

7th SEMESTER

PHARMACEUTICS-VI (Biopharmaceutics & Pharmacokinetics)

PH. 7.1 THEORY

3 hours/ week

UNIT -I

1. Introduction to Biopharmaceutics and Pharmacokinetics and their role in information development and clinical setting.

2. Biopharmaceutics :

Passage of drugs across biological barrier (passive diffusion, active transport facilitated Diffusion and pinocytosis.

Factors influencing absorption-Physicochemical, physiological and pharmaceutical.

UNIT -II

Drug distribution in the body, plasma protein binding.

Metabolism of drugs.

3. Pharmacokinetics:

Different Pharmacokinetic models and their significance.

Compartment model- Definition and scope.

Significance of Plasma drug concentration measurement.

UNIT -III

Pharmacokinetics of drug absorption – Zero order and first order absorption rate constant.

Volume of distribution and distribution coefficient.

Compartment kinetics – One compartment and two compartment models.

Determination of pharmacokinetic parameters from plasma and urine data after drug administration by intravascular and oral route.

UNIT -IV

Clearance concept, Mechanism of renal clearance, clearance ratio, determination of renal clearance.

Extraction ratio, hepatic clearance, biliary excretion, extrahepatic circulation.

4. Bioavailability and bioequivalence:

Measures of bioavailability , C_{max} , t_{max} and area under the curve (AUC)

RECOMMENDED BOOKS :

1. Biopharmaceutics and Pharmacokinetics by D.M. Brahmkar and Sunil B. Jaiswal
2. Fundamentals of Biopharmaceutics and Pharmacokinetics by V. Venkateswarulu
3. Biopharmaceutics and Clinical Pharmacokinetics by Notari
4. Biopharmaceutics and Clinical Pharmacokinetics by Gibaldi
5. Applied Biopharmaceutics and Pharmacokinetics by Shargel and Yu

PHARMACOLOGY – III

PH. 7.2 THEORY

3 hours / week

UNIT -I

1. Drugs Acting on the Gastrointestinal Tract.

(a) Antacids, Anti Secretory and Anti-ulcer drugs

(b) Laxatives and antidiarrhoeal drugs

(c) Appetite stimulants and suppressants

(d) Emetics and anti-emetics

(e) Miscellaneous – carminatives, demulcents, protectives, adsorbents,

astringents, digestants, enzymes and mucolytics.

UNIT -II

2. Pharmacology of drugs affecting Endocrine System:

- (a) Hypothalamic and pituitary hormones
- (b) Thyroid hormones and anti thyroid drugs, parathormone, calcitonin and Vitamin D
- (c) Insulin, oral hypoglycaemic agents and glucagon
- (d) ACTH and corticosteroids
- (e) Androgens and anabolic steroids
- (f) Estrogens, progesterone and oral contraceptives.

UNIT -III

3. Chemotherapy

- (a) General principles of Chemotherapy
- (b) Sulfonamides and cotrimoxazole, Quinolones
- (c) Antibiotics-pencillins, Cephalosporins, Tetracyclines, Amino glycoside antibiotics, Chloramphenicol, Erythromycin and Miscellaneous Antibiotics.
- (d) Chemotherapy of tuberculosis, leprosy fungal diseases, viral diseases
- (e) Chemotherapy of malignancy and immunosuppressive agents
- (f) Antiprotozoal drugs and anthelmintics

UNIT -IV

4. Principles of Toxicology

- (a) Definition of poisons, Adverse drug reactions, general principles of treatment of poisoning with particular reference of barbiturates, opioids, organophosphorous and atropine poisoning.
- (b) Heavy metals and heavy metal antagonists.

PHARMACEUTICAL CHEMISTRY - VII **(Medicinal Chemistry – III)**

PH. 7.3 THEORY

3 hours / Week

UNIT -I

1. Drug metabolism and Concepts of Prodrugs.
2. Classification, mode of action, uses and structure activity relationship of the following classes of drugs. Synthesis of those compounds only exemplified against each class.

- (i) Sulphonamides : Sulphadiazine, Sulphamethoxazole, Sulphacetamide sodium.
- (ii) Antibiotics : : General study including classification, synthesis of Methicillin, Ampicillin, Amoxicillin and Chloramphenicol

UNIT – II

- (iii) Antifungal agents: Griseofulvin, Nystatin, Ketoconazole, Amphotericin B, Miconazole.
- (iv) Anti Malarial Drugs : Chloroquine, Pamzquine, Mepacrine, Proguanil, Pyrimethamine.
- (v) Antineoplastic agents: Chlorambucil, Thiotepa, Busulfan, 5-Fluorouracil
- (vi) Anti-TB and anti-leprosy Drugs: Isoniazid, Ethambutol, Pirazinamide, Dapsone
- (vii) Antiamoebic agents: Metronidazole Diloxamide furoate

UNIT -III

- (viii) Anthelmintics : Thiabendazole, Mebendazole, Niclosamide
- (ix) Anti-viral including anti-HIV agents; Acyclovir, Zidovudine
- (x) Immunosuppressives and immunostimulants: To study only the general concept
- (xi) Diagnostic Agents: Propylidone, Sodium diatrizoate, Fluorescein sodium.
- (xii) Anticoagulants: Heparin, Coumarins, Phenindione derivatives.

UNIT -IV

- (xiii) Amino acids, Peptide, nucleotides and related drugs.

Thyroid and Anti thyroid drugs: Thyroxine, Liothyronine, Propylthiouracil, Carbimazole

Insulin, Insulin preparations and oral hypoglycaemic agents: Chlorpropamide, Tolbutamide, Glibenclamide, Phenformin.

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 Vol I & Vol II
4. Medicinal Chemistry by Ashutosh Kar
5. Bentley's and Driver's Text Book of Pharmaceutical Chemistry

PHARMACEUTICAL ANALYSIS-III

PH. 7.4 THEORY

3 hours/ week

The theoretical aspects, basic instrumentation, elements of interpretation of spectra, and applications of the following analytical techniques should be discussed.

UNIT -I

1. Ultraviolet and visible spectrophotometry
2. Fluorimetry
3. Infrared spectrophotometry
4. Flame Photometry

UNIT -II

5. Nuclear Magnetic resonance spectroscopy including C¹³ NMR.
6. Mass Spectrometry

UNIT -III

7. **Chromatography:** The following techniques will be discussed with relevant examples of pharmacopoeial products.

TLC, Paper Chromatography and Column Chromatography,
UNIT-IV

HPLC, GLC, and HPTLC

PHARMACEUTICAL ANALYSIS-III

PH 7.5 PRACTICAL 3-hours/ week
(A minimum of 15 experiments shall be conducted)

1. Quantitative estimation of at least ten formulations containing single or more than one drug, using instrumental techniques like spectrophotometry, fluorimetry etc. (at least 5 experiments).
2. Estimation of Na⁺, K⁺, Ca⁺⁺ ions using flame photometry. 3 Expts.
3. Chromatographic analysis of some pharmaceutical products, (Paper chromatography of Amino acids, TLC of alkaloids, sulphonamides etc)
4. Workshop to interpret the structure of simple organic compounds using UV, IR, NMR and MS. 3 demons.

RECOMMENDED BOOKS:

1. Vogel's Text Book of Quantitative Chemical Analysis
2. Instrumental methods of Chemical Analysis by B.K. Sharma
3. Instrumental methods of Analysis by Willard Den & Merrit
4. Practical Pharmaceutical Chemistry by Beckett and Sten Lake Vol. 2
5. Text Book of Pharmaceutical Analysis by Conner

PHARMACEUTICAL BIOTECHNOLOGY

PH. 7.6 THEORY 3 hours/week

UNIT -I

1. **Immunology and Immunological Preparations :** Principles of immunology, antigens, antibodies and haptens, Immune system- cellular and humoral immunity, immunological tolerance, antigen-antibody reactions and their applications, Hypersensitivity, Active and passive immunization, Preparation, standardization and storage of immunological products.

UNIT -II

2. **Genetic Code and Protein synthesis:** Genetic code, components of protein synthesis, inhibition of protein synthesis. Brief account of protein engineering and polymerase chain reactions. Regulation of gene expression.
3. **Genetic Recombination :** Gene cloning and its applications. Development of hybridoma for monoclonal antibodies. Study of drugs produced by biotechnology such as Activase, Humulin, Humatrope etc.

UNIT -III

4. **Microbial Transformation :** Introduction, types of reactions mediated by micro-organisms, design of biotransformation process, selection of organisms, biotransformation process and its improvements with special reference to steroids.
5. **Antibiotics :** Historical development of antibiotics. Antimicrobial spectrum and methods used for their standardization. Fermenter, its design, control of different parameters. Design of fermentation process, Isolation of fermentation products with special reference to penicillin, streptomycin, tetracycline and vitamin B12.

UNIT -IV

6. **Enzyme immobilization :** Techniques of immobilization of enzymes, factors affecting enzyme kinetics, study of enzymes such as hyaluronidase, penicillinase, streptokinase and streptodornase, amylases and proteases etc. Immobilization of bacteria and plant cells.
7. **Blood Products and Plasma Substitutes :** Collection, processing and storage of whole human blood, concentrated human RHCs, dried human plasma, human fibrinogen, human thrombin, human normalimmunoglobulin, human fibrin, foam plasma substitutes, ideal requirements, PVP, dextran etc. for control of blood pressure as per I.P.

RECOMMENDED BOOKS :

1. Industrial Microbiology by Casida.
2. Industrial Microbiology by A.H. Patel.
3. Industrial microbiology by Prescott and Dunn.
4. Pharmaceutical Biotechnology by Vyas and Dixit.
5. Molecularbiology and Genetic Engineering by A.M.Narayanan, A.M.Selvaraj, A.Mani
6. Text Book of Microbiology by Anantanarayana and Panicker.
7. Concepts in Biotechnology by Balasubramanium.
8. Molecular Biotechnology by Glick.
9. Molecular Biotechnology by Gingold.

PH.7.7	ELECTIVE - I
PH. 7.8	ELECTIVE – I PRACTICAL
PH. 7.9	COMPREHENSIVE VIVA-VOCE
PH. 7.10	PROJECT WORK (Seminar based on Literature Survey & Plan of Work)