

## 5<sup>th</sup> SEMESTER

### PHARMACEUTICS-IV (Pharmaceutical Technology – I)

#### PH.5.1. THEORY

3 hours / week

##### UNIT -I

1. **Liquid Dosage Forms:** Introduction, types of additives used in formulations, Vehicles , stabilizers, preservatives, suspending agents, emulsifying agents, solubilizer, colors, flavours and others, manufacturing, packaging and evaluation of clear liquids, suspensions and emulsions.

##### UNIT -II

2. **Semisolid Dosage Forms:** Definitions, types, mechanisms of drug permeation, factors influencing permeation, semisolid bases and their selection. General formulation of semisolids: like ointments, creams, pastes & gels, their manufacturing procedure, evaluation and packaging.
3. **Suppositories:** Ideal requirements, bases, manufacturing procedure, packaging and evaluation.

##### UNIT -III

#### 4. Tablets:

Types of tablets, excipients used, and different granulation techniques used for preparation of tablets, types of tablet press, manufacturing defects and evaluation of tablets.

Coating of Tablets: Types of coating- sugar coating, film coating, enteric coating, film defects, materials used and evaluation of coated tablets.

##### UNIT –IV

5. **Capsules:** Advantages and disadvantages of capsule dosage forms, materials used for production of hard gelatin capsules, different sizes of capsules, methods of capsule



- b) Sterilization, different methods, validation of sterilization methods & equipment.

#### **UNIT -III**

7. Test for sterility – Sampling media and general procedure. Control tests and inactivation of inhibitory substances.

#### **UNIT -IV**

8. Microbiological assay of antibiotics – penicillin, streptomycin and tetracycline, Vitamins – vitamin B12 and amino acids – lysine.

### **APPLIED MICROBIOLOGY**

**PH. 5.4      PRACTICAL      3 hours/ week**  
**(A minimum of 15 experiments shall be conducted)**

Experiments devised to prepare various types of culture media, sub-culturing of common aerobic bacteria, fungi and yeast. Various staining methods, various methods of isolation of microbes, sterilization techniques and validation of sterilizing techniques, evaluation of antiseptics and disinfectants, Testing the sterility of pharmaceutical products as per I.P. requirements and Microbiological assay of antibiotics.

1. Preparation of Nutrient broth & Nutrient Agar medium
2. Preparation of Potato dextrose Agar medium
3. Subculture of aerobic bacteria, fungi and yeast by aseptic technique
4. Gram's staining Technique
5. Isolation of microbes by streak plate, spread plate methods.
6. Moist heat dry heat sterilization
7. Phenol coefficient method.
8. Test for sterility of Dextrose injection I.P.
9. Microbiological assay of antibiotics.
10. Demonstrating the use of membrane filtration technique.
11. Motility of bacteria using hang drop method.

#### **RECOMMENDED BOOKS:**

1. Microbiology of Pelczar and Kreig.
2. Text Book of Microbiology by Anantanarayana and Panicker.
3. Dispensing for pharmaceutical students by Cooper and Gunn.
4. Bently's Text Book of Pharmaceutics
5. Tutorial Pharmacy by Cooper and Gunn
6. Indian Pharmacopoeia
7. Shah and Shah (Pharmaceutical Microbiology)

### **PHARMACEUTICAL CHEMISTRY-V**

(Medicinal Chemistry – I)

PH. 5.5 THEORY

3 hours/ week

UNIT -I

1. **Basic Principles of Medical Chemistry:** Physico-chemical aspects (Optical, geometric and bioisosterism) of drug molecules and biological action; Drug receptor interaction including transduction mechanisms.
2. **Brief concept on QSAR:** Free Wilson model, Hansch analysis – its derivation and discussion on different parameters like electronic parameters, steric factor, and partition coefficient. Comparison between Free Wilson model and Hansch analysis, Molecular Connectivity Index.

UNIT -II

3. Classification, mode of action, uses and structure activity relationship of the following classes of drugs. Synthesis of those compounds only exemplified against each class.  
**A. Drugs acting on autonomic nervous system :**
  - (i) Cholinergics and Anticholinesterases : Acetylcholine, Carbachol, Bethanechol, methacholine and Neostigmine.
  - (ii) Adrenergic drugs and adrenergic blocking agents : Adrenaline, Salbutamol, Phenylephrine, Naphazoline
  - (iii) Antispasmodic and anti ulcer drugs : Homatropine, Cyclopentolate, Diclomine, Tropicamide.
  - (iv) Neuromuscular blocking agents : Gallamine, succinylcholine

UNIT -III

- B. Autacoids :**
- (i) Antihistamines: Diphenhydramine, Mepyramine, Chlorpheniramine, Promethazine, Chlorcyclizine, Cimetidine, Ranitidine.
  - (ii) Eicosanoids : Occurrences, Chemical nature, Medicinal applications
  - (iii) Analgesic – antipyretics, anti-inflammatory (non-steroidal) agents : Aspirin, Paracetamol, Ibuprofen, Phenylbutazone, Naproxan, Diclofenac sodium.

UNIT -IV

- C. Drugs affecting uterine motility :Oxytocics (including oxytocin, ergot alkaloids and prostaglandins) Their Occurrence, Chemical nature, Medicinal applications.**

PHARMACEUTICAL CHEMISTRY-V

(Medicinal Chemistry – I)

PH. 5.6 PRACTICAL

3 hours/week

**(A minimum of 15 experiments shall be conducted)**

1. Synthesis of selected drugs and intermediates from the course content.

2. Monographs of selected official drugs including identification tests and tests for purity.

#### RECOMMENDED BOOKS

1. Wilson and Grisvold's Text Book of Organic Medicinal and Pharmaceutical Chemistry.
2. Principles of Medicinal Chemistry by William O.Foye.
3. A Text Book of Medicinal Chemistry by S.N.Pandeya.
4. Medicinal Chemistry by Ashutoshkar.
5. Bentley's and Driver's Text Book of Pharmaceutical Chemistry.

## PHARMACOLOGY – I

PH. 5.7      **THEORY**

**3 hours / week**

#### UNIT -I

1. **General Pharmacology:** Introduction to Pharmacology, Sources of drugs, dosage forms and routes of administration, mechanism of action, Combined effect of drugs, Factors modifying drug action, tolerance and dependence, Pharmacokinetics: Absorption, Distribution, Metabolism and Excretion of drugs, Drug Addition & Drug abuse.

#### UNIT -II

2. **Pharmacology of drugs acting on Peripheral Nervous System:**
  - A. Neurohumoral transmission (autonomic and somatic)
  - B. Cholinergic drugs, Cholinergic blockers, Adrenergic drugs, Adrenergic blockers, Ganglionic stimulants and blocking agents
  - C. Skeletal Muscle Relaxants
  - D. Local anaesthetic agents

#### UNIT -III

3. **Pharmacology of drugs acting on Central Nervous System:**
  - A. Neurohumoral transmission in the C.N.S
  - B. General Anesthetics
  - C. Alcohol and treatment of alcoholism
  - D. Sedatives, hypnotics
  - E. Anti-epileptics drugs (Anticonvulsants)
  - F. Analgesics, Antipyretics, Anti-inflammatory and Anti-gout drugs.
  - G. Narcotic analgesics and antagonists

#### UNIT -IV

- H. Psychopharmacological agents – Antipsychotics (Neuroleptic drugs), Antidepressants, Psychomimetics, Anti-anxiety drugs,
- I. Anti-parkinsonian drugs
- J. C.N.S.stimulants

## PHARMACOLOGY – I

PH. 5.8 PRACTICAL

3 hours/week

(A minimum of 15 experiments shall be conducted)

1. Introduction to Experimental Pharmacology
2. Preparation of different solutions for experiments
3. Common Laboratory animals and their maintenance
4. Study of commonly used instruments in experimental pharmacology  
Procedures for rendering animals unconscious – stunning of rodents, pithing of frogs, chemical anaesthesia
2. **Experiments on intact preparations;**  
Study of different routes of administration of drugs in mice / rats. To study the effect of hepatic microsomal enzyme inhibitors and induction on the pentobarbitone/hexobarbitone/thiopental sodium sleeping time in mice.
3. **Experiments on Central Nervous System:**  
Recording of spontaneous motor activity, stereotypy, analgesia, anticonvulsant activity and muscle relaxant activity of drugs using simple experiments.
4. Effects of autonomic drugs on rabbit's eye.
5. **Pharmacology of Cardiovascular System:**
  - (a) To study the inotropic and chronotropic effects of drugs on isolated frog heart.
  - (b) To study the effects of drugs on normal and hypo dynamic frog heart.

### RECOMMENDED BOOKS:

1. Essentials of Medical Pharmacology by K.D.Tripathy
2. Pharmacology and pharmacotherapeutics by Satoshkar and Bhandarkar
3. Pharmacology by Prasun K Das, S.K.Bhattacharya and P.Sen.
4. Text book of Pharmacology by S.D. Sethi
5. The Pharmacological basis of Therapeutics by Goodman and Gilman
6. Pharmacology by Rang, Dale and Ritter.
7. Basic and Clinical Pharmacology by B.G.Katzung.

## PHARMACEUTICAL ANALYSIS-II

PH. 5.9 THEORY

3 hours/ week

### UNIT -I

Theoretical considerations and application in drug analysis and quality control of the following analytical techniques :

1. **Oxidation Reduction Titrations :** Concepts of oxidation and reduction, Redox reactions, strengths and equivalent weights of oxidizing and reducing agents, Theory of

redox titrations, Redox indicators, cell representations, Measurement of electrode potential, Oxidation-reduction curves, Iodimetry and Iodometry, Titrations involving ceric sulphate, potassium iodate, potassium bromate, potassium permanganate, Titanous chloride and sodium 2, 6-dichlorophenol indophenol.

#### UNIT -II

2. **Miscellaneous Methods of Analysis** : Diazotisation titrations, Kjeldahl method of nitrogen estimation, Karl-Fischer titration, Oxygen flask combustion gasometry.
3. Potentiometry and pH Meter

#### UNIT -III

4. Conductometry
5. Coulometry
6. Polarography and Amperometry

#### UNIT -IV

7. Nephelometry and Turbidimetry.
8. Radioimmuno Assays.
9. Electrophoresis

## PHARMACEUTICAL ANALYSIS-II

### PH. 5.10 PRACTICAL

3 hours/ week

**(A minimum of 15 experiments shall be conducted)**

1. **Miscellaneous Determinations:** Exercise involving diazotization, Kjeldahl, Karl-Fischer, shall be covered.
2. Exercises based on acid base titration in aqueous and non-aqueous media, oxidation reduction titrations using potentiometric technique. Determination of acid-base disassociation constants and plotting of titration curves using pH meter.
3. Exercises involving conductometric titrations.
4. **Oxidation Reduction Titrations:** Preparation and standardization of some redox titrants e.g. potassium permanganate, potassium dichromate, iodine, sodium thiosulphate etc. Some exercises related to determination of oxidizing and reducing agents in the sample shall be covered. Exercises involving potassium iodate, potassium bromate, iodine solution, sodium 2, 6-ichlorophenolindophenol, and ceric ammonium sulphate.

#### RECOMMENDED BOOKS:

1. Vogel's Text Book of Quantitative Chemical Analysis.
2. Practical Pharmaceutical Analysis by Beckette and Stenlake Vol. I & II.
3. Indian Pharmacopocia Vol. I & II

4. Instrumental methods chemical analysis by B.K. Sharma
5. Bently and Driver's Text Book of Pharmaceutical Chemistry.

## COMMUNITY PHARMACY AND HEALTH EDUCATION

**PH. 5.11      THEORY**

**3 hours/ week**

### UNIT -I

1. **Community Pharmacy:** Organization and structure of retail and wholesale drug store-types of drug store and design. Legal requirements for establishment, maintenance and drug store-dispensing of proprietary products, maintenance of records of retail and wholesale.
2. **Patient counseling:** role of pharmacist in community health care and education.

### UNIT -II

3. **Concepts of health and disease:** Disease causing agents and prevention of disease.
4. **Classification of food requirements:** Balanced diet, nutritional deficiency disorders, their treatment and prevention .

### UNIT -III

5. **Communicable diseases:** Brief outline, their causative agents, modes of transmission and prevention (Chicken pox, measles, influenza, diphtheria, whooping cough, tuberculosis, poliomyelitis, helminthiasis, malaria, filariasis, rabies, trachoma, tetanus, leprosy, syphilis, gonorrhoea, and AIDS).

### UNIT -IV

6. **Demography and family planning:** Introduction ,Methods and procedures.
7. **First Aid:** Emergency treatment of shock, snakebites, burns, poisoning, fractures and resuscitation methods.

### RECOMMENDED BOOKS:

- 1) Role of Pharmacist in the Health care system, WHO/ PHArm/94.569
- 2) Remington's sciences and practice of Pharmacy; 20<sup>th</sup> edition Lippin cott. Williams and Welkens.
- 3) Medicare scenario in India; Perceptions and Perspectives – Delhi society for promotion of rational use of drugs