M.Sc. Pharmaceutical Chemistry : Semester –IV
[Choice Based Credit System]

[Credit 4]

MPC-401: ADVANCED MEDICINAL CHEMISTRY

UNIT –I: a) Insulin – types of diabetes, physiological functions of insulin, insulin preparations, insulin deficiency and adverse effects.

b)Hormones- Introduction, thyroid hormones, SAR, diseases of thyroid gland, drugs used in therapy of hyperthyroidism.

UNIT –II: Pharmacodynamics

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

UNIT –III:

a)Antibiotics-Introduction

β-Lactam antibiotics –Synthesis , SAR ,uses and side effects of penicillins & general structure, classification,uses and side effects of cephalosporin

b) Antitubercular – General structure ,SAR ,uses and side effects of Streptomycin

c) Tetracyclines- General structure , SAR ,uses and side effects

d) Anticancer –Introduction, uses and side effects of Dactinomycin (Actinomycin D)

Unti – IV:

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

a) Anticoagulants and Anti Platelets Drugs
b) Immunosupressants
c) Antiviral and Anti HIV
d) Antiprotozoal
e) NSAIDS

Unti –V:

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

a) Antihyperlipidemic Drugs
b) Antispasmodics and Antiulcer Drugs
c) Antiparkinsonism
d) Antialzheimer Drugs
e) Antifungal drugs

Books Suggested

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

M.Sc. Pharmaceutical Chemistry : Semester –IV
[Choice Based Credit System]

[Credit 4]

MPC-402 MODERN ANALYTICAL TECHNIQUES

UNIT-I:

FT-IR : Theory, Instrumentation, sample preparation, working, analytical information , advantages , limitations and its applications.

C^{13} NMR : Origin of spectra, Chemical shifts, factors affecting chemical shift, splitting, simplification and its applications.

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 Viley.
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.

M.Sc. Pharmaceutical Chemistry : Semester –IV
[Choice Based Credit System]

[Credit 4]

MPC-403 (a) DRUG DESIGN

UNIT – 1: Introduction to Drug Design & Discovery
Historical Perspective, Generation of Lead Compound & Lead Optimization with example, Cell Biology & Genomics as a Source of Drugs, Aspects of Future Developments in the Drug Design.

UNIT –II: Three dimensional aided drug design
a)) Structure Aided Drug Design- Design Process, Methods to Derive 3D Structures, Optimization of Identified Compounds, Example of Structure Aided Drug Design.
b) Mechanism based drug design-Introduction ,Steps involved in design process ,Examples of mechanism based drug design.

UNIT –III: 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: Computers in Medicinal Chemistry
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, Ashutosh. New Age International Publ.
4. Principles of Medicinal Chemistry Foye, W.O. Varghese Publication
5. drug Design, S. Morris, Sarup Book Publ.

M.Sc. Pharmaceutical Chemistry : Semester –IV
[Choice Based Credit System]

[Credit 4]

MPC-403 (b) PHARMACOLOGY

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) Noradrenegic Pathways

ii) General Anesthetics

UNIT –II: Psychopharmacological Agents

a) Antipsychotics
b) Antidepressants
c) Antimanics
d) Hallucinogens

UNIT –III: Drugs Acting on the Gastrointestinal Tract

a) Antacids, Anti-ulcer Drugs
b) Laxatives and Anti-diarrheal 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) Euiconosoids- Prostaglandins, Leukotrienes, Thromboxane.
c) Non-Steroidal, Anti-inflammatory Agents, Opiod 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 Dishtributors.
5. Pharmaceutical Pharmacology, S. C. Mehta and Ashutosh Kar, New Age International Publ.

M.Sc. Pharmaceutical Chemistry : Semester –IV
[Choice Based Credit System]

[Credit 4]

MPC – 404 (a) BIOPHARMACEUTICS AND PHARMACOKINETICS

UNIT –I: Biopharmaceutics

Definition, passage of drugs across biological barrier, cell membrane- structure and physiology with reference to gastrointestinal absorption of drugs and mechanisms of drug absorption .

Methods of Studying Gastrointestinal Absorption – In vitro and in vivo Method

Factors influencing drug absorption and bio-availability from its dosage form.

(a) Physicochemical factors (b) dosage form characteristics and pharmaceutic ingredients (c) Patient related factors.

UNIT –II: Pharmacokinetics

Distribution of drugs , Tissue permeability and physiologic barriers to distribution of drugs, protein binding and its significance, Biotransformation of drugs (phase I & Phase II reactions), excretion of drugs.

UNIT –III: Compartment Models

Pharmacokinetic drug interactions and their significance in combination therapy , plasma drug concentration pharmacokinetic models, zero order, first order and missed order kinetics, non compartmental analysis, concept of prodrugs.

UNIT –IV: Clinical Pharmacokinetics

Pharmacokinetic parameters with reference to one compartment model , Apparent volume of distribution, clearance, curve fitting method of absorption rate constant, urinary excretion data criteria for obtaining valid urinary excretion data rate of exertion method, applications of pharmacokinetic principles.

UNIT –V: Bioavailability and Bioequivalence

Studies of bioavailability and bio-equivalence, measurement of bioavailability methods for enhancement of bioavailability, Federal requirements .

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.

M.Sc. Pharmaceutical Chemistry : Semester –IV
[Choice Based Credit System]

[Credit 4]

MPC- 404 (b) Homoeopathic Pharmacy- II

Unit-I

GENERAL CONCEPTS AND ORIENTATION –
Components of Pharmacy.
Weights and Measurements.
Nomenclature of Homoeopathic Drugs with their Anomalies.

Unit-II

Raw Material – Drugs And Vehicles –
Vehicles.
Homoeopathic Pharmaceutical Instruments & Appliances.
Classification of Homoeopathic Medicines according to their Botanical and Zoological natural orders

Unit-III

Homoeopathic Pharmaceutics -
External applications (focus on scope of Homoeopathic lotions, glycerol, liniment and ointment).
Doctrine of signature.
Pharmaconomy – routes of Homoeopathic drug administration .
Dispensing of medicines.

Unit-IV

Pharmacodynamics -
Quality Control -
Standardization of Homoeopathic Medicine - raw material and finished products.
Good Manufacturing Practices and Industrial Pharmacy, and Dispensing.
Homoeopathic Pharmacopoeia Laboratory – Functions and activities.

Unit-V

Legislations Pertaining to Homoeopathic Pharmacy (as amended from time to time) -
The Narcotic Drugs and Psychotropic Substances Act, 1985.
Drugs and Magic Remedies (Objectionable Advertisements) Act , 1954.
Medicinal and Toilet Preparations (Excise Duties) Act , 1955.

Book Recommended

1.	Pharmaceutical Science in Homoeopathy & Pharmacodynamics	K.P. Muzumdar
2.	Homoeopathic Materia Medica & Pharmacy	Dewey
3.	A Treatise of Homoeopathic Pharmacy	Banerjee & Sinha
4.	A Text- book of Homoeopathic Pharmacy	Mandal & Mandal
5.	Homoeopathic Pharmacopoeia .Vol -I	Govt. of India
6.	Homoeopathic Pharmacopoeia .Vol -II	Govt. of India
7.	Homoeopathic Pharmacopoeia .Vol -III	Govt. of India
8.	Homoeopathic Pharmacopoeia .Vol -IV	Govt. of India
9.	Homoeopathic Pharmacopoeia .Vol -V	Govt. of India
10.	Homoeopathic Pharmacopoeia .Vol -VI	Govt. of India
1.	Homoeopathic Pharmacopoeia .Vol -VII	Govt. of India
2.	Homoeopathic Pharmacopoeia .Vol -VIII	Govt. of India
3.	Homoeopathic Pharmacopoeia .Vol- IX	Govt. of India

M.Sc. Pharmaceutical Chemistry
SEMESTER-IV
[Choice Based Credit System]

[Credit 3]

LAB COURSE –I

Duration of Exam : 6 Hrs

Maximum Marks : 75		**Min.Marks:30**
(i)	Instrumental Analysis	**20 Marks**
(ii)	Multi step Synthesis	**20 Marks**
(iii)	Pharmacological Experiments	**18 Marks**
(iv)	Practical Record	**07 Marks**
(v)	Viva	**10 Marks**

(I) (a) Instrumental Analysis **20 Marks**

(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.

(e) Determination of Concentration of Permanganate by using Ferrous ion by Potentiometer Method.

(b) Homeopathic Identification

Identification of drugs (listed in Appendix-B) – macroscopic and microscopic characteristics of drug substances – minimum 05 drugs (upto 3 X).

(II) Multi step Synthesis **20 Marks**

(a) Preparation of Sodium Ferrooxylate $Na_3[Fe(C_2O_4)_3]\,9\,H_2O$

(b) Preparation of ortho-chloro Benzoic Acid from Phthalic Anhydride.

(c) Preparation of para Nitroaniline from Aniline

(d) Preparation of Acridon from Anthranilic Acid

(e) Preparation of Pthalide from Phthalic Anhydride

(II) (a) Pharmacological Experiments **18 Marks**

(i) To Study Central Muscle relaxants using Rotarod Apparatus

(ii) To Study the Hypnotic Activity of Sedatives.

(iii) To Study the Analgesic Activity of Opiod Analgesic on Mice.

(b) Estimation

(i) Estimation of Paracetamol Spectrophotometrically.

(ii) Estimation of Chlorophyll Spectrophotometrically.

(iii) Estimation of iron in Tablets by Isothiocynate method.

(iv) Estimation of Ammonium Chloride Colorimetrically using nessler's reagent

(v) Estimation of amount of Copper (II) with EDTA Spectrophotometrically.

(vi) Determination of pK value of methyl red indicator at room temp. Spectrophotometrically.

(iv) Practical Record **07 Marks**

(v) Viva **10 Marks**

M.Sc. Pharmaceutical Chemistry
SEMESTER-IV
[Choice Based Credit System]

[Credit 3]

LAB COURSE –II

Duration of Exam: 6 Hrs

Maximum Marks: 75		**Min.Marks:30**
(i)	**Solvent Extraction**	**20 Marks**
(ii)	**Water Analysis**	**20 Marks**
(iii)	**Pharmaceutical and Cosmetic Preparations**	**18 Marks**
(iv)	**Practical Record**	**07 Marks**
(v)	**Viva**	**10 Marks**

(I) Solvent Extraction **20 Marks**

Separate and estimate Mg (II) and Fe (III) by Solvent Extraction Method.
Separation and identification of aspirin and caffeine from an analgesic tablet.

(II) Water Analysis **20 Marks**

Determination of Following Parameters in the given sample of the water
Colour, Odour, Turbidity, pH, Electrical Conductivity, Acidity, Alkalinity, Hardness, Total Solids, Total Dissolved Solids, Total Suspended Solids and some other detectable parameters.

(III) (a) Pharmaceutical and Cosmetic Preparation **18 Marks**

(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.

(b) Homeopathic Preparation

(i) Preparation of 0/1 potency (LM scale) of 1 Drug.
(ii) Preparation of 1X and 1C potency from Mother Tincture by old method.
(iii) Preparation of external applications – lotion, glycerol, liniment, ointment.

(iv) Practical Record **07 Marks**

(v) Viva **10 Marks**

Books Suggested

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