1. Preformulation studies: Principal areas like

- a. Bulk Characterization: Crystallinity and Polymorphism, hygroscopicity, bulk density, powder flow properties.
- b. Solubility analysis: pKa, pH solubility profile, Common ionic effect , thermal effects, solubilization ,partition coefficient and dissolution.

UNIT -II

- 2. Sustained release formulations:** Concept, Rationale for Extended – Release Pharmaceuticals, Terminology, Techniques of Extended – Release oral dosage forms, Delayed - Release oral dosage forms, Evaluation of sustained release formulations.

UNIT -III

- 3. Brief introduction to controlled release dosage forms.
Design and evaluation of transdermal drug delivery systems.
Basic concepts of liposomes, nanoparticles, resealed erythrocytes, osmotic pump, implants, IUDs and ocuserts,**

UNIT -IV

- 4. Cosmetics:** Fundamentals of cosmetic science, Formulation, preparation and packaging of cosmetics like anti-perspirants & deodorants, creams, lotions, shampoos, hair conditioners & dyes, nail polish and lipsticks. Special formulation considerations for baby care products.

PHARMACEUTICS-VII (Pharmaceutical Technology III)

PH. 8.2

PRACTICAL

3 hours / week

(A minimum of 15 experiments shall be conducted)

1. Solubility enhancement by different techniques (at least 2).
2. Dissolution testing and data evaluation for oral solid dosage forms.
3. Determination of pharmacokinetic parameters from the given plasma drug concentration - time and urinary excretion data.
4. Preparation (at least 6) and evaluation (at least 2) of cosmetic products.

RECOMMENDED BOOKS :

1. The Theory and Practice of Industrial Pharmacy by Lachmann, Libermann and Kanig
2. Pharmaceutical Dosage Forms and Drug Delivery Systems by Ansel, Allen and Popovich
3. REMINGTON : The Science and Practice of Pharmacy, 20th Edition
4. Pharmaceutics : The Science of Dosage Form Design by Aulton
5. Bently's Textbook of pharmaceutics edited by E.A. Rawlins

CLINICAL PHARMACY & THERAPEUTICS**PH.8.3 THEORY****3 hours/week****UNIT -I**

1. Introduction to Clinical Pharmacy
2. Basic concepts of Pharmacotherapy:
3. The Basics of Drug Interactions with suitable examples: Pharmacokinetic drug interactions, pharmacodynamic drug interactions, food and drug interactions, alcohol and drug interactions

UNIT -II

4. Important disorders of organ systems and their management:
Cardiovascular Disorders – Hypertension, Congestive Heart, Failure, Angina, Acute Myocardial infarction, Cardiac arrhythmias,
CNS Disorders : Epilepsy Parkinsonism, Schizophrenia, Depression
Respiratory Diseases – Asthma
Gastrointestinal Disorders – Peptic ulcer, Ulcerative colitis, Hepatitis, Cirrhosis
Endocrine Disorders – Diabetes mellitus and Thyroid Disorders.

UNIT – III

- Infectious Diseases – Tuberculosis, Urinary Tract Infection, Enteric infections, Upper Respiratory Infections
Haematopoietic Disorders – Anemias
Joint and Connective Tissue Disorders – Rheumatic Disease, Gout and Hyperuricemia
Neoplastic Diseases – Acute Leukemias, Hodgkin's diseases

UNIT -IV

5. Therapeutic Drug Monitoring.
6. Concept of Essential Drugs and Rational Drug use.
7. Adverse drug reactions and approaches to minimize them

RECOMMENDED BOOKS:

1. Remington the Science and Practice of Pharmacy
2. Clinical Pharmacology by Laurence, Bennett and Brown
3. Medical diagnosis and treatment by Tierney, Mc phee and Papadakis

Margin/Morale). Principles of Management (Co-ordination, Communication, Motivation, Decision-making, leadership, innovation, creativity, delegation of authority/responsibility and record keeping) Identification of Key points to give maximum thrust for development and perfection.

UNIT – II

2. **Accountancy:** Principles of accountancy, Ledger posting and book entries, Preparation of trial balance, columns of a cash book, bank reconciliation statement, rectification of errors, profits and loss account, balance sheet, purchase, keeping and pricing of stocks, treatment of checks, bills of exchange, promissory notes and hundies, documentary bills.
3. **Economics:** Principles of economics with special reference to the laws of demand and supply, demand schedule, demand curves, labour welfare, general principles of insurance, inland and foreign trade, procedure of exporting and importing goods.

UNIT – III

4. **Pharmaceutical Marketing:** Function, buying, selling, transportation, storage, finance, feedback, information, channels of distribution, wholesale, retail, departmental store, multiple shop and mail order business.
5. **Salesmanship:** Principles of sales promotion, advertising, ethics of sales, merchandising, literature & detailing. Recruitment, training, evaluation and compensation to the pharmacist.
6. **Market research:** Prerequisites, Basic information services.

UNIT – IV

7. **Materials management:** A brief exposure to the basic principles of materials management, purchase, stores & inventory control and evaluation of materials management.
8. **Production Management :** A brief exposure of the different aspects of production management (Visible & Invisible) inputs, methodology of activities, performance evaluation techniques, process – flow, process know – how and maintenance management.

RECOMMENDED BOOKS:

1. M. J. Etazel , B. J. Walker and W. J. Stanton, Marketing, Tata McGraw Hill, 13th Edition, 2004.
2. R. Saxena, “Marketing Management” Tata McGraw Hill, second Edition, 2003.

PH. 8.6	ELECTIVE – II
PH. 8.7	ELECTIVE – II PRACTICAL
PH. 8.8	COMPREHENSIVE VIVA-VOCE
PH. 8.9	PROJECT REPORT & VIVA-V0CE

ELECTIVES

(To be chosen one each against papers **PH. 7.7, PH. 7.8, PH. 8.6 and PH. 8.7**)

COSMETIC TECHNOLOGY

PH. E.1 **THEORY** **3 hours/week**
UNIT –I

1. Fundamentals of cosmetic technology, classification of cosmetics, A brief study of raw materials used for Cosmetic preparations: surfactants, humectants, cream bases, aerosol propellants, perfumes, colours.

UNIT -II

2. Stability aspects of cosmetics: Shelf-life, effects of environmental factors like light, temperatures etc on product stability.
3. Quality control tests of different cosmetic products, Packaging of Cosmetics

UNIT -III

4. Hair Care Products: Hair structure, Shampoos, Conditioners, Setting lotion, Hair creams, Hair dyes.
5. Skin Care Products: Anatomy and physiology of skin, formulation of skin cleaners, moisturizers, sunscreen products, acne products, anti ageing creams.

UNIT -IV

6. Colour Cosmetics: Introduction, lip colour, nail polish, face make-up eye make-up.
7. Dental products: Dentifrices, Oral rinses, Tooth powder, Tooth paste.
8. Personal Hygiene Products: Shaving creams, after shave products.

COSMETIC TECHNOLOGY

PH. E.2 **PRACTICAL** **3 hours/week**
(A minimum of 15 experiments shall be conducted)

1. Preparation of selected cosmetic preparations representing the following classes:
 - a) Shampoos
 - b) Hair conditioners
 - c) Hair creams

1. To find out the strength of the given sample of acetylcholine by comparative bioassay using rectus abdominis muscle of frog.
2. To find out the strength of the given sample of acetylcholine by interpolation bioassay using rectus abdominis muscle of frog.
3. To find out the strength of the given sample of acetylcholine by three-point bioassay using rectus abdominis muscle of frog.
4. To find out the strength of the given sample of acetylcholine by four-point bioassay using rectus abdominis muscle of frog.
5. To find out the strength of the given sample of d-tubocurarine by graphical bioassay using rectus abdominis muscle of frog.
6. To find out the strength of the given sample of acetylcholine by four-point bioassay using guinea pig ileum.
7. To find out the strength of the given sample of histamine by four-point bioassay using guinea pig ileum.
8. To find out the strength of the given sample of oxytocin by four-point bioassay using rat uterus.
9. To find out the strength of the given sample of 5-hydroxy tryptamine by four-point bioassay using rat fundus.
10. To find out the strength of the given sample of 5-hydroxy tryptamine by comparative bioassay using rat fundus.

RECOMMENDED BOOKS:

1. Sharma, H.L.; Sharma, K.K. General Pharmacology Basic Concepts
2. Barar, F.S.K. Essentials of Pharmacotherapeutics
3. Rang, H.P.; Dale, M.M.; Ritter, J.M.; Moore, P.K. Pharmacology
4. Satoshkar, R.S.; Bhandarkar, S.D.; Ainapure, S.S. Pharmacology and Pharmacotherapeutics
5. Sharma, V.N. Essentials of Pharmacology
6. Derasari and Gandhi's Elements of Pharmacology
7. Remington's Pharmaceutical Sciences
8. Indian Pharmacopeia
9. Pillai, K.K. Experimental Pharmacology
10. Kulkarni, S.K. Hand Book of Experimental Pharmacology

HOSPITAL PHARMACY ADMINISTRATION

PH. E.7 THEORY

3 hours/week

UNIT -I

1. The role of hospital pharmacy department and its relationship to other hospital departments and staff.
2. Hospital drug policy – Drug Committee, formulary and guidelines, other hospital committees such as infection control committee and research & ethics committee.

UNIT -II

3. Hospital Pharmacy management – Staff (Professional and non-professional), Materials (drugs, non-drugs consumables), Financial (drug budget, cost centers,

Planning infrastructure requirements (building, furniture and fitting, specialized Equipment, maintenance and repairs), Work load statistics, Hospital formulary.

4. Organization of Hospital Pharmacy Services,

UNIT -III

- 5. Drug Distribution:** Purchasing, warehousing (Storage conditions, expiry date control, recycling of drugs, stock-taking, drug recalls), Drug distribution methods (ward stock, individual patient dispensing, unit doses), specific requirements for inpatients, causality / emergency theatre, ICU/CCU, Drugs of dependence.

UNIT -IV

- 6. Manufacturing:** Sterile and non sterile production, including total parenteral nutrition, IV additive service, Pre-Packing and labeling Quality control.

HOSPITAL PHARMACY ADMINISTRATION

PH. E.8

PRACTICAL

3 hours/week

(A minimum of 15 experiments shall be conducted)

1. Experiments based on sterilization of various types of materials used in Hospitals.
2. Practicals designed on the use of computers in Drug information Centre,.
3. Prescription filling documentation of information of drug interaction.
4. Manufacture of LVP used in hospitals.
5. Observing Drug distribution pattern in a local hospital and writing report.
6. Any other experiments to Substantiate theory.

RECOMMENDED BOOKS:

1. Hospital Pharmacy-Hassan WE, Lec and Febiger Publication ., 1999.
2. Text book of Hospital Pharmacy-Allowood MC and Blackwell, 1980, 1st ed.
3. Avery's Drug Treatment, 4th edition, Adis international limited
4. Managing Drug Suppl-2nd Edition, Management Sciences for health, Kumarian press, 1997.

ADVANCED PHARMACEUTICAL ANALYSIS

PH. E.9

THEORY

3 hours/week

UNIT -I

1. Theory, instrumentation and applications of the following Instrumental Methods of Analysis.
 - (i) X-ray fluorescence spectrometry
 - (ii) X-ray diffraction
 - (iii) Electron spin resonance spectroscopy (ESR)
 - (iv) Advanced chromatographic techniques like super critical fluid chromatography, size exclusion chromatography.
 - (v) Differential scanning calorimetry, Differential thermal analysis and Thermal gravimetric analysis,

UNIT - II

2. Theory and procedure involved in the qualitative and quantitative analysis of pharmaceutical properties and dosage forms containing the following drugs: (Biological and microbiological method excluded).
- NSAID - Analgesics and antipyretics (Diclofenac sodium, Ketoprofen, Oxyphenebutazone, Paracetamol, Allopurinol, Aspirin + Caffeine)
 - Barbiturates (Phenobarbitone sodium)
 - Steroids (Nandrolone, Cortisone acetate, Fludrocortisone acetate, Prednisolone, Dexamethasone)
 - Antihistaminics (Mepyramine maleate, Chlorpheniramine maleate, promethazine hydrochloride, Cyclazine hydrochloride, Astemizole)
 - Alkaloids (Codeine, Opium, Vincristine, Ergotamine and Ergometrine)

UNIT -III

3. Theory and procedure involved in the qualitative and quantitative analysis of pharmaceutical properties and dosage forms containing the following drugs: (Biological and microbiological method excluded).
- Antibiotics (Cycloserine, Chloramphenicol, Ampicillin, Rifampicin, Cefotaxim sodium)
 - Vitamins (Riboflavin, Nicotinamide, Pyridoxine hydrochloride, Folic acid, Cyanocobalamine)
 - Cardiovascular agents (Digoxin, Isosorbide dinitrate, nifedipine, Verapamil hydrochloride, Propranolol hydrochloride, Timolol maleate, Atenolol)
 - Hypoglycaemic agents (Insulin and its different forms, Chlorpropamide, glibenclamide, Metformine)
 - Sulphonamides (Sulphadiazine, Sulphamethoxazole, Sulphacetamide)

UNIT - IV

4. Theory and procedure involved in the qualitative and quantitative analysis of pharmaceutical preparations and dosage forms using the following reagents / reactions.
- (i) Diazotisation followed by coupling.
 - (ii) Oxidation followed by complexation.
 - (iii) Condensation reactions using the reagents Para Dimethyl Amino Benzaldehyde (PDAB), Folin's reagent, Gibb's reagent and para Dimethyl Amino Cinnamaldehyde (PDAC) reagent.

ADVANCED PHARMACEUTICAL ANALYSIS

P.H. E.10

PRACTICAL

3 hours/week

(A minimum of 15 experiments shall be conducted)

1. Estimation of following classes of drugs using different analytical methods.
 - NSAID - Analgesics and Antipyretics.
 - Barbiturates.
 - Sulphonamides.
 - Antibiotics.
 - Steroidal hormones
 - Vitamins
 - Alkaloids
 - Cardiovascular drugs
 - Hypoglycaemic agents
 - Antihistaminics
2. Estimation of different classes of drugs using the following reagents.

- (i) Feric chloride.
- (ii) Perchloric acid.
- (iii) 2,6-Dichlorophenol indophenol.

RECOMMENDED BOOKS:

Instrumental methods of analysis by Scoog and West.
 Chemical Analysis – Modern Instrumentation methods and techniques by Wiley.
 Instrumental methods of analysis by Willard Den & Merrit.
 Hand book of Instrumental techniques for analytical chemistry edited by Frank Settle by Prentice Hall Inc.
 A text book of Pharmaceutical analysis by K.A.Conners (John Wiley)
 Spectrometric identification of organic compounds by silverstein (7th Edition) 1981.
 IP.BP.USP.

PHARMACY PRACTICE

PH. E.11 THEORY

3 hours/week

UNIT-I

Rational use of drugs: Problems of irrational drug use, prescribing indicators, patient care indicators, health facility indicators, role of pharmacist in promotion of rational use of drugs.

Essential drugs concept, selection, quantification, procurement and distribution of essential drugs, WHO model list of essential drugs, Pharmaceutical policy

UNIT-II

Pharmacoepidemiology, Pharmacoeconomics: types of health economic evaluations
 Therapeutics in practice – decision making in drug therapy

UNIT-III

Drug Information system: Introduction to drug information resources, Drugs and poisons information, design of literature searches, development of a drug and poison information database, emergency treatment of poisoning.

UNIT-IV

Public health policy and Health care system.

RECOMMENDED BOOKS:

1. Role of Pharmacist in the Health care system, WHO/ PHARM/94.569
2. Remington's sciences and practice of Pharmacy; 20th edition Lippin cott. Williams and Welkens.
3. Medicare scenario in India; Perceptions and Perspectives – Delhi society for promotion of rational use of drugs.
4. WHO publications on essential drugs and medicines.
5. Relevant review articles from recent medical and pharmaceutical journals

