DEVI AHILYA VISHWAVIDYALAYA, INDORE
POST GRADUATE SEMESTER WISE SYLLABUS
Session 2011-2012 & Onwards
SCHEME OF MARKS
M.Sc. Pharmaceutical Chemistry
Semester – I

Paper	Paper Title	Code	Max. Marks	Theory/Project /Practical Marks		CCE	
				Max.	Min.	Max.	Min.
I	Principles of Inorganic Pharmaceutical Chemistry - I	MPC-101	50	35	12	15	05
II	Principles of Organic Pharmaceutical Chemistry – I	MPC-102	50	35	12	15	05
III	Principles of Physical Pharmacy – I	MPC-103	50	35	12	15	05
IV	Pharmaceutical Analysis – I	MPC-104	50	35	12	15	05
V	(a) Mathematics for Pharmaceutical Chemistry OR (b) Biology for Pharmaceutical Chemistry	MPC- 105	50	35	12	15	05
VI	Job Oriented Project Work		50	50	20	-	-
VII	Practical-1 (Laboratory Course-I)		50	50	20	-	-
	Practical -2 (Laboratory Course-II)		50	50	20	-	-
	Total		400				

2-6-11

M.R.S.C.P.S. INDORE

Syllabus Received from [illegible]

DEVI AHILYA VISHWAVIDYALAYA, INDORE

Faculty of Science

M.Sc. (Pharmaceutical Chemistry)

Scheme of Examination & Courses of Studies for the Examination of :

M.Sc.I,II Semester 2011-12& Onwards
M.Sc.III,IV Semester 2012-13& Onwards

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DEVI AHILYA VISHWAVIDYALAYA,
INDORE (M.P.)

M.Sc. Pharmaceutical Chemistry: Semester – I

MPC-101 PRINCIPLES OF INORGANIC PHARMACEUTICAL CHEMISTRY

ax Marks:35 Min Passing Marks:12

NIT –I: Bonding in Inorganic Compounds
eak Chemical Forces-Hydrogen Bonding, Hydrates and Clathrates on Dipole, Dipole-Dipole teraction. VSEPR Theory, Molecular Orbital Theory (MOT), Theories of Bonding in Metals ree Electron, Valence Bond and Molecular Orbital Theories) for Conductors, Insulators and miconductors (Extrinsic and Intrinsic).

NIT –II: Metal-Ligand Bonding
ystal Field Theory, Bent Theory and Energetics of Hybridization. Limitations of Crystal Field heory and Molecular Orbital Theory, Octahedral, Tetrahedral and Square Planner Complexes, Bonding and Molecular Orbital Theory.

NIT –III: Reaction Mechanism of Transition Metal Complexes
eactivity of Metal Complexes, Inert and Labile Complexes, Acid Hydrolysis, Factor Affecting cid Hydrolysis, Base Hydrolysis, Substitution Reactions in Square Planner Complexes, Trans ffect, Redox Reactions, Electron Transfer Reactions, Mechanism of One Electron Transfer eaction, Outer Sphere Type Reactions, Cross Reactions and Marcus-Hush Theory, Inner Sphere ype Reactions.

NIT –IV:
(a) Cationic and anionic Components of Inorganic Drugs useful for Systemic Effect
(b) Complexing and Chelating Agents used in Therapy,
(c) Gases and Vapours : Oxygen Anesthetic and Respiratory Stimulants.
(d) Dental Product : Dentifrices, Anti-Caries Agents.

NIT –V: Bioinorganic Chemistry
etal Porphirin : Biochemistry of Iron Heme iron and Non Heme-Proteins, Haemoglobin and yoglobin. Nitrogen Fixation in Bacterial Nitrogenase Systems. Essential and Trace Element in iological Systems.

ooks Suggested

Advanced Inorganic Chemistry, F.A. Cotton and Wilkinson, John Wiley.
Inorganic Chemistry, J.E. Huhey, Harpes & Row
Chemistry of the Elements. N.N. Greenwood and A. Earnshow, Pergamon.
Inorganic Electronic Spectroscopy, A.B.P. Lever, Elsevier.
Comprehensive Coordiantion Chemistry eds., G. Wilkinson, R.D. Gillars and J.A. Mc Cleverty, Pergamon.
Pharmaceutical Chemistry Inorganic II Chatwal, G.R., Himalaya Pulishing House

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M.Sc. Pharmaceutical Chemistry: Semester – I

MPC-103 PRINCIPLES OF PHYSICAL PHARMACY

Max Marks:35 **Min Passing Marks:12**

UNIT –I: Thermodynamics

The First Law of Thermodynamics: Thermo Chemistry, Second Law of Thermodynamics. Third Law of Thermodynamics. Free energy functions and applications, Thermodynamics of phase equilibria, Thermal analysis (DSC) of Crystals and liquid crystals. Supra molecules. Inclusion compounds. Thermodynamic Treatment of stability constants.

UNIT –II: Kinetics:

Rates and Orders of Simple and Complex Reactions, Influence of Temperature and other factors on Reaction Rates, Theories of Rates, Effect of Solvent and Ion Strength, Acid Base Catalysis, Enzyme Catalysis, Decomposition and Stabilization of Medicinal Agents, Photodegradation, Kinetics in the Solid States, Solid Dosage Forms, Accelerated Stability Analysis.

UNIT –III: Diffusion and Dissolution:

Steady-State Diffusion, Procedures and Apparatus, Dissolution, Drug Release, Drugs in Polymer Matrices, Release from Granular Matrices, Multilayer Diffusion, Membrane Control and Diffusion Layer Control, Diffusion Principles in Biologic Systems, Thermodynamics of Diffusion, Fick's Second Law, Diffusion and Ecology.

UNIT –IV: Interfacial Phenomena:

Liquid Interfaces, Adsorption at Liquid Interfaces, Adsorption at Solid Interfaces, Applications of Surface Active Agents, Electric Properties of Interfaces.

Colloids:

Introduction, Types of Colloidal Systems, Optical Properties of Colloids, Kinetic Properties of Colloids, Electric Properties of Colloids, Solubilization, Addendum, Thermodynamics of Micellization.

UNIT –V: Micromeritiecs: Particle Size and Size Distribution, Methods for Determining Particle Size, Particle Shape and Surface Area, Methods for Determining Surface Area, Pore Size, Derived Properties of Powders

Books Suggested

1. Physical Chemistry, P.W. Atkins, ELBS Publication.
2. Chemical Kinetics. K.J. Laidler, McGraw-Hill.
3. Kinetics and Mechanism of Chemical Transformation J.Rajaraman and J. Kuriacose, Mc Millan
4. Micelles, Theoretical and Applied Aspects, V: MOraoi, Plenum Publ.
5. Essentials of Physical Pharmacy, Sunjiv Aggarwal, Anmol Publication
6. Chemical Kinetics, .V.B. Patania, Campus Books International
7. Physical Pharmacy , David Attwood, Alexender T. Florence, Pharmaceutical Press

M.Sc. Pharmaceutical Chemistry: Semester – I

MPC-104 PHARMACEUTICAL ANALYSIS

Max Marks:35 **Min Passing Marks:12**

UNIT –I: Infrared Spectroscopy

Review of Linear Harmonic Oscillator, Vibrational Energies of Diatomic Molecules, Zero Point Energy, Force Constant and Bond Strength, Anharmonicity, Morse Potential Energy Diagram, Vibration-Rotation Spectroscopy, P.Q.R Branches, Breakdown of Born Oppenheimer Approximation, Vibration of Polyatomic Molecules, Selection Rules, Normal Modes of Vibration, Group Frequencies, Overtones, Hot Band, Factor Affecting Band Positions, Applications of IR Spectroscopy in Pharmaceutical analysis, Interpretation of IR Spectra of Following Compounds :- Aspirin and Quinoline.

UNIT –II: Nuclear Magnetic Resonance Spectroscopy (NMR)

Nuclear Spin, Nuclear Resonance, Saturation, Shielding of Magnetic Nuclei, Chemical Shift and its Measurements, Factors Influencing Chemical Shift, Deshielding, Spin-Spin Interactions, Factors Influencing Coupling Constant "j" Classification (AXB, AMX, ABC, A2B2 etc.). Spin Decoupling; Basic Ideas about Instrument.

UNIT –III: Raman Spectroscopy

Classical and Quantum Theories of Raman Effect. Pure Rotational, Vibrational and Vibrational-Rotational Raman Spectra, Selection Rules, Mutual Exclusion Principle, Resonance Raman Spectroscopy, Coherent Anti Stokes Raman Spectroscopy (CARS).

UNIT –IV: Electron Spin Resonance Spectroscopy

Basic Principles, Zero Field Splitting and Kramer's Degeneracy, Factors Affecting the 'g' Value. Isotropic and Anisotropic Hyperfine Coupling Constants, Spin Hamiltonian, Spin Densities and Mc Connell Relationship, Measurement Techniques, Applications.

UNIT –V: Atomic Absorption Spectroscopy

Introduction, Theory, Instrumentation, Aspects of Atomic Absorption Spectroscopy, Applications of AAS in Pharmaceutical Analysis.

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 Puplication
5. Fundamentals of Molecular Spectroscopy, C. N. Banwell, Mc Graw Hill Puplication
6. Introduction to Molecular Spectroscopy, G.M. Barrow, Mc Graw Hill Puplication
7. Basic Principles of Spectroscopy, R. Chang, Mc Graw Hill Puplication
8. Molecular Structure and Spectroscopy, G. Aruldas, Phi Learning, Pvt. Ltd.
9. Spectroscopy, V. B. partania, S. Campus Books international Publication.
10. Instrumental Methods of Chemical Analysis, G.W. Ewing, McGraw Hill Book Company

M.Sc. Pharmaceutical Chemistry: Semester – I

MPC-105 (a) MATHEMATICS FOR PHARMACEUTICAL CHEMISTRY

Max Marks:35 **Min Passing Marks:12**

UNIT –I: Matrix Algebra

Addition and Multiplication, Inverse, Adjoint and Transpose of Matrices, Special Matrices (Symmetric, Skew symmetric Hermitian, Unit Diagonal Unitary etc.) and their properties, Matrix Equations :- Homogeneous, Non Homogeneous Linear Equations and Conditions for the Solution Linear Dependence and Independence, Introduction to Vactor Spaces, Matrix Eigen Values and Eigen Vactors, Diagonlization, Determination (Examples from Huckel's Theory)

UNIT –II: Differential Calculus

Functions, Continuity and Differentiability, Rules for Differentiation, Applications of Differential Calculus Including Maxima and Minima Exact and Inexact Differentials.

UNIT –III: Integral Calculus

Basic Rules for Integration, Integration by Parts, Partial Fraction and Substitution. Reduction Formulae, Applications for Integral Calculus.

Functions of Several Variables, Partial Differentiation, Coordinate Transformation (e.g. Cartesian to Spherical Polar) Curve Sketching.

UNIT –IV: Elementary Statistics

Organizing and Displaying Data Variables, Univariate Data Bivariate Data, Random Variables. Summarizing Data and Variation: The Mean, The Median, The Mode, The Mean Deviation, The Variance and Standard Deviation, Coefficient of Variation.

UNIT –V: Permutations and Combinations

Probability: Definitions, Rules of probability Distributions (Binomial and Normal Distributions). Regression and Correlation, Introduction, Simple Linear Regression Model Correlation Coefficient.

Book Suggested

1. The Chemistry Mathematics Book, E.Steiner, Oxford University Press.
2. Mathematics for chemistry, Doggett and Suiclific, LogmanPublication
3. Mathematical for Physical chemistry : F. Daniels, Mc. Graw HillPublication
4. Chemical Mathematics D.M. Hirst, Longman Publication
5. Applied Mathematics for Physical Chemistry, J.R. Barante, Prentice Hall Publication
6. Basic Mathematics for Chemists, Tebbutt, Wiley Publication

M.Sc. Pharmaceutical Chemistry: Semester – I

MPC-105 (b) BIOLOGY FOR PHARMACEUTICAL CHEMISTRY

Max Marks:35 **Min Passing Marks:12**

UNIT –I: Cell Structures and Functions

Structure of Prokaryotic and Eukaryotic Cell, Intercellular Organelles and their functions, comparison of plant and Animal Cells. Overview of Metabolic Processes- Catabolism and Anabolism. ATP-Biological Energy Currency. Origin of Life- Unique Properties of Carbon, Chemical Evoluation and Rise of Living System. Introduction to Biomolecules, Building Blocks of Bio-macromolecules.

UNIT –II: Carbohydrates

Structure and Functions of Important Derivatives of Monosaccarides Like Glycosides, Deoxysugars, Myoinositol, Aminosugars. N-Acetylmuramic Acid, Disaccharides and Polysaccharides, Structural Polysaccharides – Cellulose Chitin. Storage Polysaccharide, Starch and Glycogen. Structure and Biological Functions of Glucosaminoglycans or Mucopolysaccharides. Carbohydrates of Glycoproteins and Glycolipids. Roll of Suger in Biological Recognition.

UNIT –III: Lipids

Fatty Acids, Essential Fatty Acids, Structure and Function of Triacylglycerols. Glycerophospholipids, Sphingolipids, Cholesterol, Bile Acids, Prostaglandins. Lipoproteins-Composition and Function, Roll in Atherosclerosis.

Properties of Lipid aggregates-Micelles, Bilayers, Liposomes and their possible Biological Functions, Biological Membranes, Fluid Mosaic model of Membrane Structure, Lipid Metabolism- β-oxidation of Fatty acids.

UNIT –IV: Amino-Acids, Peptides and Proteins

Chemical and Enzymatic Hydrolysis of Proteins to Peptides, Amino Acid Sequencing. Secondary Structure of Proteins, Forces Responsible for Holding of Secondary Structure. α-Helix, β-Sheets, Super Secondary Structure, Triple Helix Structure of Collagen. Tertiary Structure of Protein-Folding and Domain Structure. Quaternary Structure. Amino Acid metabolism-Degradation and Biosynthesis of Amino Acids, Sequence Determination: Chemical/Enzymatic/Mass spectral, Recemization /Detection. Chemistry of Oxytocin and Tryptophan Realising Harmone (TRH).

UNIT –V: Nucleic Acids

Purine and Pyrimidine bases of Nucleic Acids, Base Pairing Via-H-Bonding. Structure of Ribonucleic acids (RNA) and Deoxyribonucleic Acids (DNA), Double Helix Model of DNA and Forces Responsible for Holding it. Chemical and Enzymatic Hydrolysis of Nucleic Acids. The Chemical Basis for Heredity, an Overview of replication of DNA, Transcription, Translation and Genetic Code. Chemical Synthesis of Mono and Trinucleoside.

Book Suggested

1. Principles of Biochemistry, A.L. Lehninger, Worth Publishers.
2. Biochemistry, L. Stryer, W.H. Freeman and Company, New York
3. Biochemistry, J. David Rawan, Neil Patterson publishers, USA
4. Biochemistry, Voet and Voet, John Wiley Publication
5. Outlines of Biochemistry E.E. Conn and P.K. Stumpf, John Wiley and Sons.
6. Chemistry of Natural Products, V.K. Ahluwalia, Ane Books Pvt. Ltd.

M.Sc. Pharmaceutical Chemistry

SEMESTER-I

LAB COURSE –I

Maximum Marks: 50 **Duration of Exam: 8 Hours**

(i)	Preparation	12
(ii)	Extraction	12
(iii)	Chromatography	12
(iv)	Dairy	6
(v)	Viva	8

LAB COURSE –II

Maximum Marks: 50 **Duration of Exam: 8 Hours**

(i)	Qualitative Analysis	12
(ii)	Identification of Drugs	12
(iii)	Volumetric Assay	12
(iv)	Dairy	6
(v)	Viva	8

LAB COURSE –I

Maximum Marks : 50 **Duration of Exam: 8 Hours**

(I) Preparation

(A) Organic Preparations 8

(a) To prepare Anthraquinone from Anthracene.
(b) To prepare p-Amino Phenol from Phenyl Hydroxylamine.
(c) To prepare 2,4-Di nitrophenyl hydrazine from 2,4-Di nitrochlorobenzene
(d) To prepare Phenyl Urea from Aniline
(e) To prepare Picric Acid From Phenol
(f) To prepare P-Bromo Acetanilide
(g) To prepare Dibenzalacetone from Benzaldehyde (Condensation reaction) i.e. Claisen-Schmidt Reaction.

(B) Pharmaceutical Preparations 4

(a) To prepare Aluminium Acetate Ear Drop
(b) To prepare Ammoniated Camphor Ointment.
(c) To prepare Electrolyte Maintenance IV Fluid (for Paediatric Use)
(d) To prepare Salicylic Acid Compound dusting Powder
(e) To prepare Compound Sodium Chloride and Dextrose oral Powder
(f) To prepare Strong Iodine Solution
(g) To prepare Zinc Sulphate Eye/Ear Drop
(h) To Prepare Effervescent Granules

(II) Extraction 12

(a) To isolate caffine from Tea Leaves.
(b) To Isolate Casein and Lactose from Milk
(c) To Isolate Glucose from cane sugar.
(d) To Isolate Cystine from Tea Leaves.

(III) Chromatography 12

(a) Separation ortho and para nitroaniline by TLC.
(b) Separation of Dyes by TLC.

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LAB COURSE –II

Maximum Marks : 50 **Duration of Exam: 8 Hours**

(I) Qualitative Analysis 12

Limit tests for Chloride, Sulphate, Lead, Arsenic and Heavy Metals.

(II) Identification of Drugs 12

Paracetamol, Ibuprofen, Metranidazole, Pyrazinamide, Aspirin, Chloroquine Phosphate, Ascorbic Acid

(III) Volumetric Assay 12

(a) Assay of Sodium bicarbonate
(b) Assay of Citric Acid
(c) Assay of Benzoic Acid
(d) Assay of Borax
(e) Assay of Zinc Sulphate

Books Suggested

1. Vogel's Textbook of Quantitative Analysis, revised, J. Bassett, R.C. Denney, G.H. Jeffery and J. Mendham, ELBS.
2. Experiments and Techniques in Organic Chemistry, D.P. Pasto, C. Johnson and M. Miller, Prentice Hall.
3. Practical Physical Chemistry, R.S. Gaud and G. D. Gupta, CBS Publication
4. Vogel's Textbook of Practical Organic Chemistry, A.R. Tatchell, John Wiley.
5. Practical Physical Chemistry, A.M. James and F.E. Prichard, Longman.
6. Findley's Practical Physical chemistry, B.P. Levitt, Longman.
7. Experimental Physical Chemistry, R.C. Das and B. Behera, Tata McGraw Hill.
8. Practical Pharmaceutical Chemistry - I ,Backett, A.H. , CBS Publisher, Delhi
9. Practical Pharmaceutical Chemistry - II , Backett, A.H. , CBS Publisher, Delhi

DEVI AHILYA VISHWAVIDYALAYA, INDORE
POST GRADUATE SEMESTER WISE SYLLABUS
Session 2011-2012 & Onwards
SCHEME OF MARKS
M.Sc. Pharmaceutical Chemistry
Semester – II

aper	Paper Title	Code	Max. Marks	Theory/Project /Practical Marks		CCE	
				Max.	Min.	Max.	Min.
I	Principles of Inorganic Pharmaceutical Chemistry - II	MPC-201	50	35	12	15	05
II	Principles of Organic Pharmaceutical Chemistry – II	MPC-202	50	35	12	15	05
III	Principles of Physical Pharmacy – II	MPC-203	50	35	12	15	05
IV	Pharmaceutical Analysis – II	MPC-204	50	35	12	15	05
V	Computer for Pharmaceutical Chemistry	MPC- 205	50	35	12	15	05
VI	Job Oriented Project Work		50	50	20	-	-
VII	Practical-1 (Laboratory Course-I)		50	50	20	-	-
	Practical -2 (Laboratory Course-II)	—	50	50	20	-	-
	Total		400				

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LAB COURSE –II

Maximum Marks : 50 **Duration of Exam: 8 Hours**

(I) Qualitative Analysis 12

Limit tests for Chloride, Sulphate, Lead, Arsenic and Heavy Metals.

(II) Identification of Drugs 12

Paracetamol, Ibuprofen, Metranidazole, Pyrazinamide, Aspirin, Chloroquine Phosphate, Ascorbic Acid

(III) Volumetric Assay 12

(a) Assay of Sodium bicarbonate
(b) Assay of Citric Acid
(c) Assay of Benzoic Acid
(d) Assay of Borax
(e) Assay of Zinc Sulphate

Books Suggested

1. Vogel's Textbook of Quantitative Analysis, revised, J. Bassett, R.C. Denney, G.H. Jeffery and J. Mendham, ELBS.
2. Experiments and Techniques in Organic Chemistry, D.P. Pasto, C. Johnson and M. Miller, Prentice Hall.
3. Practical Physical Chemistry, R.S. Gaud and G. D. Gupta, CBS Publication
4. Vogel's Textbook of Practical Organic Chemistry, A.R. Tatchell, John Wiley.
5. Practical Physical Chemistry, A.M. James and F.E. Prichard, Longman.
6. Findley's Practical Physical chemistry, B.P. Levitt, Longman.
7. Experimental Physical Chemistry, R.C. Das and B. Behera, Tata McGraw Hill.
8. Practical Pharmaceutical Chemistry - I ,Backett, A.H. , CBS Publisher, Delhi
9. Practical Pharmaceutical Chemistry - II , Backett, A.H. , CBS Publisher, Delhi

M.Sc. Pharmaceutical Chemistry: Semester – II

MPC-201: PRINCIPLES OF INORGANIC PHARMACEUTICAL CHEMISTRY

Max Marks: 35 **Min Passing Marks: 12**

UNIT –I: Impurities in Pharmaceutical Substances and their tests

a) Sources of Impurities in Pharmaceutical Chemicals
b) Effects of Impurities
c) Permissible Impurities in Pharmaceutical Substances
d) Methods Used to Purify Inorganic Substances
e) Tests of Purity
f) Limit Test of Chloride, Sulphate, Arsenic, Iron, Lead,

UNIT –II: Synthesis, Properties and Uses of Inorganic Compounds of Pharmaceutical Importance

a) **Topical Drugs :** Dusting Powders, Lubricants, Astringents
b) **Gastro-Intestinal Drugs:** Antacid, Digestants, Emetics, Adsorbents
c) **Respiratory Drugs:** Expectorants and Antitussives

UNIT –III: Radiopharmaceuticals

Basic Properties, Production, Quality Control, Stability, Clinical and Medicinal Applications of Radio Isotopes used in Pharmacy and Medicinal preparations of Diagnostic and Therapeutic Agents.

UNIT –IV: Calcium and Iron Compounds as Pharmaceutical Agents

Role of Calcium in Body, Deficiency Disorder of Calcium, Preparation, Properties and Uses of Calcium Acetate, Calcium Carbonate, Calcium Chloride, Calcium Gluconate, Calcium Hydroxide, Calcium Lactate. Importance of Iron in Human Body, Deficiency Disorder of Iron, Preparation, Properties and Uses of Ferric Ammonium Citrate, Ferrous Fumarate, Ferrous Gluconate, Ferrous Succinate, Ferrous Sulphate.

UNIT: V – Pharmaceutical Aids

a) Absorbents and Adsorbents, b) Antioxident and Preservatives, c) Excipients,
d) Suspending Agents, e) Filter Aids, f) Colourants, g) Tonicity Adjusting Agent,
h) Colouring, Flavouring and Sweetening agent, i) Ointment and Suppository Bases,
j) Diluents, Binders, Disintegrating Agents, and Lubricants.

Books Suggested

1. A Text Book of Inorganic Medicinal Chemistry , Surendra N Pandya, S.G. Publisher, Varanasi
2. Pharmaceutical Chemistry Inorganic II , G. R. Chatwal, Himalaya Publishing House
3. A Text Book of Inorganic Pharmaceutical Medicical Chemistry, Quardy & Quardy
4. Text Book of Pharmaceutical Chemistry, Bentley & Driver, Oxford University Press, New Delhi.

M.Sc. Pharmaceutical Chemistry: Semester – II

MPC-202: PRINCIPLES OF ORGANIC PHARMACEUTICAL CHEMISTRY

Max Marks: 35 **Min Passing Marks: 12**

UNIT –I:

a) **Classification of the Drugs on the Basis of :**
(i) Chemical Structure (ii) Therapeutic Action (at least one examples of each class)

b) **Drug Receptors:**
(i) Classification of Receptors (ii) Structure and Nature of Receptors
(iii) Receptor Theories (iv) Mechanism of Receptors

UNIT –II:

a) **Physico Chemical Properties in Relation to Biological Action :**
(i) Factor Affecting Drug Absorption, Distribution, Metabolism and Elimination
(ii) Study of properties Like Ionization, Partition Coefficients, Acid Base Properties, Hydrogen Bonding and Stereochemistry,

b) **Drug Metabolism :**
Metabolic Changes of Drugs in the body, Factor Affecting Metabolism, Pathway of Metabolism.

UNIT –III: Reagents in Organic Synthesis :
Preparation and Uses of Complex Metal Hydride – Lithium Aluminium Hydride, Gilmen's Reagents, Lithium diisopropylamide, Osmium Tetra Oxide, Dicyclohexylcarbodiisomide, 1-3, Dithiane, Phase Transfer Catalysis, Wilkinson's Catalyst, Raney Nickel, Lead Tetra Acetate Periodic Acid, Diazomethane, Ozone,

UNIT –IV: Heterocyclic Compounds:
Synthesis, Reactivity, Chemical Properties, Applications and Biological Significance of Following Heterocyclic Compounds :

a) Mono Hetero atoms systems : Indole, Quinoline, Isoquinoline,
b) Multi Hetero atoms systems : Diazole, Pyrazole, Imidazole, Oxazole,

UNIT –V: Addition to Carbon Hetero Multiple Bonds
Mechanism of Metal Hydride Reduction of Saturate and Unsaturated Carbonyl Compounds, Acid Ester and Nitriles. Addition of Grignard Reagents, Organozinc and Organolithium reagents to carbonyl and unsaturated carbonyl compounds. Mechanism of Condensation Reaction involving Enolates – Aldol, Knoevenagel, Claisen, Mannish, Benzoin, Perkin and Stobbe Reactions, Hydrolysis of Esters and amides, Ammonolysis of Esters.

Books Suggested

1. Advanced Organic Chemistry-Reactions, Mechanism and Structure, Jerry March, John Wiley.
2. Advanced Organic Chemistry, F.A. Carey and R.J. Sunderg, Plenum.
3. A Guide Book to Mechanism in Organic Chemistry, Peter Sykes, Longman.
4. Structure and Mechanism in Organic Chemistry, C.K. Ingold, Comell University Press.
5. Organic Chemistry, R.T. Morrison and R.N. Boyd, Prentice-Hall.
6. Modern Organic Reactions, H.O. House, Benjamin.
7. Principles of Organic Synthesis, R.O.C. Norman and J.M. Coxon, Blackie Academic &* Professionals.
8. Pericyclic Reactions, S.M. Mukherji, Macmillan, India
9. Medicinal Chemistry, Wilson & Gisvold.
10. An introduction to Medicinal Chemistry Patrick, Graham.
11. Text Book of Organic Medicinal & Pharmaceutical Chemistry, Wilson & Grisvold, Lippincott Williams & Wilkins.

M.Sc. Pharmaceutical Chemistry: Semester – II

MPC-203 : PRINCIPLES OF PHYSICAL PHARMACY

Max Marks:35 **Min Passing Marks:12**

UNIT –I: Rheology:
Introduction, Newtonian Systems, Non-Newtonian Systems, Thixotropy, Determination of Rheological Properties, Viscoelasticity, Psychorheology, Applications to Pharmacy.

UNIT –II: Coarse Dispersions:
Suspensions, Interfacial Properties of Suspended Particles, Formulation of Suspensions Emulsions, Theories of Emulsification, Physical Stability of Emulsions, Preservation of Emulsions, Rheologic Properties of Emulsions Microemulsions, Semisolids, Drug Kinetics in Coarse Disperse Systems, Drug Diffusion in Coarse Disperse Systems.

UNIT –III: Drug Product Design:

(A) **Prodrug and Drug Carriers:** Prodrug Liposomes, Monolithic and reservoir devices (microcapsules, Nano capsules and nanoparticles)

(B) **Routes of administration:** Ocular administration, Nasal administration, Buccal administration, pulmonary administration, Gastrointestinal administration, Rectal administration, Transdermal administration.

UNIT –IV: Polymer Science
Historical Background, Pharmaceutical Applications of Polymers, Definitions, Molecular Weight Determination from Solution Viscocity, Conformation of Dissolved Linear Macromolecules, Polymers as Thickening Agents, Polymer Solution-Overview, Solvent Selection, Preparing Polymer Solutions.

UNIT –V:
Thermodynamics of Polymer Solutions, Phase Separation, Gel Formation, Coacervation and Microencapsulation, Polymers in the solid state-Overview, Mechanical Properties, Interchain Cohesive Forces, Crystallinity, Tacticity, Morphology, Orientation, Thermodynamics of Fusion and Crystallization, Glass-Rubber Transition, Plasticization, Elastomers, Fabrication Technology, Future Trends in Pharmaceutical and Other Biomedical Uses of Polymers.

Books Suggested

1. Physical Chemistry, P.W. Atkins, ELBS Publication.
2. Physical Pharmacy: Physical Chemical Principles in the Pharmaceutical science Martin, Pilar Bustamante, A.H.C. Chun , Lippincott Williams & Wilkins
3. Micelles, Theoretical and Applied Aspects, V. Moraoi, Plenum Publication.
4. Introduction to Polymer Science, V.R. Gowarikar, N.V. Vishwanathan and J. Sridhar, Wiley Eastern.
5. Essentials of Physical Pharmacy, Sunjiv Aggarwal, Anmol Publication
6. Physical Pharmacy , David Attwood, Alexender T. Florence, Pharmaceutical Press

M.Sc. Pharmaceutical Chemistry : Semester – II

MPC-204 : PHARMACEUTICAL ANALYSIS

Max Marks:35 **Min Passing Marks:12**

UNIT –I: Chromatographic Method
Principles, Techniques and Applications of Thin Layer Chromatography, Column Chromatography, Gas-Liquid Chromatography in Pharmaceutical Analysis.

UNIT –II:
High Performance Liquid Chromatography (HPLC), Ion Exchange Chromatography, Size Exclusion or Gel Chromatography.

UNIT –III: Solvent Extraction
Principle of Liquid-Liquid Extraction and Solid-Liquid Extraction, Distribution Law, Factor Favouring Solvent Extraction, Sequences of the Extraction Process, Extraction Techniques – Batch Extraction, Stripping Extraction, Continuous Extraction and Soxhelt Extraction, Important Applications of Liquid-Liquid Extraction.

UNIT –IV: Titrimetry and Gravimetry
Determination of Dissolved Oxygen (DO), Biological Oxygen Demand (BOD), Chemical Oxygen Demand (COD), Arsenic, Cadmium, Lead, Mercury, Calcium and Magnesium by Titrimetric and Gravimetric Methods.

UNIT –V: Naphelometry and Turbidimetry
Theory of Naphelometry and Turbidimetry, Instrumentation - Single and Double Beam. Factors Affecting Measurements, Applications of Turbidimetry and Naphelometry.

Books Suggested

1. Pharmaceutical analysis Parimoo, CBS Publisher.
2. Pharmaceutical Analysis theory and practice Kamboj,P.C., Vallabh Publication.
3. A T.B. of Pharmaceutical Analysis I Rao, G. Devala, Birla Publication .
4. A T.B. of Pharmaceutical Analysis II Rao, G. Devala, Birla Publication
5. Pharmaceutical Analysis, Ashutosh Kar, CBS Publisher
6. Pharmaceutical Analysis Practical Sheorey, Sonal, Hanrao, Career Publications
7. Environmental Chemistry,A.K. De, wiley Eastern.
8. Instrumental Methods of Chemical Analysis, G.W. Ewing, McGraw Hill Book Company
9. Fundamental of Analytical Chemistry, Douglas A. Skoog, Donald M. West, F. James Holler , Ceneage Learning India Pvt Ltd.

M.Sc. Pharmaceutical Chemistry: Semester – II

MPC-205 : COMPUTER FOR PHARMACEUTICAL CHEMISTRY

Max Marks:35 **Min Passing Marks:12**

Unit-I: Introduction to computers and Computing

Basic structure and functioning of computer with a PC as illustrative example. Memory I/O devices. Secondary storage Computer languages. Operating systems with DOS as an example Introduction to UNIX and WINDOWS. Principles of programming Alogrithms and flow-charts.

Unit-II: Computer Programming in FORTRAN/C/BASIC

Elements of the computer language. Constants and variables. Operations and symbols Expressions. Arithmetic assignment statement. Input and output Format statement. Termination statements. Branching statements as IF or GO TO statement. LOGICAL variables. Double precession variables. Subscripted variables and DIMENSION. DO statement FUNCTION AND SUBROUTINE. COMMON and DATA statement.

Unit-III: Programming in Pharmaceutical Chemistry

Developing of small computer codes involving simple formula in pharmaceutical chemistry such as Van der Waals equation, Chemical kinetics (determination of Rate constants) Radioactive decay (Half Life and Average Life). Determination of Normality, Molarity and Molality of solutions.

Unit-IV: Use of Computer Programmes

Operation of PC. Data Processing, Running of standard Programs and Packages such as MS WORD, MS EXCEL -special emphasis on calculations and chart formations.MS-POWER POINT, X-Y plot. Simpson's Numerical Integration method. Programmes with data preferably from physical pharmacy laboratory.

Unit V: Internet

Application of Internet for Pharmaceutical Chemistry with search engines, various types of files like PDF, JPG, RTF and Bitmap. Scanning, OMR, Web camera.

Book Suggested:

1. Fundamentals of Computer : V. Rajaraman , Prentice Hall Publ.
2. Computers in Chemistry : K.V. Raman , Tata Mc Graw Hill Publ.
3. Computer Programming in FORTRAN IV-V Rajaraman , Prentice Hall Publ.
4. Computers in Pharmacy, Rakesh Gupta, Anmol Publ.
5. Coputer Fundamentals with pharmacy Applications, n.k. Tiwari,SB. Publication.

M.Sc. Pharmaceutical Chemistry

SEMESTER-II

LAB COURSE –I

Maximum Marks : 50 Duration of Exam : 8 Hrs.

(i)	Volumetric Assay	12
(ii)	Gravimetric Assay	12
(iii)	Chromatography	12
(iv)	Dairy	6
(v)	Viva	8

LAB COURSE –II

Maximum Marks : 50 Duration of Exam : 8 Hrs.

(i)	Quantitative Analysis	12
(ii)	Physical Pharmacy	12
(iii)	Physical parameters of Tablets	12
(iv)	Dairy	6
(v)	Viva	8

LAB COURSE –I

Maximum Marks : 50

(i) **Volumetric Assay** 12

(a) Assay of Ampicilline (b) Assay of Aspirin

(c) Assay of Aluminium Hydroxide (d) Assay of Magnesium Sulphate

(e) Assay of Lithium Carbonate.

(ii) **Gravimetric Assay** 12

(a) Assay of Sodium Sulphate (ppt. of $BaSO_4$)

(iii) **Chromatography** 12

(a) Separation of Paracetamol and Ibuprofen by TLC.

(b) Separation of Vitamins by TLC.

(c) Separation of α-amino acid by Paper Chromatography

LAB COURSE –II

Maximum Marks : 50

(I) **Quantitative Analysis** 12

(a) Potentiometric Analysis of Sulphanilamide by titration with $NaNO_2$
(b) Conductmetric Analysis of Chlorides in Drugs.
(c) Determination of COD (Chemical Oxygen Demand) of Water sample.
(d) Estimation of Phenols using bromate bromide solution/ or Acetylation Method.

(II) **Physical Pharmacy** 12

(a) Determination of Heat of Ionization of Acetic Acid.
(b) Investigate the auto Catalytic reaction between $KMnO_4$ and Oxalic Acid.
(c) Investigate the adsorption of oxalic acid by activated charcoal and test validity of Freundlich and Lanmuir, isotherms.
(d) To construct phase diagram for three component system (e.g Chloroform-Acetic Acid-Water).

(III) **Physical parameters of Tablets** 12

(a) Hardness (b) Friability
(c) Disintegration Test of Coated and Uncoated Tablets and Capsules.
(d) Dissolution Test of Coated and Uncoated Tablets and Capsules.

Books Suggested

1. Vogel's Textbook of Quantitative Analysis, revised, J. Bassett, R.C. Denney, G.H. Jeffery and J. Mendham, ELBS.
2. Vogel's Textbook of Practical Organic Chemistry, A.R. Tatchell, John Wiley.
3. Practical Physical Chemistry, A.M. James and F.E. Prichard, Longman.
4. Findley's Practical Physical chemistry, B.P. Levitt, Longman.
5. Experimental Physical Chemistry, R.C. Das and B. Behera, Tata McGraw Hill.
6. Text Book of Quantitative Chemical Analysis, Vogel, Pearson Education.
7. Practical Pharmaceutical Chemistry, Beckett & Stenlake Vol.-II, CBS Publishers & Distribution.

DEVI AHILYA VISHWAVIDYALAYA, INDORE

POST GRADUATE SEMESTER WISE SYLLABUS

Session 2012-2013 & Onwards

SCHEME OF MARKS

M.Sc. Pharmaceutical Chemistry

Semester – III

Paper	Paper Title	Code	Max. Marks	Theory/Internship /Practical Marks		CCE	
				Max.	Min.	Max.	Min.
I	Medicinal Chemistry	MPC-301	50	~~35~~ 85	~~12~~ 15	15	05
II	Chemistry of Natural Products	MPC-302	50	~~35~~ 85	~~12~~ 15	15	05
III	Toxicology	MPC-303	50	~~35~~ 85	~~12~~ 15	15	05
IV	Pharmaceutical Biotechnology	MPC-304	50	~~35~~ 85	~~12~~ 15	15	05
V	Pharmacognosy	MPC- 305	50	~~35~~ 85	~~12~~ 15	15	05
VI	Internship		50	50	20	-	-
VII	Practical-1 (Laboratory Course-I)		50	50	20	-	-
	Practical -2 (Laboratory Course-II)		50	50	20	-	-
	Total		400				

M.Sc. Pharmaceutical Chemistry : Semester –III

MPC – 301: MEDICINAL CHEMISTRY

Max Marks:35 **Min Passing Marks:12**

The synthesis and therapeutic application of compounds under each class of drugs mentioned below. Structure, mechanism of action, SAR, side effects and doses where known shall be discussed.

UNIT – I: Non Steroidal Anti-inflammatory drugs (NSAIDs)

Classification and SAR of Heterocyclic acid Analogues, Aryl Propionic acid Analogues, Salicylic acid Analogues.Synthesis, Mode of action, Therapeutic uses and Adverse effects of Indomethacin, Tolemetin Sodium, Ibuprofen, Naproxen, Asprin, Paracetamol, Phenyl butazone.

UNIT – II:

a) **Local Anesthetics:** Classification, structure, activity, relationship of Local Anesthetics, Mechanism & Theories of local anesthetics, Synthesis, MOA, Uses and Adverse effects of Benzocaine, Procaine, Lignocaine, Dibucaine, Diperidon.

b) **General Anesthetics** : Definition, classification, theories of General anesthetics, Synthesis, Uses, Adverse effects of Cyclopropane, Halothane, Nitrous oxide, Chloroform, Thiopental sodium, Tribromoethanol.

UNIT – III:

a) **Antihypertensive drugs** : Hypertension- Types and Causes, Classification of Antihypertensives. Synthesis, therapeutic uses adverse effects of Metraminol, Naphazoline, Hexamethonium bromide, Methyl Dopa, Rauwolfia.

b) **Diuretics** : Physiology of urine formation, Classification of Diuretics, SAR of Mercurials, Thiazides, Xanthines. Mechanism of action of Mercurials, Carbonic Anhydrase Inhibitors, Thiazides and Loop Diuretics. Synthesis, Mode of action, Therapeutic uses and adverse effect of Mersaly, Ethacrynic acid, Furosemide, Spiromolactone, Chlorthiazide, Acetazolamide.

UNIT – IV:

a) **Anti-Histaminics:** Introduction and Classification of Anti-Histamines, SAR of Amino Alkylethers and ethylenediamines, Mode of action of H_1 and H_2 Receptor Antagonists. Synthesis, therapeutic uses and adverse effect of Diphenydramine Hydrochloride, Tripelennamine HCl, Promethazine HCl, Chlorcuclizine HCl, Antazoline HCl.

b) **Antimalarials:** Etiology of Malaria, Classification of Anti-malarials, SAR of 4-aminoquinolines and 8-aminoquinolines. Synthesis, Mode of action, Therapeutic uses and adverse effects of Chloraquine Phasphate, Amodiaquinine Hydrochloride, Primaquinine Phasphate, Proguanil Hydrochloride, Trimethoprim.

c) **Anti Tubercular Agents:** Ethambutol, isonicotinic acid, rifgmpacin, streptomycin.

UNIT – V:

a) **Antimetabolities** : Synthesis, Uses and Side Effects of Sulfanilamide, Sulfapyridine, sulfadiazine, SAR of Sulphanilamide.

b) **Antineoplastic Agents** : Introduction, Roll of Alkylating Agents, Synthesis. Uses, Properties & Side Effect of Mustard Drugs, Mechloroethamic, Cyclophosphamide, Melphalon Uracil.

Books Suggested

1. Principles of Medicinal Chemistry Foye, W.O. Varghese Publication
2. Medicinal Chemistry Kar, Ashitosh.New Age Publication.
3. Burger's Medicinal Chemistry and Drug discovery , Jone-Wiley puplication.
4. Medcinal and Pharmaceutical Chemistry, Harikishan Singh,V. K. Kapoor, Vallabh Prakashan, Delhi.

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MPC-302: CHEMISTRY OF NATURAL PRODUCTS

Max Marks:35

Min Passing Marks:12

UNIT – I: Terpenoids and Carotenoids

Classifications, nomenclature, occurrence, isolation, general methods of structure determination, isoprene rule. Structure determination, stereochemistry, biosynthesis and synthesis of the following representative molecules : Citral, Geraniol α-Terpeneol, Menthol, Farnesol, Zingiberene, Santonin, Phytol, Abietic acid and β-Carotene.

UNIT –II: Alkaloids

Definition, nomenclature and physiological action, occurrence, isolation, general methods of structure elucidation, degradation, classification based on nitrogen heterocyclic ring, role of alkaloids in plants. Structure, stereochemistry, synthesis and biosynthesis of the following: Ephedrine, (+) - Coniine, Nicotine, Atropine, Quinine and Morphine.

UNIT –III: Steroids

Occurrence, nomenclature, basic skeleton, Diel's hydrocarbon and stereochemistry, Isolation, Structure determination and synthesis of Cholesterol, Bile acids, Androsterone, Testosterone, Estrone, Progesterone, Aldosterone, Biosynthesis of Steroids.

UNIT –IV: Plant Pigments

Occurrence, nomenclature and general methods of structure determination. Isolation and synthesis of Apigenin, Luteolin Quercetin, Myrcetin, Quercetin 3-glucoside, Vitexin, Diadzein, Anthocyanin, Cyanidin-7arabinoside, Cyanidin, Hirsutidin, Biosynthesis of flavonoids: Acetate pathway and Shikimic acid pathway.

Porphyrins: Structure and synthesis of Haemoglobin and Chlorophyll.

UNIT –V:

a) **Prostaglandin :** Occurrence, nomenclature, classification, biogenesis and physiological effects. Synthesis of PGE2 and PGF2a.

b) **Pyrethroids and Rotenones :** Synthesis and reactions of Pyrethroids and Rotenones. (For structure elucidation, emphasis is to be placed on the use of spectral parameters wherever possible).

Books Suggested

1. Chemistry of Natural Products, V. K. Alhluwalia, Ane Books Pvt. Ltd.
2. Chemistry of Natural Products, N.R. Krishnaswamy, Universities Press.
3. Organic chemistry of Organic Natural Products I & II Chatwal,G.R., Himalaya Publishing House

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M.Sc. Pharmaceutical Chemistry : Semester –III

MPC-303: TOXICOLOGY

Max Marks:35 **Min Passing Marks:12**

UNIT-I

Definition and Types of Toxicology, Basic Principles of Toxicology, Carcinogenicity, Mutagencity, Teratogenicity, Acute, Sub-acute and Chronic Toxicity, Pre Clinical Evaluation of Drugs.

UNIT –II: Drug Dependence

Definition, Drugs of Abuse, Classification of Drugs of Abuse, Drug Addiction, Physical Dependence, Psychological Dependence, Mechanism of Tolerance and Dependence.

UNIT –III: Poisoning

Classification of Poisons, Factors Modifying the action of Poison, Types of Poisoning, General Treatment and Management of Poisoning.

UNIT –IV: Detailed Treatment of Poisoning of the Following Substance

a) Metals such as – As, Hg, Pd, Zn, Cyanide, Heavy Metal
b) Opium, Morphine, L.S.D.
c) Alcohol, Barbiturates.
d) Salicylates and Paracetamol.
e) Digitalis, Nicotine and Cocaine.

UNIT –V:

a) Environmental Pollution: Types of Pollution, Methods of Control of Pollution.
b) Drugs and Pregnancy: Drug-Drug Interaction During Pregnancy, Teratogenic Drugs, Drugs Contraindicated in Pregnancy.
c) Drug Interaction: Definitions, Factors Predisposing to Drug Interactions, Classification and Mechanism of Drugs Interaction, Adverse Drugs Interactions.

Books Suggested

1. Pharmacology and Toxicology, Siddiquie, Anees Ahmad ; Krishna,N. Rama;Jain,S.K.Supernova Pubplishers and Dishtributors.
2. Biochemistry, Kuchel, Philip W.;Ralston,Gregory B., Mcgraw Hill Publ.
3. Essentials of Phrmacotherapeutics, F. S. K. Barar, S. Chand & Co. ,Delhi.
4. Pharmacology and Toxicology , V.N.Raje, CBS Publishers and Dishtributors.

M.Sc. Pharmaceutical Chemistry : Semester –III

Depth

MPC – 304: PHARMACEUTICAL BIOTECHNOLOGY

Max Marks:35 Min Passing Marks:12

UNIT -I: Basics of Immunology

Immunity, Cells and Tissues of Immue System, Antigens: Characteristics and Types, Antibodies: Structure and Types, Antigen-Antibody Reactions and its Applications, Hypersensitivity.

UNIT –II: Vaccinology

Vaccines - Conventional vaccines, Modern Vaccine technologies, Genetically improved live vaccines, Genetically improved subunit vaccines, Pharmaceutical considerations.

UNIT –III: Genetics

Structure & Function of DNA, DNA Replication & Repair, Expression of Genetic Information: Structure & Function of RNA, Transcription, Genetic code, Translation, Post translational modification.

UNIT –IV: Recombinant DNA Technology

Gene Cloning, Restriction enzymes, Vectors, Genomic libraries, Polymerase Chain reaction. Methodology for Production of Biopharmaceutical by Recombinant DNA Technology: Enzymes, Interferons, t-Plasminogen Activator. Monoclonal Antibodies and Hybridoma Technology.

UNIT –V: Gene Therapy

General Introduction, Potential target diseases for Gene therapy. Gene transfer methods, Molecular Principles of Drug Targeting, Drug Delivery System in Gene Therapy, Clinical studies.

Books Suggested

1. ~~Industrial Microbiology – A.H.Patel, Mac Millan, India Ltd.~~
2. Pharmaceutical Biotechnology,P.Vyas and V. K. Dixit , CBS Pulishere and distributors
3. Pharmaceutical Biotechnology , Manoj Kumar, Anmol Publishers
4. Pharmaceutical Biotechnology , M. Sharma and N. Tripathi, Campus International Publication.
5. ~~Industrial Microbiology – L.E.Casida, IR, New Age International (P) Ltd.~~

Textbook of Microbiology - Anant Narayanan - Orient Longman (Unit - I (Immuno))

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M.Sc. Pharmaceutical Chemistry : Semester –III

D. Siv

MPC – 305: PHARMACOGNOSY

Max Marks:35 Min Passing Marks:12

UNIT-I

Cultivation, Factors Affecting Cultivation, Collection, Harvesting, Drying.
Plant Growth Hormones.
Pest and Pest Control Methods.

UNIT -II:
Natural Sources of Drugs: Higher Plants, Microbes, Animals, Marine Organisms.
Classifications of Drugs from Natural Origin: Morphological, Taxonomical, Pharmacological (Therapeutical), Chemical Classification.

UNIT -III:
Phyto-constituents of Therapeutic Significance: General Methods of Extraction, Isolation, Identification and Characterization of Carbohydrates, Glycosides, Phenonlic Compounds, Steroids and Alkaloids.

UNIT -IV:
Isolation of the Following Phyto-Constituents (Including Industrial Methods): Morphine, Quinine, Glycosides, Methanol, Thymol, Digitalis and Diosgenin.

UNIT -V:
a) Herbs as Health Foods and as Cosmetics.
b) An Introduction to Tissue Culture and Its Scope in Production of Phyto-Pharmaceuticals.

Books Suggested

1. Pharmacognosy , C. K. Kokate, A.P. Purohit and S.B.Gokhale , Nirali Publication.
2. Text Book of Pharmacognosy, S.S.Handa & V. K. Kapoor, Nirali Publication.
3. Text Book of Pharmacognosy , Shah & Quadry, CBS Publishers and Distributors.
4. Pharmacognosy & Phyto Chemistry Part 1 Rangari, V.D., Career Publication.
5. Pharmacognosy & Phyto Chemistry Part 2 Rangari, V.D. Career Publication.
6. Pharmacognosy , V. N. Raje, CBS Publishers and Distributors.
7. Text Book of Pharmacognosy , G. K. singh and Anil Bhandari, CBS Publishers and Distributors.

G. Sharma

5/10/12

M.Sc. Pharmaceutical Chemistry
SEMESTER-III

LAB COURSE –I

Maximum Marks : 50 Duration of Exam 8 Hours

(i)	Titrimetric Method	12
(ii)	Spectrophotometric (UV Visible) Determination	12
(iii)	Chromatography and Ion Exchange Methods	12
(iv)	Dairy	6
(v)	Viva	8

LAB COURSE –II

Maximum Marks : 50 Duration of Exam 8 Hours

(i)	Optical Method of Analysis	12
(ii)	Flame Photometric Determination	12
(iii)	Extraction	12
(iv)	Dairy	6
(v)	Viva	8

LAB COURSE –I

Maximum Marks : 50 Duration of Exam : 8 Hrs

(i) **Titrimetric Method** 12

(a) Determination of Solubility of Benzoic Acid in Water at different temperature and hence its heat of solution.
(b) Estimation of Ascorbic Acid Tablets by Iodometric Methods
(c) Estimation of available Chlorine in Bleaching Powder by Iodometric Methods
(d) Estimation of available Oxygen in Hydrogen Peroxide by $KMnO_4$ Method.

(ii) **Spectrophotometric (UV Visible) Determination** 12

(a) Determination of the wavelength of the Maximum Absorbance and molar excitation coefficient of a given sample.
(b) Determination of Paracetamol and Ibuprofen in the given Tablets.
(c) Determination of Phosphate Concentration in a Soft Drink.
(d) UV Visible determination of Following groups of Compounds
(i) Amino Acids (ii) Proteins (iii) Carbohydrates (iv) Cholesterol (v) Ascorbic Acid
(vi) Aspirin (vii) Caffeine

(iii) (A) **Chromatography** 6

(i) Separation and Identification of Sugar Present in the given Mixture of Glucose, Fructose and Sucrose by Paper Chromatography and determination of *Rf* Values.
(ii) TLC – Separation of Nickel, Manganese, Cobalt and Zinc. Determination of *Rf* Values.
(iii) Separation of Zn and Mg. (iv) Separation of Cd and Zn.
(iv) Separation of Anthracene and Picric Acid from Anthracene Picrate by Column Chromatography.

(B) **Ion Exchange Method** 6

Separate and Estimate Mg (II) and Zn (III) by Ion Exchange Method.

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M.Sc. Pharmaceutical Chemistry: Semester –IV

MPC-401: ADVANCED MEDICINAL CHEMISTRY

Max Marks:35 *Min Passing Marks:12*

UNIT –I:

a) Theoretical basis of newer drug delivery systems; Prodrug, Dendrimer and Polymers as carrier.
b) 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)

Unti – IV:

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

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

Books Suggested

1. Medicinal Chemistry, V. K. Ahluwalia and M. Chopra, CRC Press.
2. Medicinal Chemistry Kar, Ashitosh., New Age Inetrnational Publ.
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 puplication.

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M.Sc. Pharmaceutical Chemistry : Semester –VI

MPC-402: DRUG DESIGN

Max Marks:35 **Min Passing Marks:12**

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.

M.Sc. Pharmaceutical Chemistry : Semester –VI

MPC-403: MODERN ANALYTICAL TECHNIQUES

Max Marks:35 **Min Passing Marks:12**

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 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 –VI

MPC – 404: BIOPHARMACEUTICS AND PHARMACOKINETICS

Max Marks:35 **Min Passing Marks:12**

UNIT –I: Biopharmaceutics

Definition, passage of drugs arcross 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 Partion 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.

M.Sc. Pharmaceutical Chemistry : Semester –VI

MPC-405: PHARMACOLOGY

Max Marks:35 Min Passing Marks:12

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) 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) Fibrinolutic and Anti-platelet Drugs
d) Bolld 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, Antipyrdics

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

LAB COURSE –I

Maximum Marks : 50 **Duration of Exam : 8 Hrs**

(i)	Instrumental Analysis	12
(ii)	Multi step Synthesis	12
(iii)	Pharmacological Experiments	12
(iv)	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	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 Ferrooxylate $Na_3 Fe(C_2O_4)_3 \cdot 9 H_2O$

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

(c) Preparation of para Nitroaniline from Aniline

(d) Preparation of Acridon from Anthranilic Acid

(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.