DOCTOR OF PHARMACY

4TH YEAR

SYLLABUS

RESEARCH DOCTOR PHARMA

4.1 PHARMACOTHERAPEUTICS – III (THEORY)

Topic

1. **Gastrointestinal system:**
    - Peptic ulcer disease
    - Gastro Esophageal Reflux Disease
    - Inflammatory bowel disease
    - Liver disorders –
        - Alcoholic liver disease
        - Viral hepatitis
        - jaundice
        - Drug induced liver disorders
2. **Haematological system:**
    - Anaemias
    - Venous thromboembolism
    - Drug induced blood disorders
3. **Nervous system:**
    - Epilepsy
    - Parkinsonism
    - Stroke
    - Alzheimer's disease
4. **Psychiatry disorders:**
    - Schizophrenia
    - Affective disorders
    - Anxiety disorders
    - Sleep disorders
    - Obsessive Compulsive disorders
5. **Pain management**
    - Pain pathways
    - neuralgias
    - headaches
6. **Evidence Based Medicine**

4.1 PHARMACOTHERAPEUTICS – III (PRACTICAL)

Hospital postings for a period of at least 50 hours is required to understand the principles and practice involved in ward round participation and clinical discussion on selection of drug therapy. Students are required to maintain a record of 15 cases observed in the ward and the same should be submitted at the end of the course for evaluation. Each student should present at least two medical cases they have observed and followed in the wards.

4.2 HOSPITAL PHARMACY (THEORY)

Topics

1. **Hospital** - its Organization and functions
2. **Hospital pharmacy**-Organization and management
   a) Organizational structure-Staff, Infrastructure & work load statistics
   b) Management of materials and finance
   c) Roles & responsibilities of hospital pharmacist
3. **The Budget** – Preparation and implementation
4. **Hospital drug policy**
   a) Pharmacy and Therapeutic committee (PTC)
   b) Hospital formulary
   c) Hospital committees - Infection committee - Research and ethical committee
   d) developing therapeutic guidelines
   e) Hospital pharmacy communication – Newsletter
5. **Hospital pharmacy services**
   a) Procurement & warehousing of drugs and Pharmaceuticals
   b) Inventory control Definition, various methods of Inventory Control ABC, VED, EOQ, Lead time, safety stock
   c) Drug distribution in the hospital
      i) Individual prescription method
      ii) Floor stock method
      iii) Unit dose drug distribution method
   d) Distribution of Narcotic and other controlled substances
   e) Central sterile supply services – Role of pharmacist
6. **Manufacture of Pharmaceutical preparations**
   a) Sterile formulations – large and small volume parenterals
   b) Manufacture of Ointments, Liquids, and creams
   c) Manufacturing of Tablets, granules, capsules, and powders
   d) Total parenteral nutrition

7. **Continuing professional development programs Education and training**
8. **Radio Pharmaceuticals** – Handling and packaging
9. **Professional Relations and practices of hospital pharmacist**

4.2 HOSPITAL PHARMACY (PRACTICAL)

LIST OF THE EXPERIMENT

1. Assessment of drug interactions in the given prescriptions
2. Manufacture of parenteral formulations, powders.
3. Drug information queries.
4. Inventory control

4.3 CLINICAL PHARMACY (THEORY)

Topic

I. Definitions, development and scope of clinical pharmacy

II. **Introduction to daily activities of a clinical pharmacist**

a. Drug therapy monitoring (medication chart review, clinical review, pharmacist interventions)

b. Ward round participation

c. Adverse drug reaction management

d. Drug information and poisons information

e. Medication history

f. Patient counseling

g. Drug utilisation evaluation (DUE) and review (DUR)

h. Quality assurance of clinical pharmacy services

III. **Patient data analysis** The patient's case history, its structure and use in evaluation of drug therapy & Understanding common medical abbreviations and terminologies used in clinical practices.

IV. **Clinical laboratory tests used in the evaluation of disease states, and interpretation of test results**

a. Haematological, Liver function, Renal function, thyroid function tests

b. Tests associated with cardiac disorders

c. Fluid and electrolyte balance

d. Microbiological culture sensitivity tests

e. Pulmonary Function Tests

V. **Drug & Poison information**

a. Introduction to drug information resources available

b. Systematic approach in answering DI queries

c. Critical evaluation of drug information and literature

d. Preparation of written and verbal reports

e. Establishing a Drug Information Centre

f. Poisons information- organization & information resources

VI. **Pharmacovigilance**

a. Scope, definition and aims of Pharmacovigilance

b. Adverse drug reactions - Classification, mechanism, predisposing factors, causality assessment [different scales used]

c. Reporting, evaluation, monitoring, preventing & management of ADRs

d. Role of pharmacist in management of ADR.

VII. **Communication skills**, including patient counselling techniques, medication history interview, presentation of cases.

VIII. Pharmaceutical care concepts

IX. Critical evaluation of biomedical literature

X. Medication errors

4.3 CLINICAL PHARMACY (PRACTICAL)

TOPICS –

Students are expected to perform 15 practicals in the following areas covering the topics dealt in theory class.

a. Answering drug information questions (4 Nos)

b. Patient medication counselling (4 Nos)

c. Case studies related to laboratory investigations (4 Nos)

d. Patient medication history interview (3 Nos)

4.4 BIOSTATISTICS AND RESEARCH METHODOLOGY (THEORY)

TOPICS –

1. **Research Methodology**

   a) Types of clinical study designs: Case studies, observational studies, interventional studies,

   b) Designing the methodology

   c) Sample size determination and Power of a study Determination of sample size for simple comparative experiments, determination of sample size to obtain a confidence interval of specified width, power of a study

   d) Report writing and presentation of data

2. **Biostatistics**

   2.1 a) Introduction

   b) Types of data distribution

   c) Measures describing the central tendency distributions-average, median, mode

   d) Measurement of the spread of data-range, variation of mean, standard deviation, variance, coefficient of variation, standard error of mean.

   2.2 Data graphics Construction and labeling of graphs, histogram, piecharts, scatter plots, semilogarthimic plots

   2.3 **Basics of testing hypothesis**

   a) **Null hypothesis,** level of significance, power of test, P value, statistical estimation of confidence intervals.

   b) **Level of significance** (Parametric data)- students t test (paired and unpaired), chi Square test, Analysis of Variance (one-way and two-way)

   c) **Level of significance** (Non-parametric data)- Sign test, Wilcoxan's signed rank test, Wilcoxan rank sum test, Mann Whitney U test, Kruskal-Wall is test (one way ANOVA)

d) **Linear regression and correlation-** Introduction, Pearsonn's and Spearmann's correlation and correlation co-efficient.

e) **Introduction to statistical software**: SPSS, Epi Info, SAS.

2.4 Statistical methods in epidemiology Incidence and prevalence, relative risk, attributable risk

3. **Computer applications in pharmacy**

Computer System in Hospital Pharmacy : Patterns of Computer use in Hospital Pharmacy – Patient record database management, Medication order entry – Drug labels and list – Intravenous solution and admixture, patient medication profiles, Inventory control, Management report & Statistics.

Computer In Community Pharmacy Computerizing the Prescription Dispensing process Use of Computers for Pharmaceutical Care in community pharmacy Accounting and General ledger system

Drug Information Retrieval & Storage : Introduction – Advantages of Computerized Literature Retrieval Use of Computerized Retrieval.

4.5 BIOPHARMACEUTICS AND PHARMACOKINETICS (THEORY)

TOPICS –

I. **Biopharmaceutics**

1. **Introduction to Biopharmaceutics**
   a. Absorption of drugs from gastrointestinal tract.
   b. Drug Distribution.
   c. Drug Elimination.

II. **Pharmacokinetics**

2. **Introduction to Pharmacokinetics.**
   a. Mathematical model
   b. Drug levels in blood.
   c. Pharmacokinetic model
   d. Compartment models
   e. Pharmacokinetic study.
3. **One compartment open model.**
   a. Intravenous Injection (Bolus)
   b. Intravenous infusion.
4. **Multicompartment models.**
   a. Two compartment open model.
   b. IV bolus, IV infusion and oral administration
5. **Multiple – Dosage Regimens.**
   a. Repititive Intravenous injections – One Compartment Open Model
   b. Repititive Extravascular dosing – One Compartment Open model
   c. Multiple Dose Regimen – Two Compartment Open Model
6. **Nonlinear Pharmacokinetics**.
   a. Introduction
   b. Factors causing Non-linearity.

c. Michaelis-menton method of estimating parameters.

7. **Noncompartmental Pharmacokinetics.**
    a. Statistical Moment Theory.
    b. MRT for various compartment models.
    c. Physiological Pharmacokinetic model.
8. **Bioavailability and Bioequivalence.**
    a. Introduction.
    b. Bioavailability study protocol.
    c. Methods of Assessment of Bioavailability

4.5 BIOPHARMACEUTICS AND PHARMACOKINETICS (PRACTICAL)

LIST OF THE EXPERIMENT –

I. Improvement of dissolution characteristics of slightly soluble drugs by some methods.
II. Comparison of dissolution studies of two different marketed products of same drug.
III. Influence of polymorphism on solubility and dissolution.
IV. Protein binding studies of a highly protein bound drug and poorly protein bound drug.
V. Extent of plasma-protein binding studies on the same drug (i.e. highly and poorly protein bound drug) at different concentrations in respect of constant time.
VI. Bioavailability studies of some commonly used drugs on animal/human model.
VII. Calculation of Ka, Ke, t1/2, Cmax, AUC, AUMC, MRT etc. from blood profile data.
VIII. Calculation of bioavailability from urinary excretion data for two drugs.
IX. Calculation of AUC and bioequivalence from the given data for two drugs.
X. In vitro absorption studies.
XI. Bioequivalency studies on the different drugs marketed.(eg) Tetracycline, Sulphamethoxzole, Trimethoprim, Aspirin etc., on animals and human volunteers.
XII. Absorption studies in animal inverted intestine using various drugs.
XIII. Effect on contact time on the plasma protein binding of drugs.
XIV. Studying metabolic pathways for different drugs based on elimination kinetics data.
XV. Calculation of elimination half-life for different drugs by using urinary elimination data and blood level data.

XVI. Determination of renal clearance.

4.6 CLINICAL TOXICOLOGY (THEORY)

TOPICS –

I. General principles involved in the management of poisoning
II. Antidotes and the clinical applications.
III. Supportive care in clinical Toxicology.
IV. Gut Decontamination.
V. Elimination Enhancement.
VI. Toxicokinetics.
VII. **Clinical symptoms and management of acute poisoning with the following agents** –

a) Pesticide poisoning: organophosphorous compounds, carbamates, organochlorines, pyrethroids.
b) Opiates overdose.
c) Antidepressants
d) Barbiturates and benzodiazepines.
e) Alcohol: ethanol, methanol.
f) Paracetamol and salicylates.
g) Non-steroidal anti-inflammatory drugs.
h) Hydrocarbons: Petroleum products and PEG.
i) Caustics: inorganic acids and alkali.
j) Radiation poisoning

VIII. Clinical symptoms and management of chronic poisoning with the following agents – Heavy metals: Arsenic, lead, mercury, iron, copper
IX. Venomous snake bites: Families of venomous snakes, clinical effects of venoms, general management as first aid, early manifestations, complications and snake bite injuries.
X. Plants poisoning. Mushrooms, Mycotoxins.
XI. Food poisonings
XII. Envenomations – Arthropod bites and stings.

XIII. Substance abuse: Signs and symptoms of substance abuse and treatment of dependence a) CNS stimulants :amphetamine b) Opioids c) CNS depressants d) Hallucinogens: LSD e) Cannabis group f) Tobacco