# ERA UNIVERSITY

## DEPARTMENT OF PHARMACOLOGY

## M.Sc. MEDICAL PHARMACOLOGY Syllabus 2nd year

## Syllabus 2nd year – 3rd SEMESTER

## PAPER -I

### GENERAL PHARMACOLOGICAL PRINCIPLES AND APPLIED SCIENCES

1. Introduction: Definition nature & sources of drugs dosage forms, drug Nomenclature etc,
    a. Dosage forms - Oral, Parenteral, Topical & Others
    b. Routes of drug administration, setting up of an intravenous drip
2. Pharmacokinetics I
    a. Absorption: General Principles passage of drugs across biological membranes, factors affecting absorption, transport, bioavailability. Routes of administration: Advantages & disadvantages of important routes used.
    b. Distribution: Plasma protein binding, biological barriers (BBB& Placental), volume of distribution, tissue storage.
    c. Biotransformation: Principle phases (I & II), sites, types with examples. Factors affecting (Induction, Inhibition, First pass effect).
    d. Elimination: Routes, Kinetics Half-Life, Loading dose, Maintenance dose.
    e. Therapeutic Drug Monitoring
3. Pharmacodynamics & Factors modifying dose of a drug.
    a. Pharmacodynamics I : Principles of drug action, mechanism of drug action, Receptors, Agonist, partial agonist, inverse agonist etc. Transducer mechanism, Calculation of drug dosage, Use of drugs in pregnancy, lactation children and elderly. Use of drugs in liver disease and renal disease
    b. Pharmacodynamics II : Dose-response relationship, Drug efficacy & potency, Therapeutic index, LD 50 & ED 50, synergism, Drug antagonism.
    c. Factors modifying dose of a drug.
4. Adverse drug reactions.
    a. ADR monitoring
    b. Pharmacovigilance
5. Clinical Pharmacology & Toxicology
    a. Drug Interactions, Phases of drug development, Generic name, trade name. Fixed dose combinations. Rational Drug concept : P Drugs, Essential drugs, Evidence based Medicine.
    b. Drug development and Basics of Clinical Trials

c. Pharmacogenetics : Pharmacogenomics and Personalized Medicine
d. Wonder Discoveries in Pharmacology
e. Toxicology : General principles of treatment of poisoning including snake bite and animal stings. Heavy metal poisoning and heavy metal antagonists.

## PAPER -II

### SYSTEMIC PHARMACOLOGY

1. Autonomic nervous system
    a. Adrenergic drugs and its antagonists
    b. Cholinergic drugs and its antagonists
2. Drugs for Glaucoma
3. Autacoids
    a. Histamine, Serotonin
    b. Prostaglandins and NSAIDs
    c. Pharmacotherapy of migraine
    d. Pharmacotherapy of Gout and Rhematoid Arthritis
4. Complimentary Alternative Medicine.

### PRACTICAL 3rd SEMESTER

1. General Principles of Pharmacy
2. Preparation and dispensing of powders, emulsion ointments, mixtures, liniments, suppositories and syrups
3. Spotting exercise – Identify the commonly used items in Pharmacology
4. Exercise on drug interactions
5. Essential drug list
6. ADR Form filling and entry in vigiflow
7. Critical appraisal of drug promotional literature
8. Selection of P drug
9. Prescription writing, prescription auditing

# M.Sc. MEDICAL PHARMACOLOGY Syllabus 2nd year

## Syllabus 2nd year – 4th SEMESTER

## PAPER -I

### SYSTEMIC PHARMACOLOGY

1. Drugs affecting respiratory system
    a. Drugs for cough
    b. Drugs for Bronchial asthma
2. Hormones and related drugs
    a. Pituitary hormones
    b. Thyroid drugs
    c. Drugs for diabetes
    d. Corticosteroids
    e. Androgens
    f. Female sex hormones
    g. Drugs acting on uterus
    h. Drugs affecting calcium balance

### EXPERIMENTAL PHARMACOLOGY, BIOASSAY

1. Experimental methodologies involved in the discovery of drugs (in vivo, in vitro, ex vivo).
2. Common laboratory animals.
3. Standard drugs and salt solutions.
4. Animal handling and animal care.
5. Methods of anaesthetising animals and methods of euthanasia.
6. Restraining and blood collecting methods.

## PAPER -II

1. Drugs acting on Peripheral Nervous system (PNS)
    a. Skeletal muscle relaxants
    b. Local anesthetics
2. Central nervous system
    a. General anesthetics
    b. Alcohols
    c. Sedative hypnotics
    d. Drugs for epilepsy
    e. Drugs for parkinsonism

f. Antipsychotic and antimanic drugs
g. Antidepressants and antianxiety
h. Opoid analgesics
i. CNS stimulants
j. Drugs for Alzeihmers disease

**EXPERIMENTAL PHARMACOLOGY, BIOASSAY**

Drug screening methods involved in the evaluation of anti-ulcer, antidepressant, anti-anginal, antihypertensive, anti-arrhythmic, anti-diabetic, anti-cataract, anti-platelet, anticancer, anti-inflammatory, anti-diarrhoeal, antiepileptic, analgesic, anti-thyroid, antipyretic, anti-glaucoma, anti-hyperlipidemic anti-asthmatics drugs and cough suppressants.

**PRACTICAL 4th SEMESTER**

- Evaluation of analgesic activity of morphine using tail flick latency test and Eddy's hot plate method.
- Effect of anti-inflammatory agents on caraagennian induced rat paw edema.
- Effect of autonomic drugs on rabbit eye
- Effect of sedatives & skeletal muscle relaxants on rodents (rotarod test).
- Prescription writing for common diseases in the proper format.
- Audit a given prescription.
- ADR Form filling and entry in vigiflow
- Criticize & evaluate pharmaceutical company's literature.
- Interpret graphs & charts of Experimental and Clinical Pharmacology.

## M.Sc. MEDICAL PHARMACOLOGY Syllabus 3rd year

## Syllabus 3rd year – 5th SEMESTER

## PAPER -I

1. Cardiovascular system
    a. Drugs affecting RAS system
    b. Drugs for heart failure
    c. Drugs for angina
    d. Drugs for arrhythmias
    e. Drugs for hypertension
2. Drugs affecting kidney function
    a. Diuretics
    b. Antidiuretics

**EXPERIMENTAL PHARMACOLOGY, BIOASSAY**

1. Drug screening methods used in screening antifungal, anti-helminthic, antibacterial, antiviral agents, drugs for heart failure, posterior pituitary, adrenal steroid (gluco & mineralo corticoids), testicular, parathyroid, ovarian, thyroid hormones,
2. Toxicity studies and Methods involved in testing teratogenicity, carcinogenicity and organ toxicities in animals.
3. Alternatives to animal experimentation.

## PAPER -II

1. Drugs acting on blood and blood forming organs
    a. Hematinics
    b. Drugs affecting coagulation/Bleeding
    c. Hypolipidemic drugs
2. Drugs acting on GIT
    a. Drugs for peptic ulcer
    b. Antiemetics and Prokinetics
    c. Drugs for constipation and diarrhea

**Instrumentation In Drug Analysis.**

1. Qualitative testing. Beer and Lambert's law.
2. Basis and working principle of colorimeter, ultraviolet, atomic absorption spectrometers, Fluorescence spectroscopy, NMR and Mass Spectroscopy.

3. Basics of Chromatography. Partition, adsorption and ion exchange chromatography. Column chromatography, thin layer chromatography, paper chromatography, immune-absorbant chromatography, high performance thin layer Chromatography, high performance liquid chromatography (HPLC) and gas Chromatography.
4. Radio immunoassay.

**PRACTICAL 5th SEMESTER**

- Prescription writing for common diseases in the proper format.
- Audit a given prescription.
- ADR Form filling and entry in vigiflow
- Criticize & evaluate pharmaceutical company's literature.
- Effect of autonomic drugs on rabbit intestine on CAL
- Interpret graphs & charts of Experimental and Clinical Pharmacology.

**DISSERTATION M.Sc. (MEDICAL PHARMACOLOGY)- Protocol to be submitted**

## M.Sc. MEDICAL PHARMACOLOGY Syllabus 3rd year

## Syllabus 3rd year – 6th SEMESTER

## PAPER - I

1. Chemotherapy of microbial diseases
    a. General consideration
    b. Sulphonamides, cotrimoxazole, Quinolones
    c. Beta lactam
    d. Broad spectrum
    e. Aminoglycosies
    f. Newer antimicrobials
    g. Urinary antiseptics
    h. Anti-TB, Leprosy
    i. Antifungal
    j. Antiviral
    k. Antimalarial
    l. Antiamoebic, antiprotozoal
    m. Antihelminthic

**BIOSTATISTICS**

1. Calculation of basic statistical parameters (mean, median, mode, standard deviation, standard error etc.).
2. Null hypothesis, parametric and non parametric tests (Student 't test, Wilcoxon, ANOVA etc.)
3. Meta-analysis

**Drug Development Process:**

1. Methods involved in the development of new drugs.
2. Preclinical toxicological studies.
3. High throughput screening

## PAPER - II

1. Anticancer agents
2. Immunomodulators
3. Vitamins (water soluble and fat soluble vitamins).
4. Heavy metals and chelating agents
5. Ocular and dermato-pharmacology.
6. Recent developments in Pharmacology

7. Free radical biology and antioxidants

**Recent Advances in PHARMACOLOGY**

1. **Drug Regulations:** Drugs and Cosmetics Act
2. Application for Investigational New Drug (IND)
3. Application for New Drug Discovery (NDD) according to Indian Control Authority & USFDA guidelines.
4. Ethical considerations in utilizing human subjects for drug discovery process. Helsinki's declaration. ICH-GCP Guidelines.
5. GCP, GLP guidelines
6. SOPs

**PRACTICAL 6th SEMESTER M.Sc. (MEDICAL PHARMACOLOGY)**

- Prescription writing for common diseases in the proper format.
- Audit a given prescription.
- ADR Form filling and entry in vigiflow
- Criticize & evaluate pharmaceutical company's literature.
- Effect of autonomic drugs on rabbit intestine on CAL
- Effect of Histamine on Guinea pig ileum.
- Interpret graphs & charts of Experimental and Clinical Pharmacology.

**DISSERTATION M.Sc. (MEDICAL PHARMACOLOGY)-to be submitted**

**BOOKS**

Fundamentals of experimental pharmacology. (1984) Ed.Ghosh MN. Scientific book agency, Calcutta.

Essentials of Medical Pharmacology by KD Tripathi- 9th edition

Principles of Pharmacology by HL Sharma, KK Sharma- 3rd edition

Drug screening methods- SK Gupta/Vogel

**Journals to be referred:**

1. Indian Journal of Pharmacology.
2. Indian Journal of Physiology and Pharmacology.
3. Pharmacology and Experimental Therapeutics.
4. Journal of Ethnopharmacology.
5. Nature.
6. Science.
7. European Journal of Clinical Pharmacology.
8. BJCP