Pharmacology & Therapeutics

Total marks – 300

Formative assessment marks=10

- Written = 90
  [MCQ=20 (Multiple True False-10 + SBA-10),
  SAQ+SEQ = 70
  Making a total of 100 marks
- Structured Oral Examination (SOE) = 100
- Practical: 100 OSPE =40 (08 procedure stations, each having 05 marks]
  Traditional =60 (Prescription writing 10, Drug interaction 05 x 02 =10,
  Tracing and plotting = 10, Integrated teaching and Case report = (5+15) = 20,
  Practical notebook =10)

Term I

Core Contents
A. GENERAL PRINCIPLES OF PHARMACOLOGY **Lectures:** **01: Introduction to Pharmacology** **02: Drug Compendia (Information sources)** Pharmacopoeia, Formulary, Treatment guidelines (BP, INN, BNF and BDNF) **03. Drug Administration** Routes, drug delivery and formulations for local & systemic effects **04: Drug Absorption** Transfer of drugs across cell membrane & specialized barriers, Factors influencing absorption **05: Bio-availability** Studies to compare bio-equivalence & to monitor therapy **06: Drug Distribution** Vd, Plasma protein & tissue binding, redistribution **07: Drug Metabolism** Where, why and how of bio- transformation, hepatic microsomal enzymes- induction & inhibition Genetic influence on Drug metabolism (Pharmacogenetics) **08: Drug Elimination** Routes, Renal Excretion & factors influencing renal excretion **09: Clinical Pharmacokinetics** Vd, Cl, First & Zero order kinetics of Elimination, t½, Steady state concentration, loading dose & maintenance dose

10: Pharmaco-Dynamics:
Specific and non-specific mechanisms Receptors involved Second messenger system Enzyme mediated drug action

11: Quantitative aspects of drug action Dose-response relationships & curves Therapeutic Index and window-importance Information obtained from D-R curves Agonists – efficacy, potency, shift of curves Antagonists - efficacy, potency, shift of curves

12: Individual variations in drug responses

13. Drug Interaction at different levels

14: Drug safety and Pharmacovigilance
Adverse drug reactions: Types, detecting & managing ADR ADR monitoring & reporting

Core Contents

A. **AUTONOMIC PHARMACOLOGY**

Lectures

01: Introduction
Organization of ANS – sympathetic, parasympathetic, and enteric NS. Transmitters in ANS (ACh, NA, NANCs) Co-transmission, pre and postsynaptic modulation Cholinergic neurotransmission & drugs modifying the events, Cholinergic receptors

02: Cholinergic Drugs
Effects of the stimulation of Cholinoceptors Classification of cholinergic drugs – cholinoceptor agonists and anti-cholinesterase

03: Drugs for Glaucoma
Role of Cholinergic drugs compared to other drugs

04: OPC insecticide poisoning
Manifestation & management

05: Anti-cholinergic Anti-muscarinic
Atropine and atropine substitutes

06: Anti-cholinergic anti-nicotinic
Classification – Neuromuscular blockers & their role as skeletal muscle relaxant during anesthesia Ganglion blocker (names only) (No-6 red part to be deleted)

07: Adrenergic neurotransmission
Drugs modifying the events Adrenergic receptors Effects of stimulation of adrenoceptors

08: Adrenergic Drugs
Classification Adrenergic inotropic agents & their role in therapy Role of Adrenaline, Noradrenaline, Isoprenaline, Dopamine & Dobutamine in therapy Adrenergic vasoconstrictors, nasal decongestants

09: Selective β2 agonists as Bronchodilators, Other bronchodilators
used in bronchial asthma

10: α–adrenoceptor antagonist
Role of selective α1 antagonist in therapy

11: β- adrenoceptor antagonist
Role of β blockers in therapy

Core Contents
Renal & Cardiovascular Pharmacology Lectures: **01: Diuretics** Classification of diuretics: based on sites & mechanism of action and efficacy Pharmacology of Thiazides, Loop, Potassium sparing diuretics: their role in therapy edema and hypertension **02: Drugs used in hypertension** Epidemiology and pathophysiology of hypertension, Objectives of anti-hypertensive therapy, Classification of anti-hypertensive drugs. Pharmacology of Diuretics, β blockers, Ca channel blockers, ACE inhibitors, Angiotensin receptor antagonists, α blockers, α methyl dopa, Vasodilators Principles of selection of drug in different clinical situations **03: Drugs used in congestive cardiac failure** Pathophysiology of heart failure Objectives of therapy Drugs used in CCF: Diuretics, ACE inhibitors & ARBs, Selective β-blockers, (Additional) Cardiac glycosides, vasodilators, Phosphodiesterase inhibitors. **04: Antianginal drugs** Pathophysiology of angina, Objectives of therapy Drugs used in angina: Nitrates, β- blockers, Ca2+ channel blockers. **05. Antiarrhythmic Drugs** Pathophysiology of arrhythmia Pharmacology of antiarrhythmic drugs

Core Contents
HEMATOPOIETIC PHARMACOLOGY **<u>Lectures:</u>** **01: Anticoagulants & Thrombolytics** Pathophysiology of thrombo-embolism Pharmacology of Anti-coagulants: Heparin and LMW heparin, warfarin. Pharmacology of thrombolytics: Streptokinase, Alteplase, Rerelease etc. **02: Antiplatelet drugs** Pharmacology of low dose aspirin, clopidogrel, glycoprotein IIb/IIIa inhibitors and their role in therapy

03: Lipid regulating drugs
Pharmacology of statins. fibrates, nicotinic acid, resins etc.

04: Drugs for anemia
Pathophysiology of anemia Pharmacology of hemopoietic iron, folic acid, vit B12 Pharmacology of erythropoietin

Core Contents
Endocrine Pharmacology **Lectures** **01: Endocrine Pancreas and control of blood glucose** Islet hormones, control of blood glucose Diabetes mellitus – types, diagnostic criteria, monitoring Insulin & preparations Oral Hypoglycemic agent's Hypoglycemic reactions & management **02: Adrenal cortex and drugs used in therapy** Adrenocortical hormones: synthesis & blockers; Control of secretion, mechanism of action Pharmacological actions, uses and preparations Adverse effects **03: Reproductive system** Hormonal control of female reproductive system Estrogens & anti-estrogens Progesterone & anti-progesterone Hormone replacement therapy **(HRT)** Drugs used for contraception **04: The Uterus** Drugs that stimulate uterine contraction (oxytocic) Drugs that inhibit uterine contraction **05: The Thyroid** Synthesis, storage & secretion of thyroid hormones Thyroid functions & regulations Abnormalities of thyroid function Drugs used in disease of thyroid

Core Contents
Gastrointestinal Pharmacology **Lectures** **01: Drugs used in Peptic ulcer** Pathophysiology of peptic ulcer Therapeutic goal and approach Antacids, H2- blockers, Proton pump inhibitors, gastric cytoprotective agents, Helicobacter pylori eradication regimen Gastroprokinetic drugs and other agents **02: Drugs to treat diarrhea** Epidemiology, Principles of management Fluid and electrolyte replacement Selection of route and preparations ORS and different IV fluids Role of Antimicrobial drugs Antimotility drugs **03: Drugs used in helminthiasis** **04: Laxatives** **05: Drugs for Inflammatory Bowel Diseases (IBS) & irritable bowel syndrome (IBS)**

06: Anti-emetic and Pro-kinetic drugs

Term II

Core Contents
Central Nervous System **<u>Lectures</u>** **01: Introduction to CNS Drugs** Neurotransmitters of CNS (distribution, ion channel) general characteristics of CNS drugs **02: Opioid analgesic** Pathophysiology of pain, Pain pathway, endogenous opioids and opioid receptors Opioids: morphine, codeine, pethidine, tramadol, fentanyl used as analgesics compared. Role of morphine in myocardial infarction and pulmonary edema. Other clinical uses of opioids **03: Anxiolytics and hypnotics** Pathophysiology of sleep Benzodiazepines and other non-BDZ sedative-hypnotics Centrally acting muscle relaxants **04: Antidepressant drugs** Neurochemical basis of depression TCAs, SSRIs, MAOIs and other atypical antidepressants, Antimanic drugs **05: Antipsychotic drugs** Neurochemical basis of psychosis Pharmacology of anti-psychotic drugs: **06: Local anesthetic** Drugs, mechanism of action, techniques of local anesthesia, uses and hazards **07: General anesthetics** Principles of General Anesthesia Preanesthetic medication, Balanced Anesthesia Induction & Maintenance: Intravenous anesthetics &Inhalation anesthetics (nitrous oxides, halothane, fluranes) **08: Skeletal muscle relaxation** Depolarizing and non-depolarizing **09: Antiparkinsonian Drugs** Pathophysiology of Parkinson's diseases Pharmacology of antiparkinsonian drugs **10: Antiepileptics/Anticonvulsants** Pathophysiology of epilepsy Pharmacology of antiepileptic drugs

Core-Content
Autacoids and drugs used in inflammation **Lectures:**

01: Autacoids
Definition and lists of autacoids
Histamine: synthesis, storage & release, pharmacological actions & physiological role
Histamine antagonist: H1 antagonists: classification, role in allergic conditions & other clinical uses and adverse reactions
H2-receptor antagonists: role in peptic ulcer (covered with GIT Pharmacology)

02: Ecosanoids Prostaglandins, Leukotrienes, Platelet Activating Factor (PAF) Synthetic pathways & antagonists' Physiological roles, pharmacological actions and possible clinical uses of synthetic analogues and antagonists

03: NSAIDs / Non-opioid analgesics delete red part* of the line Paracetamol (mechanism of antipyretic and analgesic action, adverse effects) Other NSAIDs (mechanism of action, adverse effects and precaution) Selective COX II inhibitors

04. Drugs for Migraine

Core Contents

CHEMOTHERAPY
Lectures:
01: Introduction
General concept, Mode of action & Classification of antimicrobials Principles of antimicrobial therapy

02: Drug Resistance Mechanism of development of drug resistance by microbes

03: Cell wall synthesis inhibitors Penicillin's Cephalosporins Other β-lactams Non β-lactam antibiotics

04: Protein Synthesis Inhibitors
Aminoglycosides
Tetracyclines
Macrolides
Chloramphenicol
Newer Protein synthesis inhibitors

05: Sulfonamides & Cotrimoxazole
Sulfonamides combinations, Topical uses Cotrimoxazole

06: Quinolones & Fluoroquinolones

07: Anti Amoebic Drugs:
Metronidazole and other uses of Metronidazole

08: Drugs used in Tuberculosis

09: Drugs used in Leprosy

10: Drugs used in Malaria & Kala-Azar
11: Drugs used in Fungal Infections
12: Drugs used in Viral Infections
13: Cancer Chemotherapy
14. Anti-Helminthic Drugs

Core Contents
CLINICAL PHARMACOLOGY **Lectures:** **01: Rational Prescribing** General Principles, cusses & consequences of irrational prescribing, Measures to prevent irrational prescribing **02: Essential Drug concept** Definition, Selection criteria, Essential Drug List Rationale for prescribing from this Drug List **03: 'P' Drug concept** Definition, Selection criteria, selection of 'P' Drug for some clinical situations 04: Drug selection for some special clinical conditions: Pregnancy, Lactating mother, elderly, children, renal / hepatic failure or impairment 05: Anti-Microbial Resistance and how to overcome the indiscriminate use of antimicrobials

Pharmacology Practical

Core Contents
GENERAL PRINCIPLES OF PHARMACOLOGY **1. Prescription writing** Format, legal & ethical aspects, drug nomenclature, compliance and Exercise on Prescription Writing **2. Drug Dosage Formulations** Source & Routes of drug administration Drug Formulation & Delivery Techniques Exercise on Drug Dosage Formulations **3. Clinical Pharmacokinetics** Study of Time-Plasma Concentration Curves Determination of t½, Vd, Cl, Ke, steady-state concentration, Loading & Maintenance dose **4. Study of Pharmacodynamics** **I.Study of Dose Response Relationship** Construction of Log Dose-Response Curves **I.Study of Drug Antagonism** Construction of Log Dose-Response Curves in presence of Antagonists

5. **Adverse drug Reaction**

Exercise on ADRs reporting & monitoring

Core Contents
AUTONOMIC PHARMACOLOGY **1. Interpretation of Tracings on Blood Pressure** Demonstration of presence of Autonomic receptors **2. Study of Effect of Drugs on Skeletal Neuromuscular Junction** Demonstration of presence of Nicotinic receptors & effect of competitive reversible & irreversible neuromuscular blockers on them

Core Contents
CLINICAL PHARMACOLOGY **1. Drug Information Sources** A comparative study of the 'Prescribing information of Drugs' as provided by the Manufacturers' Product Literatures and the authentic Drug Compendia (British National Formulary/ Bangladesh National Formulary) **2. Essential Drug Concept** Exercise on selection Essential Drugs **3. 'P Drug' Concept** Exercise on selection 'P Drugs for different clinical situations & preparation of student formulary **4. Prescription Audit** Exercise on 'Prescription Audit' using INRUD indicators

Pharmacology Tutorial

	Contents
Term I	**General Pharmacology:** Pharmacokinetics and Pharmacodynamics **Autonomic Pharmacology:** • Review of Cholinergic–Anticholinergic drugs • Revives of Adrenergic–Antiadrenergic drug • Drugs acting on Renal & CVS • Review on Endocrine drug • Drugs for Bronchial asthma, PUD, Anemia
Term II	• Drugs used in Anxiety, sleep disorder • Drugs used in depression, epilepsy and parkinsonism • Autacoids & NSAIDs • Chemotherapy for specific infections: Shigellosis, Enteric fever, ARIs, UTIs, malaria, tuberculosis, fungal infections

	• RUM: Principles of Rational prescribing & means to resist pressure for irrational prescribing, Essential Drug Concept
	Clinical case studies & presentation – 5 clinical Cases