

M.Sc. I semester Pharmaceutical Chemistry syllabus  
Paper-PCHC-1.1- (L) - Inorganic Chemistry-I

**UNIT-I: PERIODIC PROPERTIES:**

**Review of Periodicity:** Atomic size, ionic radii, ionization potential, electron affinity and electronegativity. General characteristics of s,p,d and f block elements- comparative studies with reference to electronic configuration, various oxidation states, trends in physical and chemical properties and complexation tendencies

**Transition elements:** characteristic properties, correlation with electronic configuration, 3d, 4d and 5d series, trends in their chemistry.

**Lanthanides and actinides:** General properties, electronic configuration, stable oxidation state. Lanthanide contraction and its causes. Comparison of general properties of lanthanides with 3d and 4f block elements. General properties of actinides, actinide contraction comparison of actinides with lanthanides.

**16 Hours**

**UNIT-II: CHEMICAL BONDING -I:**

Introduction to chemical bonding, atomic orbitals molecular orbitals, types of bonds with examples.

**Ionic bonding:** introduction, structure of ionic solids, properties of ionic solids, ionic radii, factors affecting ionic radii, radius ratio rules. Types and structures of simple ionic compounds- NaCl, CsCl. Lattice energy. Born-Landé equation. Born-Haber cycle- its applications, size effects, polarizing power and polarizability of ions. Fajan's rule, covalent character in ionic compounds. Hydration energy and solubility of ionic solids.

**16 Hours**

**UNIT-III: CHEMICAL BONDING-II:**

**Covalent Bond:** Valence bond theory, orbital overlap, molecular orbital theory, symmetry and overlap, molecular orbital diagrams of diatomic molecules (Homo and Hetero nuclear), triatomic molecules, linear ( $\text{CO}_2$ ,  $\text{N}_2\text{O}$ ) and Angular ( $\text{NO}_2$ ), Walsh diagrams, bent rule, some reactions of covalently bonded molecules, resonance, hybridization, VSEPR theory, molecular geometries

**Metallic bonding:** Characterization of metallic states, Valence Bond approach, Band theory, conductors, insulators, semiconductors, defects in solids.

**16 Hours**

**UNIT-IV: ACIDS AND BASES:**

Introduction, different definition, solvent system and leveling effects. Generalized acid base concepts (Basicity of metal acids, hydration and hydrolysis). Relative strength of acids and bases, steric effect (back strain, front strain and internal strain). Solvation effect with reference to liquid ammonia, anhydrous sulfuric acid acetic acid and liq. Sulfur dioxide.

**Hard, soft acids and bases:** classification, strength of hardness and softness. Irving Williams series, theoretical basis of Hardness and softness.

**16 Hours**

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**PCHC1.1-(P)-Inorganic Chemistry-I**

A] Semi micro qualitative inorganic analysis of a mixture, containing two cations and two anions including one less common cation such as Mo, Ti, Zr, Ce, V and Li.

B] Determination of total hardness, temporary hardness and permanent hardness of water by EDTA titration.

**Books:**

- 1) Advanced Inorganic Chemistry- F.A.Cotton and Wilkinson, John Wiley.
- 2) Chemistry of elements – N.N.Greenwood and A.Earnshaw Pergaman.
- 3) Concise Inorganic Chemistry –J.D.Lee. E:BS.
- 4) Inorganic Chemistry, Principles and Reactivity –J.E.Huheey, Harper and Row.
- 5) Modern Aspects of Inorganic Chemistry –H.J.Emuleus and A.G. Sharpe. ELBS.
- 6) Theoretical Inorganic Chemistry –M.C.Day, Jr and J.Selbin, East west press.
- 7) Concepts and models in Inorganic Chemistry –Dougals, McDanial and Alexander John Wiley  
and sons.
- 8) Inorganic Quantitative Analysis –A.I.Vogel ELBS.
- 9) Fundamentals of Analytical Chemistry –D.A.Skoog, D.M.West and F.T.Holler, Saunder college publication.
- 10) Analytical Chemistry –S.Usharani Macmillan Indian Ltd.
- 11) Chemical Semimicro Analysis –V.N.Alexeyev. Mir Publishers (Moscow)
- 12) Vogel's Qualitative Inorganic Analysis, Revised by G.Suchla Longarman Groups Ltd.

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M.Sc. I semester Pharmaceutical Chemistry syllabus  
Paper-PCH-1.2- (L)-Organic Chemistry-I

**UNIT-I: BONDING IN ORGANIC MOLECULES:**

Valence bond approach, orbital overlaps, resonance and hybridization, bond length, bond angles and shapes of molecules. Molecular orbital theory- LCAO methods, sigma, pi and delta molecular orbitals. MO-treatment, Homo and Hetero diatomic molecules, MO treatment of delocalized pi bonding systems, polarity of covalent molecules, bond energies (bond dissociation),

**Hydrogen bonding-** definition types of hydrogen bonding with examples, significance of hydrogen bonding

**Localized chemical bonding:** hybridization index, bonding in cyclopropane, bond distances, bond angles, bond energies, calculation of heats of reactions and bond order.

**Delocalized chemical bonding:** conjugation, cross conjugation, steric inhibition of resonance, hyper conjugation, tautomerism, valence tautomerism. Bonding in fullerenes, bonding weaker than covalent: hydrogen bonding, inclusion compounds, complexes of crown ethers. catenanes rotaxanes

**16 Hours**

**UNIT-II: STEREOCHEMISTRY**

Optical isomerism, element of symmetry, chirality, optical isomerism of compounds containing one or more than one chiral centre. projection formulae- Fischer, Saw-horse, Newman and flying wedge projection and their interconversions. Threo and erythro isomers, enantiomers and epimers, epimerization, D-L and R-S conventions. E-Z nomenclature. Conformational analysis of ethane, propane, butane and cyclohexane (chair and boat) and mono substituted cyclohexane. **Stereoselective synthesis:** terminology, cramps rule (open chain, cyclic and chelate and dipolar models), prologs rule. Strategy of stereoselective synthesis. Acyclic stereoselection. Enantioselective synthesis, diastereoselection in cyclic compounds. Stereoselective formation of double bond, stereoselective cyclization of polyenes.

**16 HOURS**

**UNIT-III: AROMATICITY:**

Aromaticity. Difference between aromatic and non aromatic compounds. Huckel's rule-HMO theory, energy level diagrams, Mobious systems, benzenoid and nonbenzenoid aromatic compounds, tropones and tropolones, borazines, azulenes pyriliium cation ferrocene. Alternant and nonalternant hydrocarbons. Aromaticity of charged rings (3-8 membered) non aromatic antiaromatic and homoaromatic systems. Physical methods for the determination of aromaticity-X-ray, UV, and NMR methods. Ring current as criteria for aromaticity. Annulenes and heteroannulenes [10-18].

**16 Hours**

**UNIT-IV: REACTION MECHANISM:**

Homolysis and heterolysis of covalent bonds. Types of organic reagents. Reactive intermediates. Formation, structure stability and reactions of carbocations, carbanions, free radicals, nitrenes, carbenes and arene-intermediates. Types of reactions: substitution reactions- Nucleophilic (SN<sub>1</sub> and SN<sub>2</sub>), Electrophilic, addition reactions, elimination reactions (E<sub>1</sub> and E<sub>2</sub>). Thermodynamic and kinetic requirements of reactions, Methods of determination of reaction mechanism (kinetic and non kinetic methods). Identification of products, detection of intermediates, stereochemical evidences, study of catalysts, isotopic labeling,.

**16 Hours**

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### **PCHC-1.2-(P)-Organic chemistry-I**

#### **Preparations;**

- 1) Acetanilide from Aniline (Acylation)
- 2) P-bromoacetanilide from acetanilide (Halogenation/bromination)
- 3) p-bromoaniline from p-bromoacetanilide (Hydrolysis)
- 4) Aniline from Nitrobenzene (Reduction)
- 5) Aryloxy acetic acid from phenol (Substitution reaction)
- 6) Benzoic acid and Benzylalcohol from benzaldehyde (cannizaro reaction)
- 7) Methyl orange from aniline (diazotization)

#### **Estimations:**

- 1) Estimation of acid and amide.
- 2) Estimation of Acid and ester.
- 3) Determination of equivalent weight of base by base hydrochloride method.

#### **Books:**

- 1) Advanced organic chemistry –reactions, Mechanisms and structure – Jerry March.
- 2) Reaction Mechanism in Organic Chemistry – S. M. Mukherji and S. P. Singh.
- 3) Organic Chemistry Vol I & II –L. Finar.
- 4) Named Reactions in Organic Chemistry – Surrey.
- 5) Vogel's Text book of practical organic chemistry- B S Furness, A J Hannaford, PWG smith
- 6) Organic name reactions and rearrangement- S N sanyal
- 7) Organic name reactions- Gurdeep Raj
- 8) practical organic chemistry- Ahluvalia

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M.Sc. I semester Pharmaceutical Chemistry syllabus  
Paper PCHC-1.3-(L):- Physical Chemistry. -1

**UNIT-I-A: ELEMENTARY QUANTUM CHEMISTRY:**

Black body radiation, planks theory, photoelectric effects, Compton effect, De-Broglie's hypothesis, Heisenberg's uncertainty principle, postulates of quantum mechanics, operator concepts, Eigen values and Eigen functions. Schrodinger wave equation, elementary application to particle in one dimensional box, hydrogen atom, Rigid rotator and harmonic oscillator.

**10 HOURS**

**B: THERMODYNAMICS:**

Brief resume of concepts of law of thermodynamics, free energy, chemical potential and entropy, Gibbs Helmholtz equation and Maxwell's relation.

**6 HOURS**

**UNIT-II: CHEMICAL DYNAMICS:**

A brief review on basic concepts and terminology in reaction kinetics, methods of determining rate laws. Arrhenius equation, collision state theory for bimolecular reaction rates. Transition state theory, comparison between collision and transition state theories. Lindmann theory of unimolecular reaction rates, concept and significance of energy of activation. Dynamics in solutions, ionic reactions, effect of ionic strength, primary and secondary salt effects.

**16 HOURS**

**UNIT-III: ELECTROCHEMISTRY:** Activity and activity coefficient, Mean activity coefficient. Debye-Huckel limiting law (qualitative aspects only).assumptions, ionic strength, thickness of ionic atmosphere, concept of pH, pKa, pKw, buffer action and capacity. Buffer solution, Handerson-Hassalback equation and its application in preparation of buffer. Importance of buffers in biological systems. Pharmaceutical buffer solutions. Standard buffer solutions. Buffer system of the body.

**16 HOURS**

**UNIT-IV: DIFFRACTION STUDIES:**

X-ray diffraction: crystallographic systems, space lattice, reciprocal lattice, Bravis lattice, unit cell, Weiss indices, miller indices, braggs equation, single crystal rotation method, powder method, structure factor and determination of molecular parameter. Fourier series, Fourier refinement, phase problem.

Electron diffraction:- Introduction and scattering intensity Vs scattering angle, Wiel equation, radial distribution function and refinement of radial distribution function, rotation sector methods.

Neutron diffraction:- Introduction, scattering of neutrons by solids and liquids. Differences between neutron and X-ray diffraction.

**16 HOURS**

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### PCHC-1.3-(P)-Physical chemistry-I

1. Determining adsorption isotherm
2. Determination of rate constant and energy of activation of first order reaction
3. Determination of molecular weight of polymer by viscometer.
4. Determination of dissociation constant of monobasic acid potentiometrically
5. Determination of percentage composition of given acid mixture conductometrically.
6. Determination of amount of  $\text{CuSO}_4$  present in the given solution using spectrophotometer
7. Conductometric titration of a weak acid with weak base strong acid with weak base.

### Books:

1. Quantum Mechanics – Chatwal and Anand.
2. A Textbook of Quantum Mechanics – P.M.Mathews and K.Venkateshhan.
3. Problems in Quantum Mechanics –G.L.Squires.
4. Quantum Chemistry – P.W.Alkins.
5. Valence – C.A.Coulson.
6. Physical Chemistry - P.W.Alkins.
7. Electro chemistry - S.Glasstone.
8. Physical Chemistry – G.K.Vemulapalli.
9. Thermodynamics – R.P.Rastogi and S.S.Mishra.
10. Chemical Kinetics - Laidler.
11. Practical Physical Chemistry – Khosla and others.
12. Practical Physical Chemistry – Findaly.
13. Experiments In Physical Chemistry – Wilson, Newcomb and others.
14. A collection of general chemistry experiments - A.J.Elias.
15. Chemicals and Electrochemical cells – Narayan and Vishwanathan
16. Introduction to Quantum chemistry – A.K.Chandra

M.Sc. I semester Pharmaceutical Chemistry syllabus  
Paper PCSC-1.4-(L)-Analytical Chemistry - I

**UNIT-I: SOLVENT EXTRACTION:**

Solvent extraction: General discussion, principle, factors affecting solvent extraction, quantitative treatment of solvent extraction, synergistic extraction, ion association complex, extraction reagents: acetyl acetone, 8-hydroxy quinoline, Dimethyl glyoxime, 1-nitroso -2-naphthal, cupferron, dithazole, sodium diethyl dithiocarbamate, ammonium pyrrolidinedithiocarbamate, tri-n -butylphosphate, poly (macrocylic) compounds, acetyltrimethyl ammonium bromide. Some practical considerations: choice of the solvent, extraction, stripping, completion of the analysis, automation of solvent extraction. Some applications: Determination of iron as 8-hydroxy quinolate, determination of lead by dithiazone method, determination of molybdenum by-thiocyanate method

**16 HOURS**

**UNIT-II: ACID BASE TITRATION:**

Principles of titrimetric analysis, titration curves for strong acid strong base, weak acid-strong base and weak base strong acid titrations. Poly protic acids, poly equivalent bases, determining the equivalence point-theory of acid base indicators, colour change range of indicator, selection of proper indicator.

**Application of acid-base titrations:** Determination of nitrogen, sulphur, ammonium salts, nitrates, and nitrites, carbonates and bicarbonates, and organic functional groups like carboxylic acid, sulphonic acid, amine, ester, hydroxyl, carboxyl groups, air pollutants like SO<sub>2</sub>.

**16 HOURS**

**UNIT-III: ION EXCHANGE METHODS:**

Ion Exchange methods: introduction, Definitions, principle, cation exchangers, anion exchangers and their synthesis, regeneration, ion exchange columns used in chromatographic separation, selection, of suitable systems, ion exchange capacity, ion exchange technique: Bath method, column method. Application of ion exchangers: separation of similar ion from one another, removal of interfering radicals, softening of hard water, complete demineralization of water, separation of lanthanides, separation of actinides, purification of organic compounds extracted in water, separation sugars, separation amino acids, preparation of pure reagents, hydro metallurgy.

**16 HOURS**

**UNIT-IV: INSTRUMENTAL METHODS OF ANALYSIS:**

Conductometry : Theory- Measurement of Conductivity - Basis for Conductometric titrations - Conductometry as an analytical tool. **Potentiometry** : Principles - Reference electrodes - indicator electrodes, selective electrodes - measurement of cell emf - potentiometric titrations. **Voltammetry** : Polarography - Direct current Polarography - Theory - Dropping Mercury Electrode- Quantitative technique - Measurement of Wave Heights - Pulse Polarography - Rapid Scan Polarography - Stripping Voltammetry - Cyclic Voltammetry. **Amperometry** : Principles, amperometric titrations with examples.

Electrogravimetry: Theory, completeness and nature of the deposit, instrumentation, electrolytic separation of metals and applications..

**16 HOURS**

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M.Sc. IV semester Pharmaceutical Chemistry  
Paper PCHC-3.1-(L)- Dosage forms and drug regulations

**UNIT-I: DOSAGE FORMS:**

Different dosage forms. Oral solids, oral liquids, solution properties, suspensions, emulsions, parenterals, aerosols, inhalation products, topical semisolids, typical liquids and powders, ophthalmic products, rectal vaginal products, oral solids-tablets, types of solids, methods of tablet production-wet granulation, coating of tablets. Quality control methods and measurement of tablet properties. Oral liquids- introduction, types, oral suspensions and oral emulsions

16 HOURS

**UNIT-II: DRUG DELIVERY SYSTEMS:**

Fundamentals of drug delivery: rationale of sustain/ control released (CR), Physicochemical and biological factors influencing design and performance of control released products. Polymers in CR: classification, properties, biocompatible and biodegradable polymers. Modeling of drug release from porous polymer: drug released from non porous and hydrophobic polymer. Diffusional release and dissolution controlled release from monolithic devices, micro porous systems. Oral controlled drug delivery systems, mucosal drug delivery system, ocular drug delivery systems, parental drug delivery systems, transdermal drug delivery systems.

16 HOURS

**UNIT-III: CURRENT GOOD MANUFACTURING PRACTICE:**

Introduction, requirements of Good manufacturing practice and quality management, guidelines to manufacturing practice for medicinal products, premises and equipments, documentation and production and quality control.

Process development: introduction, solid dosage forms and granulation and safety, plan for process development equipment, validation, batch records. Regulatory aspects of process development: in process test, validation of equipment and definition of batch size, packing

16 HOURS

**UNIT-IV: STABILITY AND PREFORMULATION STUDIES OF MEDICINAL PRODUCTS:**

**Chemical stability:** Hydrolysis, dehydration, oxidation, isomerization, racemization, polymerization, photochemical reactions, factors affecting chemical stability.

**Physical stability:** volatility, change in the water content of solids, changes in the crystal properties, physical changes in emulsions and suspensions. Stability of medicines in pharmaceutical practice, ex- glyceroltrinitrate tablet.

**Preformulation studies:** factor affecting dissolution, diffusion-pH, pKa, pKw, particle size, solubility, etc. Methods to increase solubility of poorly soluble drugs, drug release mechanism. Factors affecting/necessitating preformulation of drug.

16 HOURS



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M.Sc. III semester Pharmaceutical Chemistry  
Paper PCHC-3.2-(L)- Natural products chemistry

**UNIT-I: ALKALOIDS**

**Alkaloids:** Introduction, occurrence, function of alkaloids in plants, nomenclature and pharmaceutical applications. Isolation and general methods of structural elucidation. Structure elucidation and synthesis of following alkaloids- Morphine, Ephedrine, Nicotine, Cocain, Papavarine, Reserpene, Phytochemical tests for alkaloids.

**16 HOURS**

**UNIT-II: VITAMINS AND ESSENTIAL OILS**

Introduction classification, properties biological significance of vitamins. Synthesis and biological importance (occurrence, chemical properties, deficiency and excess defects), of following vitamins: thiamine (B1), Ascorbic acid, Pantothenic acid (B5), vitamin A, Vit-B6, Tocopherols (E) and Biotin (B7).

**Essential Oils:** introduction, definition, chemical nature, classification general methods of extraction, chemical constituents and uses of clove oil, cinnamon oil, coriander oil, eucalyptus oil, sandal wood oil their methods of production and analysis.

**16 HOURS**

**UNIT-III: GLYCOSIDES AND TERPENOIDS**

**Glycosides:** introduction, definition, general characters and classification of glycosides. Study of general methods of isolation and uses of the following: cardiac glycosides, anthracene glycoside, saponin, synogenetic glycosides and flavone glycosides.

**Terpenoids:** general introduction, classification, isolation purification and structural elucidation of menthol, camphor, pinene, cariphilin, santonin and squalene. Biological importance of terpenoids.

**16 HOURS**

**UNIT-IV: STEROIDS AND PROSTAGLANDINS**

**Steroids;** introduction nomenclature, structure and synthesis of cholesterol, female and male sex hormones- structures, their significance development of antifertility agent. Biological importance of bile acids, estrone, progesterone, testosterone, androsterone and corticosterone. Biosynthesis of cholesterol.

**Prostaglandins:** introduction, occurrence, nomenclature, classification, synthesis and structure elucidation of PGE-I, Synthesis of PGE and F series. Biological significance of prostaglandins.

**16 HOURS**

### Paper PCHC-3.2-(P) Natural products chemistry practical

Isolation of the following constituents from the natural sources:

1. Caffeine from tea powder
2. Piperine from black pepper
3. Nicotine from Tobacco
4. Eugenol from Clove/clove oil
5. Curcumin from turmeric.

#### Books

1. organic chemistry-Vol-I and II, I.L. Finar, ELBS –Longman
2. Essentials of Physiological chemistry- Anderson, John wily and sons New York
3. Principles of Biochemistry, K. Albert, L Lehninger, D L Nelson, M M Cox, CBZ publishers, east edition, new Delhi
4. Harper's Biochemistry- Ed.R. Harper 22<sup>nd</sup> edition Printice hall New York
5. Encyclopedia of Chemical technology- Kirsh- Othmer series
6. Harpers review of biochemistry- P W Martin, P A Mayer. P W. Roddfwel, 5<sup>th</sup> edition
7. Introduction to alkaloids- G A Swan
8. The Alkaloids- K W Bentley
9. Medicinal chemistry- Ram rao Nadendia
10. Organic chemistry of natural products. Vol-I and II Gurdeep R chatwal

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M.Sc. III semester Pharmaceutical Chemistry  
Paper PCHC-3.3-(L)- Medicinal Chemistry-I

**UNIT-I: BASIC PRINCIPLES OF MEDICINAL CHEMISTRY AND DRUG DEVELOPMENT**

Basic consideration, historical evolution, fundamental aspects of drugs: forms, application, biological action, metabolism, drug interaction, adverse effects. Classification of drugs, nomenclature of drugs, drug combination. Selection of essential drugs. Physicochemical properties of drug molecules in relation to biological activity; solubility, partition coefficient, hydrogen bonding. Prodrugs and drug delivery system: utility of prodrugs, types of prodrugs, mechanism of drug activation- carrier linked prodrugs, carrier linkages for various functional groups, bioprecursor prodrug.

16 HOURS

**UNIT-II: SAR and QSAR**

History and development of QSAR. Designing of analogous drugs based on original lead. Bioisosteric replacements. Rigid analogs, ring size, alkyl chain branching, ring position, isomers etc. Alteration of stereochemistry and design of stereo and geometrical isomers, physical properties related to potency, calculation, measurements and meaning of partition coefficient. Hansch analysis and application, Craig's plot. Free Wilson analysis and application.

16 HOURS

**UNIT-III: SULPHONAMIDES, ANTI AMEBOIC AND ANTI-INFECTIVE AGENTS**

Sulfonamides: introduction, nomenclature, synergism of sulfonamides and folate reductase inhibitors, SAR studies and synthesis of Sulfisoxazole, sulfapyridine, sulfacetamide and sulfamethoxazole.

Antiamoebic agents: introduction, classification, mechanism of action and synthesis of metronidazole, iodoquinol and dimercaprol.

Local antiinfective agents: introduction, classification, mechanism of action, synthesis and SAR of nitrofurazone and furazolidones.

16HOURS

**UNIT-IV: ANTIMALARIALS AND ANTIBIOTICS**

Etiology of malaria. Mechanism of action and SAR of Quinoline antimalarials. Synthesis of chloroquin, primaquin and quinacrine.

Antineoplastic agents: introduction, classification and mechanism of action of mustard gases and antimetabolites

Antiepileptic: introduction, classification, mechanism of action, Synthesis and SAR of Phenyntain sodium, carbamazepine.

16HOURS

### **Paper PCHC-3.3-(P) Medicinal chemistry practical**

Assays: Aspirin, paracetamol, analgin, ibuprofen, calcium gluconate, pheniramine maleate and chloroquin.

Synthesis: Benzimidazole, Coumarine derivative and Banzocain.

#### **Books:**

1. Introduction to quantitative drug design. Y C martin
2. Comprehensive medicinal chemistry. Crowin and Hansch
3. Medicinal chemistry- Burger
4. Principles of drug design. Smith
5. Principles of medicinal chemistry- willium o Foye
6. Drug design volumes- arienes
7. Strategies of drug design- Brucell
8. The organic chemistry of Drug design and drug action- Richard. B. Silvermann.
9. Fundamentals of medicinal chemistry-Ghareth Thomas. John wiley and sons UK

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M.Sc. III semester Pharmaceutical Chemistry  
Paper PCOE-3.7:- Drugs and drug regulations

**UNIT-I: ANTIMALARIALS AND ANTIBIOTICS**

Etiology of malaria. Mechanism of action and SAR of Quinoline antimalarials. Synthesis of chloroquin, primaquin and quinacrine.

**Antineoplastic agents:** introduction, classification and mechanism of action of mustard gases and antimetabolites

**Anticonvulsant:** introduction, classification, mechanism of action, Synthesis and SAR of Phenyntoin sodium, carbamazepine.

16HOURS

**UNIT-II: DRUG DELIVERY SYSTEMS:**

Fundamentals of drug delivery: rationale of sustain/ control released (CR), Physicochemical and biological factors influencing design and performance of control released products. Polymers in CR: classification, properties, biocompatible and biodegradable polymers. Modeling of drug release from porous polymer: drug released from non porous and hydrophobic polymer. Diffusional release and dissolution controlled release from monolithic devices, micro porous systems. Oral controlled drug delivery systems, mucosal drug delivery system, ocular drug delivery systems, parentral drug delivery systems, transdermal drug delivery systems.

16 HOURS

**UNIT-III: CURRENT GOOD MANUFACTURING PRACTICE:**

Introduction, requirements of Good manufacturing practice and quality management, guidelines to manufacturing practice for medicinal products, premises and equipments, documentation and production and quality control.

Process development: introduction, solid dosage forms and granulation and safety, plan for process development equipment; validation, batch records. Regulatory aspects of process development: in process test, validation of equipment and definition of batch size, packing

16 HOURS

**UNIT-IV: STABILITY AND REFORMULATION STUDIES OF MEDICINAL PRODUCTS:**

Chemical stability: Hydrolysis, dehydration, oxidation, isomerization, racemization, polymerization, photochemical reactions, factors affecting chemical stability.

Physical stability: volatility, change in the water content of solids, changes in the crystal properties, physical changes in emulsions and suspensions, Stability of emulsions in pharmaceutical practice, ex- g) teroltrinitrate tablet.

Reformulation studies: factors affecting dissolution, diffusion-pH, etc. Methods to increase stability of poorly soluble drugs, mechanism, Factors affecting stability of formulations of drugs.

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M.Sc. IV semester Pharmaceutical Chemistry  
Paper PCHC-4.1-(L)- Basics of Pharmacology and Pharmaceutics

**UNIT-I: GENERAL PHARMACOLOGY:**

Introduction, definition/sources and active ingredients of drugs, routes of administration of drugs, absorption of drugs and factors affecting them. Drug distribution, biotransformation and excretion. Mechanism of drug action, drug receptor interaction. Molecular and biochemical basis of drug action. Additive effects, synergism, potentiation. Factors modifying effects, drug toxicity, drug response relationship, structure activity relationship, drug interaction basic concepts of drug interactions (both *in vitro* and *in vivo*), preclinical and clinical evaluations.

16 HOURS

**UNIT-II: PHARMACOKINETICS:**

Absorption, distribution, elimination, dissolution of drugs and factors affecting these properties, passage of drugs across biological membrane, construction of diffusion equation for complex systems. Pharmacokinetics of one component and two component models. Some applications of pharmacokinetics. Principles of multidrugs, dose adjustment and availability, drug interactions illustrate with examples.

16 HOURS

**UNIT-III: SCREENING METHODS:**

General principles of screening of drugs, general screening methods, clinical trial. Experimental animals used in pharmacological assays *in vitro* *in vivo* studies. Tissue experiments and whole animal experiments. Bioassay, scope, principles involved and general methods. Bioassay of Acetylcholine, insulin and atropine. Screening method for evaluation of analgesic, anti-inflammatory, antiulcer, anticonvulsant, hepatoprotective, antidiabetic and antifertility activities. Methodology for microbial assay of penicillin, myconazole. Enzyme inhibition of acetylcholinesterase activity in rat stratum, COX inhibition studies.

16 HOURS

**UNIT-IV: PHARMACEUTICAL TECHNOLOGY:**

Introduction of pharmaceutical industrial processing. Extraction-methods of extraction, continuous extraction. Distillation-Theory of distillation, methods of distillation, azeotropic and steam extractive distillation. Drying- classification and types of dryers, factors affecting drying, tray dryer, fluidized bed dryer, freeze dryer, spray dryer

16 HOURS