GU-PET SYLLABUS OF PHARMACY

Pharmaceutics:

Pre-formulation Studies: Timing and goals of preformulation, methodology, solid state properties, partition coefficient, solubility, dissolution of drug substance & dosage, crystal form and stability, compatibility tests.

Optimization techniques in pharmaceutics, formulation and processing: Optimization parameters, statistical design and other application.

Kinetic principles and stability testing: Order of reaction, influence of pH, temperature, Acid-base catalysis, effect of ionic strength on degradation, dosage forms, influence of packaging component on dosage form stability.

Fundamental, design and fabrication of controlled release drug delivery system: Fundamental and rationale of sustained/controlled drug delivery system, factor influencing the design and performance of sustained/controlled drug delivery system, drug targeting, use of polymer in of sustained release of active agents, pharmacokinetics/ pharmacodynamics basis of controlled drug delivery system, regulatory requirements.

Nanopharmaceuticals- Method of preparation, characterization and application of nanoemulsion, nanosuspension, Solid Lipid Nanoparticles (SLN) and self-nanoemulsifying drug delivery, phytosomes, liposomes, ethosomes, cubosomes, niosomes

Good manufacturing practices: GMP in manufacturing, packaging and holding of drugs, containers and closures, production and process control, packaging and labeling control, Premises: design, construction, maintenance, equipment, warehousing. ISO 9000 certification.

Pharmaceutical Chemistry:

Principle of drug design: Analogue synthesis versus rational design; discovery of lead compounds, Pharmacophoric identification, Prodrugs and soft drug. QSAR and introduction to molecular modelling

Organic reaction intermediates; Carbocations, carbanions, carbenes and nitrenes: structure, stability and reactivity.

Reactions and their application in the synthesis of some medicinal agents: Claisen- Schmidt reaction, Perkins reaction, Friedel Craft Reaction, Aldol condensation, Beckmann's rearrangement, Wagner-Meerwein rearrangement

Natural products as lead molecules:

a.**Alkaloids**: General introduction and classification, isolation and purification methods, general methods employed for determining the structure of alkaloids, constitution of Morphine, Reserpine and Quinine.

b.**Steroids:** General introduction, stereochemistry, nomenclature and structure elucidation of sterols (cholesterol), sapogenin (diosgenin) and cardiac glycosides (Digitoxin).

c.**Antibiotics**: Classification of antibiotics, structural details of penicillins and cephalosporins

d.**Flavonoids:** Detailed chemical account of rutin and quercetin.

e.**Triterpenoids:** A general chemical treatment and structural elucidation of terpenoids

General introduction, stereochemistry, nomenclature, SAR and pharmacology of Anti-hypertensive agents, antiarrhythmic agents, antihyperlipidemic agents, antianginal agents, Antipsychotic Agents, Antidepressant Drugs, Antianxiety Agents, Antiviral agents, Anti-neoplastic agents, Diuretics, NSAID's

Instrumental Methods of Analysis:

1. Potentiometry and conductometry: Principle, instrumentation and applications,

2. Polarimetry, fluorimetry and refractometry: Principle, instrumentation and applications with suitable examples

3. Theory and Applications of chromatographic techniques such as column, paper, TLC, HPTLC, GLC, and HPLC in the isolation and purification of pharmaceuticals

4. Theory and Applications of spectroscopic techniques like UV, IR, NMR, 1HNMR, 13CNMR and Mass spectroscopy for structural elucidation

Pharmacology:

Pharmacology of CNS and ANS acting drugs: Neurohumoral transmission, parasympathomimetics, parasympatholytics, sympathomimetics, sympatholytics, general anesthetics, sedatives, hypnotics and centrally acting muscle relaxants, anti-epileptics, antipsychotics, antidepressants, anti-anxiety agents, anti-manics and hallucinogens Drug Addiction and Drug Abuse.

Receptor Pharmacology and Mechanisms: Site and mechanisms of drug action, factors modifying drug action. classification and families of receptors, regulation of receptors, drug receptor interaction theories, dose response curve and therapeutic Index

Pharmacokinetics: Processes involved in transportation of drug across cell membrane. Absorption, distribution, metabolism and excretion of drugs. Basic concepts of clinical pharmacokinetics: i) Bioavailability & bioequivalence ii) volume of distribution iii) half-life iv) clearance.

Adverse drug reactions and drug Interactions: Types and mechanisms

Pharmacological / Biological Screening methods:

In-vitro methods: Antimicrobial, Antioxidants,

In-vivo methods: Basic principles, methods of bioassay and important bioassay of drugs, Pharmacological Screening Techniques for the evaluation of Analgesics and Anti-inflammatory agents, Antiulcer drugs, Antidiabetics, Hepatoprotective, Antiepileptics, Anti-Parkinsonism, CNS acting drugs, Antioxidants

Regulations for Laboratory animal care and ethical requirements including OECD guidelines.

Pharmacognosy:

Basic concepts: General methods and Principles of extraction methods, types of extraction and their merits and demerits for crude drugs; selection and purification of solvents for extraction; screening of the plant extracts for chemicals. general methods of isolation of different classes of phytochemical

Techniques: Techniques employed in elucidation of bio synthetic pathway. Study of basic metabolic pathways (Shikimic, Acetate mevalonate pathway, calvin cycle), biogenesis of tropane, quinoline, imidazole, isoquinoline and indole alkaloids; sterols, anthraquinone, saponin glycosides and flavonoids compounds of pharmaceutical significance.

Standardization of medicinal plants: Proximate analysis, Microtomy and advanced histological techniques as applied to pharmacognostical specimen, Adulteration and Evaluation of Crude Drugs, Quantitative microscopy as applied to drug evaluation, Lycopodium spore method, Botanical, physicochemical, pharmacological and toxicological evaluation of herbs/crude drugs

Cultivation methods ofSenna, Rauwolfia, Isapgol, Opium, Cardamom, Lemon Grass.

Standardization and quality procedures for the assay of plant products including.

Preparation of herbarium specifications

Plant Biotechnology: Plant Tissue Culture techniques and its application in relation to Phytopharmaceuticals, Callus culture, Suspension culture, Micropropogation, Immobilized cell techniques, Biotransformation studies including recent developments in production of biological active constituents, Hairy root cultures, Bioreactors for production of biologically active constituents and other applications of plant tissue culture techniques.

Herbal formulations: Types of herbal formulations preparation of standardized extracts suitable for incorporation into solid dosage form like tablets, capsules etc. Recent trends in poly-herbal medicines. Herbal cosmetics and herbal teas. Manufacture, packaging and approach to quality control of herbal formulations. GMP for herbal drug formulations.