

फार्मास्युटिकल केमेस्ट्री चतुर्थ सेमेस्टर

प्रथम	Advanced Medicinal Chemistry	85	15	28	05
द्वितीय	Drug Design	85	15	28	05
तृतीय	Modern Analytical Techniques	85	15	28	05
चतुर्थ	Biopharmaceutics and Pharmacokinetics	85	15	28	05
पंचम	Pharmacology	85	15	28	05
	Practical:- 1- Laboratory Course -I	50	-		
	2- Laboratory Course -II	50			
	Project Work-Duration 60 Hours	100			

M.Sc. Pharmaceutical Chemistry : Semester -IV

MPC-401: ADVANCED MEDICINAL CHEMISTRY

Max Marks: 85

Min Passing Marks: 12

28

UNIT -I:

- Theoretical basis of newer drug delivery systems; Prodrug, Dendrimer and Polymers as carrier.
- Enzyme inhibition: Rational design based on inhibition kinetics, types, Affinity-labeling agents.

UNIT -II: Pharmacodynamics

Introduction, elementary treatment of enzymes stimulation, enzyme inhibition, sulfonamides, membrane active drugs, drug metabolism, xenobiotics, biotransformation, significance of drug metabolism in medicinal chemistry.

UNIT -III: Antibiotics and antibacterials

Introduction, Antibiotic β -Lactam type - Penicillins, Cephalosporins, Antitubercular - Streptomycin, Broad spectrum antibiotics - Tetracyclines, Anticancer - Dactinomycin (Actinomycin D)

Unit - IV:

Classification, mode of action, SAR, side effects, biological evaluation & recent advances in research of the following category of drugs.

- Anticoagulants and Anti Platelets Drugs
- Immunosuppressants
- Antiviral and Anti HIV
- Antiprotozoal
- NSAIDS

Unit -V:

Classification, mode of action, SAR, side effects, biological evaluation & recent advances in research of the following category of drugs.

- Antihyperlipidemic Drugs
- Antispasmodics and Antiulcer Drugs
- Antiparkinsonism
- Antialzheimer Drugs

Books Suggested

- Medicinal Chemistry, V. K. Ahluwalia and M. Chopra, CRC Press.
- Medicinal Chemistry Kar, Ashitosh., New Age International Publ.
- An introduction to Medicinal Chemistry Patrick, Graham, Oxford Publication.
- Medicinal Chemistry : An introduction, Thomas Gareth, Wiley India Pvt. Ltd.
- Principles of Medicinal Chemistry Foye, W.O. Varghese Publication
- Burger's Medicinal Chemistry and Drug discovery, Jone-Wiley publication.

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M.Sc. Pharmaceutical Chemistry : Semester ~~III~~ IV

MPC-402: DRUG DESIGN

Max Marks: 35 ⁸⁵

Min Passing Marks: 12 ²⁸

UNIT - 1: Introduction to Drug Design & Discovery

Historical Perspective, Generation of Leads & Lead Optimization, Cell Biology & Genomics as a Source of Drugs, Future Developments in the Drug Design.

UNIT -II: Three dimensional aided drug design

Structure Aided Drug Design Process, Methods to Derive 3D Structures., Design Process, Software Aided Drug Design, Optimization of Identified Compounds, Example of Structure Aided Drug Design.

UNIT -III: Computer Aided Drug Design

Pharmacophoric Approach: Pharmacophore Based Ligand Design, Pharmacophore Concept, Pharmacophore Elements and Representation, Active Conformation, Molecular Superimposition, Receptor Excluded and Receptor-Essential Volumes, Solvation Effects, Examples of 3D Pharmacophore Models and their Use.

UNIT -IV:

Quantitative Structure Activity Relationships (QSAR): Fundamentals of QSAR, Biological Data, the Additivity of Group Contribution Hansch Analysis and related approaches, physicochemical properties, Statistical methods in QSAR, application of Hansch and related approaches, 3D QSAR approach.

UNIT -V: Molecular modeling

Generation of 3D coordinates, Sketch approach, conversion of 2D structure in 3D form, force field, geometry optimization, energy minimizing procedures, Quantum mechanical methods, conformational analysis, pharmacophore identification, molecular modeling in 3D. QSAR - CoMFA and related methods.

Books Suggested

1. An introduction to Medicinal Chemistry Patrick, Graham, Oxford Publ.
2. Instant Notes: Medicinal Chemistry Patrick, Graham, Taylor Frncis Publ.
3. Medicinal Chemistry Kar, Ashitosh. New Age International Publ.
4. Principles of Medicinal Chemistry Foye, W.O. Varghese Publication
5. drug Design, S. Morris, Sarup Book Publ.

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M.Sc. Pharmaceutical Chemistry : Semester - ~~IV~~ IV

MPC-403: MODERN ANALYTICAL TECHNIQUES

Max Marks: ~~35~~ 45

Min Passing Marks: ~~12~~ 20

UNIT-I:

Theory and Instrumentation of IR and FT-IR, its advantage and applications in Structural elucidation. NMR, C^{13} NMR, Origin of spectra, Chemical shifts, Spin-spin coupling, Coupling constant, Instrumentation and application for Structural elucidation.

UNIT -II:

Mass spectra, Instrumentation, Fragmentation pattern and applications for Structural elucidation. Applications of GC-Mass, HPLC-Mass for complex mixtures.

UNIT -III:

Theory, Instrumentation and application of the following:
Fluorescence, X - Ray crystallography, Ultra centrifugation, Liquid Scintillation spectrometry, Auto radiography,

UNIT-IV:

Immunoassay Techniques: Enzyme and Radioimmunoassay techniques. Theory, Methods and applications.

UNIT -V:

Thermal methods: Thermo Gravimetry (TG), Differential Scanning Calorimetry (DSC), Differential Thermal Analysis (DTA).
Principles and application of light, Phase contrast, Scanning and Transmission electron microscopy, Cytometry and Flow cytometry.

Books suggested

1. Modern Spectroscopy, J.M. Hollas, John Wiley.
2. Applied Electron Spectroscopy for chemical analysis d. H. Windawi and F.L. Ho, Wiley Interscience.
3. NMR, NQR, EPr and Mossbauer Spectroscopy in Inorganic Chemistry, R.V.Parish, Ellis Harwood.
4. Physical Methods in Chemistry, R.S. Drago, Saunders College.
5. Introduction to Molecular Spectroscopy, G.M. Barrow, Mc Graw Hill.
6. Basic Principles of Spectroscopy, R. Chang, Mc Graw Hill.
7. Introduction to Magnetic Resonance. A Carrington and A.D. MacLachalan, Harper & Row.

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M.Sc. Pharmaceutical Chemistry : Semester - ~~III~~ IV

MPC - 404: BIOPHARMACEUTICS AND PHARMACOKINETICS

Max Marks: ~~35~~ 45

Min Passing Marks: ~~12~~ 28

UNIT -I: Biopharmaceutics

Definition, passage of drugs across biological barrier, Physiochemical, Biological and Pharmaceutical Factors influencing Biopharmaceutical Performance of Drugs.

Gastrointestinal Absorption of Drugs - Passage of Drugs across Biological Membranes, gastrointestinal absorption mechanisms.

Factors Affecting drug Absorption - Physiological Factors, Dietary Factors, Physiochemical Factors, pH Partition Hypothesis, Dosage form Factors.

Methods of Studying Gastrointestinal Absorption - In Vitro and in VIVO Methods.

Drug disposition - Distribution in blood, Cellular Distribution, Plasma Protein Binding, Tissue Protein Binding.

Drug Excretion : Routes of Drug Excretion, Renal Excretion of Drugs, Factors Affecting Renal Excretion, Biliary and Salivary Excretion of Drugs.

Drug Biotransformation : Pathway of Drug Metabolism, Drug Metabolizing Enzymes, Factors Affecting Drug Metabolism and Drug Response, Inhibition and Stimulation of Drugs Metabolism.

UNIT -II: Pharmacokinetics

Absorption, Distribution, Metabolism and Excretion of Drugs, Fluid Compartment and Circulatory System, Protein Binding, Significance of Plasma drug concentration measurement.

UNIT -III: Compartment Models

Model Selection Criteria, Alaika Inforamtion Criterion, One Compartment and Two Compartment Models, Wagner Nelson and Loo Riegelman Methods or Estimation of Absorption Constants, Curve Fittings, Regression Procedure and Area Under Blood Level Curves.

UNIT -IV: Clinical Pharmacokinetics

Urinary Excretions, Computation of Pharmacokinetic Parameters From Urine Data, Haepetic Clearance, Biliary Excretion, Excretion Ration, Dosage Reigmen Adjustment in Patients with and without Renal Failure, Pharmacokinetics Drug Interactions and Their Significance in Combination Therapy.

UNIT -V: Bioavailability and Bioequivalence

Bioavailability and Bio-equivalence, Federal Requirements, Methods of Determination of Bioavailability using blood level and Urinary Excretion Data, Design and Evaluations, Bioavailability assessment.

Books Suggested

1. Biopharmaceutics and Pharmacokinetics Chatwal, G.R., Himalaya Publishing-House.
2. Principles & applications of Biopharmaceutics & Pharmacokinetics Tipnis & Bajaj, Career Publ.
3. Biopharmaceutics & Pharmacokinetics , Kulkarni, CBS Publishers and Dishtributors.
4. Essentials of Biopharmaceutics & Pharmacokinetics , Ashutosh Kar, New Age International Publ.

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M.Sc. Pharmaceutical Chemistry : Semester - ~~III~~ IV

MPC-405: PHARMACOLOGY

Max Marks: 35/25

Min Passing Marks: 12/20

UNIT -I:

General Pharmacology: Dosage forms & Routes of Administration Tolerance & Dependence, ADME of Drugs.

Pathophysiology of CNS Diseases and Pharmacology of Drugs used to treat them:

- i) Neurohumoral Transmission in CNS
 - a) Cholinergic Pathways
 - b) Dopaminergic Pathways
 - c) Serotonergic Pathways
 - d) Noradrenergic Pathways
- ii) General Anesthetics

UNIT -II: Psychopharmacological Agents

- a) Antipsychotics
- b) Antidepressants
- c) Antimaniacs
- d) Hallucinogens

UNIT -III: Drugs Acting on the Gastrointestinal Tract

- a) Antacids, Anti-ulcer Drugs
- b) Laxatives and Anti-diarrhoeal Drugs
- c) Emetics and Anti-emetics

UNIT -IV: Drugs Acting on the Haematopoietic System

- a) Hematinics.
- b) Anti-coagulants, Vitamin K and Hemostatic Agents
- c) Fibrinolytic and Anti-platelet Drugs
- d) Blood and Plasma Volume Expanders

UNIT -V: Autocoids

- a) Antihistamines-Histamine 5-HT and Their Antagonists.
- b) Eicosanoids- Prostaglandins, Leukotrienes, Thromboxane.
- c) Non-Steroidal, Anti-inflammatory Agents, Opioid Analgesics, Antipyretics

Books Suggested

1. Pharmacology & Pharmacotherapeutics I Satoshakar , Popular Prakashan Pvt. Ltd.
2. Pharmacology & Pharmacotherapeutics II Satoshakar , Popular Prakashan Pvt. Ltd.
3. Essential of Pharmacology , S. Singh, New Age International Publ.
4. Essential of Pharmacology , D.K. Basu, CBS Publishers and Distributors.
5. Pharmaceutical Pharmacology, S. C. Mehta and Ashutosh Kar, New Age International Publ.

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M.Sc. Pharmaceutical Chemistry

SEMESTER-IV

LAB COURSE -I

Maximum Marks : 50

Duration of Exam : 8 Hrs

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|-------|-----------------------------|----|
| (i) | Instrumental Analysis | 12 |
| (ii) | Multi step Synthesis | 12 |
| (iii) | Pharmacological Experiments | 12 |
| (iv) | Dairy Dairy | 6 |
| (v) | Viva | 8 |

LAB COURSE -II

Maximum Marks: 50

Duration of Exam: 8 Hrs

- | | | |
|-------|--|----|
| (i) | Solvent Extraction | 12 |
| (ii) | Water Analysis | 12 |
| (iii) | Pharmaceutical and Cosmetic Preparations | 12 |
| (iv) | Dairy Dairy | 6 |
| (v) | Viva | 8 |

LAB COURSE -I

Maximum Marks : 50

Duration of Exam: 8 Hrs

- (I) Instrumental Analysis 12
- (a) Determination of Sulphate by Nephelometric Method.
- (b) Determination of the End Point of the Following Solutions by the Conductometric Method
- | | |
|--------------------------------|-------------------------------|
| (i) Strong acid Vs strong base | (ii) Strong acid Vs weak base |
| (iii) Weak acid Vs strong base | (iv) Weak acid Vs weak base |
- (c) Determination the pH of a Number of Buffer solutions using pH meter.
- (d) Karl Fisher Method for Determination of Water in Pharmaceutical Analysis.
- (II) Multi step Synthesis 12
- (a) Preparation of Sodium Ferroxylate $\text{Na}_2\text{Fe}(\text{C}_2\text{O}_4) \cdot 9\text{H}_2\text{O}$
- (b) Preparation of ortho-Chloro Benzoic Acid from Phthalic Anhydride.
- (c) Preparation of para Nitroaniline from Aniline.
- (d) Preparation of Acridon from Anthranilic Acid
- (II) Pharmacological Experiments 12
- (i) To Study Central Muscle relaxants using Rotarod Apparatus
- (ii) To Study the Hyprotic Activity of Sedatives.
- (iii) To Study the Analgesic Activity of Opiod Analgesic on Mice.

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LAB COURSE -II

Maximum Marks : 50

Duration of Exam: 8 Hrs

- (I) **Solvent Extraction** 12
Separate and estimate Mg (II) and Fe (III) by Solvent Extraction Method.
- (II) **Water Analysis** 12
Determination of Following Parameters in the given sample of the water
Colour, Oder, Turbidity, pH, Electrical Conductivity, Acidity, Alkalinity, Hardness, Total Solids, Total Dissolved Solids, Total Suspended Solids and some other detectable parameters.
- (III) **Pharmaceutical and Cosmetic Preparation** 12
- (a) Preparation of Camphor Liniment.
 - (b) Preparation of after Save Lotion.
 - (c) Preparation of Simple Shampoo.
 - (d) Preparation of Compact Powder.
 - (e) Preparation of Cleansing Cream.
 - (f) Preparation of Calamine Lotion.
 - (g) Preparation of Iodex.
 - (h) Preparation of Benzyl Benzoate Emulsion.
 - (i) Preparation of Paste.

Books Suggested

1. Practical Pharmaceutical Chemistry - I & II ,Backett, A.H., CBS Publishers and Distributors.
2. Principles of Pharmaceuical Organic Chemistry.R.R. Nadenla, New Age International
3. Practical Pharmacognosy , Rakesh Gupta , Macmillon Publ.
4. Practical Pharmacognosy , Zafar & Gandhi, CBS Publishers and Dishtributors.
5. Vogel's Text Book of Quantitative Chemical Analysis , J. Mendham, D.J. Barnes and R.C. Denney, Pearson Publication.

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