**Syllabus for Ph. D. Entrance Examination (Pharmaceutical Sciences)**

1. (a)Absorptiometric assay of Organic Compounds, Structural Analysis.

(b)Theory and instrumentation, of the following: IR, NMR and Mass Spectrometry, Optical Rotatory Dispersion, H.P.L.C, HPTLC, GC and hyphenated techniques (LC-MS), TGA, DTA, DSC and XRD.

1. Prodrug Design and Analog design:

Prodrug design: Basic concept, Carrier linked prodrugs/ Bioprecursors, Prodrugs of functional group, Prodrugs to improve patient acceptability, Drug solubility, Drug absorption and distribution, site specific drug delivery and sustained drug action. Rationale of prodrug design and practical consideration of prodrug design.

1. Combating drug resistance: Causes for drug resistance, strategies to combat drug resistance in antibiotics and anticancer therapy, Genetic principles of drug resistance.
2. Analog Design: Introduction, Classical & Non classical, Bioisosteric replacement strategies, rigid analogs, alteration of chain branching, changes in ring size, ring position isomers, design of stereo isomers and geometric isomers, fragments of a lead molecule, variation in inter atomic distance.
3. Structure Activity relationships, mechanism of action and synthesis for following class of drugs : Antimicrobial and Antiviral agents, Antimalarial, Anticancer, Analgesics and Antiinflammatory agents, Antidiabetics, Cardiovascular and Antifertility agents.
4. (a)Basics of stereochemistry including enantiomers, diastereomers, resolution, meso compounds, configuration and its specifications including sequence rule.

(b) Reaction Mechanism and principles of Oxidation, Reduction, Aliphatic and Aromatic nucleophillic and Electrophilic substitutions, Addition, Elimination and Rearrangement reactions.

1. Organization of screening for the pharmacological activity of Anti-Tubercular, Anti-Cancer, Anti-HIV, Anti-Viral drugs with emphasis on evaluation using in-vivo, in-vitro, ex-vivo, in-situ, in silico toxicity evaluation and other possible animal alternative models.
2. (a) Neurohumoral transmission in CNS and ANS.

(b) Autacoid Pharmacology.

1. (a)Fundamentals involved in Physical, Chemical and Biological evaluation of crude drugs.

(b) Monograph preparation of herbal drugs and standard tests involved thereof.

1. (a) Approaches for enhancement of production of secondary metabolites using techniques like tissue culture, r-DNA technology and biotransformation.

(b) Biological sources, method of preparation, active constituents, adulterants of antidiabetic, Anti-inflammatory, antiasthmatic , antibacterial and anticancer drugs.

1. (a) Preformulation (Physical, Chemical and Biopharmaceutical Characteristics of Medicinal Agent).

(b) Stability Testing and Dating.

(c) Diffusion and Dissolution.

1. Product Development Approaches for the Conventional Dosage Form (Tablet, Capsule, Sustained Release Formulation, Injectables, Ointment).
2. Fundamentals, Basic Concepts and Approaches involved in Newer Drug Delivery Systems, cosmetology and pharmaceutical biotechnology.
3. Biopharmaceutics: Biopharmaceutical Consideration in drug product Design (Factors influencing Dosage Form Design, Drug Dissolution & Bioavailability. Rate-limiting steps in Bioavailability). Bioavailability Assessment and Bioequivalence Studies.
4. Drug and Pharmacy Act, Schedules and penalties.