

Department of Pharmacology and Therapeutics



Study Guide

2nd Year BDS

Sharif Medical and Dental College



PREFACE

Study guides can make a major contribution to learning. They are sometimes likened to a tutor sitting on the student's shoulder-available 24 hours a day to advise the student what he/she should be doing at any stage in their study. Study guides are different from textbooks. They apprise the student at the beginning of an academic session about the course outline, the teaching methodology to be followed throughout the year, learning objectives of each academic activity and the assessment methodology to be followed in an academic session.

At SMDC we follow the traditional annual academic schedule in which the subject of Pharmacology and Therapeutics is taught in the 2nd academic year of a BDS student. Keeping in view the mission of UHS, Lahore and vision of our institute we have designed a training program which is intensive and at the same time interesting for the young minds. This guide includes details about various teaching activities which are to take place throughout the academic year along with the time allocation of each. A list of lectures to be conducted in this session with names of the instructors is attached. Broad learning outcomes of every section of the course accompanied by specific learning objective of every lecture is also included. A complete list of practical work to be carried out in the laboratory is part of this document. Details of various assessment and testing methodology are included and marks distribution for the subject in the 2nd Professional examinations has been given. Names and email contacts of faculty have also been mentioned to foster better interaction between the teacher and the taught. A list of prescribed text and reference books forms part of this study guide. Since this document is the first of its kind we intend to improve upon it in light of the student-feedback every year. For now happy reading.

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VISION & MISSION OF UHS

Qualitative and Quantitative Revolution in Medical Education and Research through Evolution and thereby improve Health Care delivery to Populace.

UHS shall be innovative global center of excellence in learning and research, supporting a community of scholars and professionals committed to serving society, promoting the development of students to reach their true potential in becoming competent, ethical, caring, and inquiring health professionals for the benefit of the country and the wider world.

MISSION OF SMDC

Sharif Medical & Dental College is dedicated to best serve the nation through preservation and dissemination of advanced knowledge and educating the students by latest trends in learning and research reaching levels pars excellence.

The Institution is committed to provide standardized quality medical education to its students by inculcating professional knowledge, skills and responsibilities in them with the aim of:

- Preparing them as modern physicians having initiative to act as future leaders in their respective fields and becoming lifelong learners.
- Encouraging the spirit of critical thinking through research and publication.
- Building up an understanding of the ethical values compatible with our religion, culture and social norms.
- Developing a sense of being responsible citizens of the society possessing professional competence and instilling in them the values of hard work and dedication thus preparing them to be accountable to the stakeholders and the state.

The Institution is devoted to keep abreast its faculty with the latest trends in Medical Education encompassing teaching/learning methodologies, assessment tools, research opportunities and professionalism to facilitate their professional development, competencies, and commitment towards continues learning.

Our patient-centered mission is achieved by outstanding medical care & services in professional practice with due emphasis and focus on our local health needs.

Our mission further elaborates upon establishing academic and research facilities in areas of local demand under global gold standards and leading advancement in research, education & patient care.

VISION OF SMDC

To be recognized for the provision of a safe and functional environment conducive to collaborative teaching & learning, comfortable working atmosphere, and conducting world class research through professionalism and excellence.



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PLANNED TEACHING ACTIVITIES FOR 2nd YEAR BDS DEPARTMENT OF PHARMACOLOGY

PMC has allocated 250 hours of teaching in the subject of Pharmacology and Therapeutics for the BDS course. In order to meet this requirement following teaching modules have been planned. These modules have been carefully designed to impart core knowledge of Pharmacology in a manner that an undergraduate student can grasp the subject fully and is adequately prepared for university examinations.

Lectures:

A total of 121 lectures are planned for the entire year. The lectures will be conducted by the Professor and assistant professors or by senior lecturers that have completed their post- graduation in the subject of pharmacology. The lectures will be interactive and students should actively participate in them to clear their doubts. The students are required to take notes of the lectures and study the topic with the help of prescribed text books in light of the learning objectives of the topic enunciated by the teacher at the beginning of each lecture.

Practical classes:

One practical class has been planned per week. It will comprise of pharmaceutical calculations, dosage forms and their intended use, prescription writing and P-drug concepts, basic biostatistics and standardization of drugs. The class will be divided into 02 batches to conduct the practicals effectively and each batch will be entertained once a week for these sessions. Practical will be conducted by demonstrators under an active supervision of senior instructors. Students are required to enter their work in their practical note books and get them checked by the instructors regularly.

Tutorials:

One tutorial class per week is proposed throughout the academic session. The class will be divided into 02 batches. Topics for the tutorial will be notified at least one week before the class. Two instructors, one senior and one junior, will be deputed for every batch on rotation basis. A pre-tutorial quiz or test will be held before tutorial discussion so that the students come prepared for the topic. During this interactive session the students must clear their concepts regarding the topic by actively engaging with their respective teachers.



TRAINING PROGRAM FOR LECTURES DEPARTMENT OF PHARMACOLOGY 2ND YEAR BDS

GENERAL

- Pharmacology should be considered as a bridge between the basic and clinical medical subjects. The teaching of this subject should encompass both the basic and the applied aspects.
- Teaching of Pharmacology should be integrated with other subjects
- Interactive modes of teaching e.g. tutorials, seminars, case –based learning modules etc. should be an essential part of teaching methodology.
- Keeping in view the expanding scope of the subject and an exponential increase in the number of available drugs, the subject may be divided into areas of high, intermediate and low priority so that more emphasis could be laid on the areas which are more pertinent to treatment of common illnesses.

GENERAL PHARMACOLOGY

DRUGS ACTING ON A N S

<i>Sr. No</i>	<i>Title of Lecture</i>	<i>Instructors</i>
01	Pharmacology: Introduction	Dr. Salman
02	Pharmacology: Branches / Divisions of Pharmacology, Role in Medicine, Sources	Dr. Maira
03	Absorption of drugs: processes	Dr. Sabeen
04	Factors modifying drug absorption.	
05	Distribution and plasma protein binding of drugs	Dr. Maira
06	Biotransformation of drugs.	Dr. Fouzia
07	Factors modifying biotransformation	
08	Bioavailability: clinical significance and factors affecting	Dr. Maira
09	Half life of drugs: factors affecting and clinical significance.	
10	Excretion of drugs. Drug clearance, Elimination and kinetics	
11	Mechanisms of drug action – I	Dr. Sabeen
12	Mechanisms of drug action – II	
13	Factors modifying actions & doses of drugs – I	Dr. Salman
14	Factors modifying actions & doses of drugs – II	
15	Factors modifying actions & doses of drugs – III	
01	A N S : Introduction-I&II	Dr. Fouzia
02	Catecholamines – I Adrenaline, Nor adrenaline, Dopamine & Dobutamine.	Dr. Maira
03	Non Catecholamines: Ephedrine, Amphetamines α receptor agonists etc.	
04	Adrenergic Blockers. Alpha-receptor Blockers	Dr. Fouzia
05	Beta receptor Blockers – I	Dr. Salman
05	Beta Receptor Blockers- II	
06	Central Sympathoplegics	Dr. Fouzia
07	Cholinergic drugs. Classification, Cholinesters, alkaloids etc.	Dr. Sabeen
08	Anti Cholinesterases, Organophosphate poisoning & Oximes	
09	Cholinergic blockers; Natural alkaloids. Comparison between Hyoscine & Atropine	Dr Maira
10	Skeletal Muscle Relaxants-I	Prof Salman
11	Skeletal Muscle Relaxants-II	



DRUGS ACTING ON CNS

<i>Sr. No</i>	<i>Title of Lecture</i>	<i>Instructors</i>
01	Central Neurotransmission I	Prof Salman
02	Gen Anaesthetics – I, Classification, Method of administration, Pharmacokinetics of inhalational Anaesthetics	Dr. Sabeen
03	Pre- anesthetic medication, Stages of Anesthesia, Mechanism of action	
04	General Anesthetics-II, Volatile liquids, Gases& Intravenous anesthetics	Dr. Fouzia
05	Local Anaesthetics-I	Dr. Salman
06	Local Anaesthetics-II	
07	Local Anaesthetics-III	
08	Sedative & Hypnotics – I. Introduction & Classification	Dr. Maira
09	Sedative & Hypnotics- II. Barbiturates, Benzodiazepines	
10	Antiepileptic drugs-I .Classification, hydantoin derivatives	
11	Antiepileptic drugs- II. Carbamazepine, valproic acid	Dr. Maira
12	Antiepileptic drugs- III. Barbiturates, Succinimides, Benzodiazepines and newer drugs	
13	Drugs used in Parkinsonism -I	Dr. Maira
14	Drugs used in Parkinsonism -II	
15	Anti-Psychotics-I	Dr Fouzia
16	Anti-Psychotics -II	
17	Anti-Depressants -I	Dr Maira
18	Anti-Depressants –II	
19	Analgesics – 1, Morphine, Semisynthetic/ synthetic opioids. & opioid antagonists	Dr. Salman
20	NSAIDs: Classification, Mechanism of Action	
21	Aspirin & other Salicylates, Propionic acid, Acetic acid der. Paracetamol	
22	Analgesics – II, Gold & Other Ant rheumatoid drugs, Anti gout drugs	Dr. Fouzia

DRUGS ACTING ON CVS

<i>Sr. No</i>	<i>Title of Lecture</i>	<i>Instructors</i>
01	Physiology of Heart	Dr. Maira
02	Drug treatment for heart failure	
03	Cardiotonic drugs.Management of cardiotoxicity of cardiac glycosides	
04	Anti anginal drugs – I	Dr. Fouzia
05	Anti anginal drugs - II	
06	Antihypertensive drugs-I Sympatholytic drugs,	Dr. Salman
07	Diuretics. Ca++ Channel blockers	
08	Antihypertensives-II, ACE inhibitors, AT receptor Antagonist Directly acting vasodilators	Dr. Sabeen
09	Anti arrhythmic drugs – I	
10	Anti arrhythmic drugs – II	

DRUG AFFECTING WATER & ELECTROLYTES BALANCE

<i>Sr. No</i>	<i>Title of Lecture</i>	<i>Instructors</i>
01	Diuretics: Introduction, Classification. Carbonic Anhydrase Inhibitors, Thiazides	Dr. Maira



02	Loop, K ⁺ sparing, diuretics	
03	Osmotic & Misc groups	Dr. Sabeen

CHEMOTHERAPY

<i>Sr. No</i>	<i>Title of Lecture</i>	<i>Instructors</i>
01	Introduction to Chemotherapy	
02	Sulfonamides	Dr. Maira
03	Trimethoprim & Cotrimoxazole	
04	Antibiotics, Penicillins	Dr. Salman
05	Antibiotics, Penicillins – Semisynthetics	
06	Antibiotics, Cephalosporins	
07	Macrolides. Antibiotics: Broad spectrum	Dr. Sabeen
08	Antibiotics: Broad spectrum, Tetracyclines	
09	Chloramphenicol	
10	Antibiotics: Aminoglycosides	Dr. Salman
11	Quinolones	Dr. Maira
12	Misc Drugs: Clindamycin, Fusidic acids, vancomycin, Nitrofurantoin, Linezolid	
13	Anti viral drugs –I	Dr. Fouzia
14	Anti viral drugs –II	
15	Anti Malarial – I	Dr. Sabeen
16	Anti Malarial – II	Dr. Sabeen
17	Antineoplastics – I. Alkylating agents	Dr. Fouzia
18	Antineoplastics – II. Antimetabolites, Vinca Alkaloids, Antibiotics & Hormones	
19	Anti T.B Drugs I	Dr. Maira
20	Anti TB Drugs II	Dr Maira
21	Anti Amoebic Drugs I	Prof Salman
22	Anti Amoebic Drugs II	
23	Anti Helminthics	Dr Fouzia
24	Anti Fungal Drugs I	Dr Maira
25	Anti Fungal Drugs II	

ENDOCRINOLOGY

<i>Sr. No</i>	<i>Title of Lecture</i>	<i>Instructors</i>
01	Antidiabetic drugs: Introduction Classification	Dr. Salman
02	Antidiabetic drugs:, Insulins	
03	Oral antidiabetic agents	
04	Corticosteroids I	Dr. Maira
05	Corticosteroids II	
06	Anti-Thyroid Drugs	Dr Maira
07	Oral Contraceptives	Dr Sabeen
08	Estrogen, Progestins, Anabolics	

DRUGS ACTING ON BLOOD

<i>Sr. No</i>	<i>Title of Lecture</i>	<i>Instructors</i>
01	Anticoagulants. Introduction, Classification. Heparin	Dr. Maira
02	Oral Anticoagulants	
03	Thrombolytic	Dr. Fouzia
04	Antiplatelet drugs	



05	Anti Hyperlipoproteinaemics-I	Dr. Sabeen
06	Anti Hyperlipoproteinaemics-II	

DRUGS ACTING ON G I T

<i>Sr. No</i>	<i>Title of Lecture</i>	<i>Instructors</i>
01	Haematinics-I	Dr Maira
02	Haematinics-II	
03	Anti emetics	Dr. Fouzia
04	Purgatives/laxatives	Dr. Sabeen
05	Drugs used in Peptic Ulcer – I	Dr. Maira
06	Drugs used in Peptic Ulcer – II	
07	Anti Diarrhoels	Dr Sab

DRUGS ACTING ON RESPIRATORY SYSTEM

<i>Sr. No</i>	<i>Title of Lecture</i>	<i>Instructors</i>
01	Antiasthmatics– I	Dr. Fouzia
02	Antiasthmatics– II	
03	Anti Tussives and Expectorants	

MISC

<i>Sr. No</i>	<i>Title of Lecture</i>	<i>Instructors</i>
01	Antihistamines-I	Dr. Salman
02	Antihistamines-II	
03	Autacoids and prostaglandins	Dr. Fouzia
04	Drug treatment of Migraine	Dr. Sabeen

DENTAL PHARMACOLOGY

<i>Sr. No</i>	<i>Title of Lecture</i>	<i>Instructors</i>
01	Antimicrobial agents used in dentistry, Analgesics used in dentistry,	Dr. Ayesha
02	Antiseptics and disinfectants,	
03	Agents used for maintenance of oral hygiene, Dentine desensitizing agent, Local anesthetics used in dentistry	Dr. Mahwish
04	Artificial salivary preparations, Hemostatic agent used in dentistry	
05	Drugs used in Root canal Therapy	Dr Ayesha
06	Agents used for the prevention of dental caries and Anti calculus Drugs	



**LIST OF LECTURES IN THE SUBJECT OF PHARMACOLOGY AND
THEIR LEARNING OBJECTIVES
DEPARTMENT OF PHARMACOLOGY & THERAPEUTICS
2ND YEAR BDS**

GENERAL PHARMACOLOGY

This course deals with the general principles of Pharmacology & Therapeutics. This serves to make the base for study of systemic Pharmacology and rational use of drugs in clinical practice. For this purpose emphasis should be laid on the clinical Pharmacokinetic and Pharmacodynamic parameters and the phenomena that lead to drug-drug interactions. At the end of the course student must be able to define the basic terminology of pharmacology, describe the various mechanism of drug actions and other concepts of pharmacodynamics.

S.NO.	TITLE OF LECTURES WITH LEARNING OBJECTIVES
1.	Pharmacology: Branches / Divisions of Pharmacology, Role in Medicine. By the end of the lecture the student will be able to <ol style="list-style-type: none">1. Enumerate various branches of pharmacology.2. Define branches of pharmacology.3. Explain the branches of the subject with the help of at least one example.4. Relate the role of various branches in medicine.
2.	Scientific sources of drug information, pharmacopeias, formularies, essential drug list. Sources of drugs/active principles. By the end of the lecture the student will be able to <ol style="list-style-type: none">1. Recall authentic sources of drug information.2. Define pharmacopeia.3. Explain the importance of pharmacopeias, formularies and essential drug list.4. Enumerate various sources of drugs.5. Describe DNA recombinant technique and its role as a source of drugs.6. Define and explain the active principles of drugs with examples.
3.	Absorption of drugs: processes By the end of the lecture the student will be able to <ol style="list-style-type: none">1. Enlist different processes involved in passage of drugs through membranes.2. Define various processes of absorption of drugs.3. Explain the characteristics of absorptive processes with examples of each.
4.	Factors modifying drug absorption. By the end of the lecture the student will be able to <ol style="list-style-type: none">1. Enumerate factors modifying absorption of drugs.2. Classify various factors into those related to body and those related to drugs.3. Explain various factors by quoting at least one example for each factor.
5.	Distribution and plasma protein binding of drugs. By the end of the lecture the student will be able to <ol style="list-style-type: none">1. Define distribution of drugs.2. Explain phases of drug distribution: Fast and Slow3. Explain redistribution of drugs with an example4. Enumerate factors effecting distribution of drugs.5. Explain the importance of plasma protein binding.6. Define volume of distribution7. Explain volume of distribution as a measure of drug distribution with examples.

6.	<p>Biotransformation of drugs. By the end of the lecture the student will be able to</p> <ol style="list-style-type: none"> 1. Define biotransformation. 2. Enumerate the aims of biotransformation with examples. 3. Enlist phase-I biotransformation reactions with examples. 4. Name phase-II biotransformation reactions with examples.
7.	<p>Factors modifying biotransformation. By the end of the lecture the student will be able to</p> <ol style="list-style-type: none"> 1. Enumerate factors effecting biotransformation. 2. Explain factors effecting biotransformation with examples. 3. Define enzyme induction and enzyme inhibition. 4. Name at least three important enzyme inhibitors and inducers. 5. Explain the importance of enzyme induction and inhibition with examples.
8.	<p>Bioavailability of drugs: clinical significance and factors affecting. By the end of this lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Define bioavailability of drugs 2. Describe the method of its measurement. 3. Enumerate factors effecting bioavailability of drugs 4. Explain the clinical significance of bioavailability of drugs 5. Differentiate between bioequivalence, therapeutic equivalence & chemical equivalence.
9.	<p>Half-life of drugs: factors affecting and clinical significance. By the end of lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Define plasma half-life of drugs. 2. Enumerate factors effecting half-life of drugs. 3. Explain the way these factors affect this entity. 4. Describe the clinical significance of plasma half-life.
10.	<p>Excretion of drugs. Drug clearance. By the end of the lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Enumerate major and minor routes of excretion. 2. Explain the processes involved in excretion of drugs through this route with examples. 3. Define clearance of drugs. 4. Explain factors effecting clearance of drugs. 5. Describe the clinical significance of clearance of drugs.
11.	<p>Mechanisms of drug action – I. By the end of the lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Enlist various mechanisms of drug action 2. Explain physical & chemical mechanisms of drug action with examples 3. Describe drug enzyme and drug ion channel interactions with examples
12.	<p>Mechanism of drug action – II. By the end of the lecture the student will be able to</p> <ol style="list-style-type: none"> 1. Enumerate different types of receptors involved in drug action. 2. Explain various receptor types in detail with examples. 3. Describe G-protein coupled receptors with 2nd messenger system citing examples. 4. Explain some of the other diverse mechanisms of drug action with examples.
13.	<p>Factors modifying actions and doses of drugs – I. By the end of the lecture the student will be able to</p> <ol style="list-style-type: none"> 1. Classify various factors modifying actions and doses of drugs. 2. Enumerate and describe physiological factors effecting action & dose of drugs

	<p>with examples.</p> <p>3. Explain some pathological factors modifying dose and actions of drugs with examples.</p>
14.	<p>Factors modifying actions and doses of drugs – II.</p> <p>By the end of the lecture the student will be able to</p> <ol style="list-style-type: none"> 1. Define Pharmacogenetics and genetic polymorphism with in relation to modification of dose and action of the drugs. 2. Explain how genetics modify actions and doses of drugs by quoting various examples. 3. Define drug synergism and its types. 4. Explain drug synergism, summation and potentiation through examples.
15.	<p>Factors modifying actions and doses of drugs – III.</p> <p>By the end of the lecture the student will be able to</p> <ol style="list-style-type: none"> 1. Define drug antagonism. 2. Define and explain various types of drug antagonism by giving examples of each. 3. Relate clinical significance of drug antagonism 4. Interpret various graphical representations of the phenomenon. 5. Define and explain other miscellaneous terms & factors which may affect the dose or action of the drug with examples.

DRUGS ACTING ON AUTONOMIC NERVOUS SYSTEM

This course comprises of the study of autonomic drugs. The students are expected to acquire a thorough back ground of the receptors and neurotransmitters of autonomic nervous system, their role in different organs and systems of body and their interactions with various drugs. At the end of the course the student must be able to classify different drug groups acting on ANS, describe their mechanism of action and enumerate their clinical uses and major side-effects with important contra-indications.

S.NO.	TITLE OF LECTURES WITH LEARNING OBJECTIVES
1.	<p>ANS : Introduction</p> <p>By the end of the lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Recall salient anatomical and physiological features of ANS. 2. Enlist types and sub types of various ANS receptors along with their locations in different structures and organ systems of the body. 3. Describe the synthesis, storage, release and degradation of the neurotransmitters of the ANS. 4. Explain the negative and positive feedback controls of neurotransmitter release.
2.	<p>Catecholamines – I Adrenaline.</p> <p>By the end of the lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Classify sympathomimetics on the basis of chemistry & receptor selectivity. 2. Explain the mechanism of action of adrenaline, the prototype drug of the group. 3. Describe the important pharmacological actions of adrenaline on different organ systems of the body.
3.	<p>Catecholamines – II Nor adrenaline, Dopamine, isoproterenol & Dobutamine.</p> <p>By the end of the lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Enlist and explain the therapeutic uses of adrenaline. 2. Enumerate important adverse effects& contraindications of the drug. 3. Explain the differences in response, therapeutic uses& side-effects of other catecholamines with reference to adrenaline.

4.	<p>Non Catecholamines: Ephedrine, Amphetamines α receptor agonists etc. By the end of the lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Differentiate between catecholamines and non-catecholamines. 2. Explain the pharmacological actions of important non-catecholamines in light of their mode of action. 3. Enlist important therapeutic uses and side-effects of important non-catecholamines. 4. Classify sympathomimetics according to their clinical indications.
5.	<p>Adrenergic Blockers. Alpha-receptor Blockers. By the end of the lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Classify alpha blockers according to receptor selectivity. 2. Explain the pharmacological actions of alpha blockers. 3. Enlist and important clinical uses and side-effects of this drug group. 4. Describe their role in benign prostatic hyperplasia & pheochromocytoma.
6.	<p>Beta receptor Blockers – I. By the end of the lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Classify beta blockers according to receptor selectivity, ISA, MSP, lipid solubility & duration of action. 2. Describe the pharmacological actions of beta blockers on different systems of the body. 3. Explain important pharmacokinetic features of the group.
7.	<p>Beta receptor Blockers – II. By the end of the lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Enlist and explain important clinical uses of beta blockers especially with reference to CVS. 2. Enlist important side effects of beta blockers 3. Enumerate important contraindications of this group of drugs. 4. Describe salient features of management in overdose of beta blockers.
8.	<p>Central Sympathoplegics. By the end of the lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Name central Sympathoplegics and centrally acting alpha-2 agonists. 2. Explain mechanism of action of alpha methyl Dopa & clonidine. 3. Enumerate therapeutic uses of the above drugs. 4. Enlist important side-effects and contra-indications of the above mentioned drugs. 5. Differentiate between alpha methyl Dopa & clonidine.
09.	<p>Cholinergic drugs – I. Classification, Cholinesters, alkaloids etc. By the end of the lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Classify cholinomimetics according to chemistry & mechanism of action. 2. Describe actions of acetylcholine on different organ systems of body. 3. Enumerate the adverse effects of acetylcholine & cholinergic drugs.
10.	<p>Cholinergic drugs – II. Anti-Cholinesterases and Organophosphates & oximes By the end of the lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Explain the salient pharmacological properties of Cholinesterases with their appropriate clinical uses. 2. Differentiate between cholinergic and myasthenic crisis. 3. Describe the management of myasthenia gravis. 4. Explain the role of Pilocarpine in glaucoma. 5. Enumerate the signs and symptoms of organophosphate poisoning due to cholinergic excess. 6. Enlist steps in the management of organophosphate poisoning.

	<p>7. Describe aging and role of oximes in the management.</p> <p>8. Explain the prevention of above mentioned poisoning</p>
11.	<p>Cholinergic blockers</p> <p>By the end of the lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Classify anti-cholinergic drugs based on chemistry. 2. Describe pharmacological actions of atropine. 3. Differentiate between atropine and hyoscine 4. Enlist valid therapeutic uses of atropine 5. Enumerate adverse effects of anti-cholinergic drugs 6. Classify anti-cholinergics according to their therapeutic use
12.	<p>Skeletal Muscle Relaxants-I.</p> <p>By the end of the lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Recall physiology of neuromuscular junction. 2. Classify skeletal muscle relaxants according to their mechanism of action. 3. Describe mechanism of action of non-depolarizing skeletal muscle relaxants. 4. Explain pharmacological actions of non-depolarizing skeletal muscle relaxants.
13.	<p>Skeletal Muscle Relaxants-II.</p> <p>By the end of the lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Describe mechanism of action of succinylcholine. 2. Enumerate therapeutic uses of peripherally acting skeletal muscle relaxants. 3. Explain salient pharmacological properties of centrally acting muscle relaxants. 4. Describe mechanism of action and uses of Dantrolene.

DRUGS ACTING ON CNS

This course should aim at imparting the knowledge on receptors, neurotransmitters and enzymes that regulate activity of the central nervous system alongwith their interactions with various types of drugs. Both basic and applied aspects of the drugs should be taught. At the end of the course the student must be able to classify different drug groups acting on CNS, describe their mechanism of action and enumerate their clinical uses and major side-effects with important contra-indications.

S.NO.	TITLE OF LECTURES WITH LEARNING OBJECTIVES
1.	<p>Central Neurotransmission – I and II</p> <p>By the end of the lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Recall main functions of different areas of the brain. 2. Describe the basic structure and function of a neuron. 3. Explain different ion channels present in the brain along with their properties. 4. Describe detail of metabotropic receptors in the CNS. 5. Identify steps where the drugs can act in the neurons. 6. Classify various neurotransmitters of CNS
02.	<p>General Anesthetics –I</p> <p>By the end of lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Classify the Inhalational Anesthetic Agents 2. Identify their pharmacokinetic and pharmacodynamic properties 3. Describe the terms second gas effect & diffusion hypoxia 4. Define Balanced anesthesia and MAC (Minimum alveolar anesthetic concentration)
03.	<p>General Anesthetics –II</p> <p>By the end of lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Classify Pre-anesthetic medications 2. Explain stages of anesthesia

	<ol style="list-style-type: none"> 3. Define Neuroleptanesthesia 4. Describe the mechanism of action of Inhaled Anesthetic agents
04.	<p>General Anesthetics – III</p> <p>By the end of lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Explain pharmacokinetic properties of Volatile liquids(Halothane) 2. Describe proposed targets for the actions of these volatile liquids 3. Enumerate their toxic effects 4. Explain dissociative anesthesia 5. Describe pharmacokinetic and pharmacodynamic properties of Propofol and Etomidate
05.	<p>Local Anaesthetics – I</p> <p>By the end of lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Classify major classes of local Anaesthetics 2. Describe the mechanism of action of local anesthetics 3. Explain the terms “use-dependent blockade” and “state-dependent Blockade
06	<p>Local Anaesthetics – II</p> <p>By the end of lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Describe the relationship among tissue pH, drug pKa, and the rate of onset of LA 2. Explain rationale of adding local anesthetics with vasoconstrictors 3. List factors that determine the susceptibility of nerve fibers to local anesthetic blockade. 4. Describe the major toxic effects of the local anesthetics
07.	<p>Sedative & Hypnotics – I</p> <p>By the end of lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Describe the mechanism of action of Benzodiazepines & Barbiturates 2. Summarize actions & adverse effects of BZDs & Barbiturates 3. Differentiate between BZDs and Barbiturates 4. Discuss their drug interactions
08.	<p>Sedative & Hypnotics – II</p> <p>By the end of lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Identify the distinctive properties of buspirone and Ramelteon 2. Discuss Mechanism of action with adverse effects of Z compounds like zaleplon 3. Describe the symptoms and management of overdose of sedative-hypnotics along with their antidotes.
09.	<p>Antiepileptic drugs-I .Classification, hydantoin derivatives</p> <p>By the end of lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Differentiate between seizure and epilepsy and differentiate between the two 2. Explain the terminology of various types of epilepsies 3. Classify Antiepileptic drugs according to chemistry and chemical use 4. Describe Pharmacokinetic and pharmacodynamic profile of Phenytoin sodium 5. Enumerate side effects of Phenytoin. 6. Explain Fetal hydantoin syndrome
10.	<p>Antiepileptic drugs- II.</p> <p>By the end of lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Describe the main pharmacokinetic features of Carbamazepine, and valproic acid

	<ol style="list-style-type: none"> 2. Discuss the mode of action (anti seizure activity) of the above drugs 3. Enlist the therapeutic applications of carbamazepine other than epilepsy 4. Enumerate major adverse effects of these two drugs
11.	<p>Antiepileptic drugs- III. By the end of lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Identify the mechanism of action of Felbamate, lamotrigine, and topiramate. 2. Enumerate major toxicities of these drugs 3. Explain why benzodiazepines are rarely used in the chronic therapy of seizure states but are valuable in status epilepticus 4. Outline the management for status epilepticus
12.	<p>Antipsychotic drugs-I Classification, Mechanism of action By the end of lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Classify different groups of Anti-Psychotics 2. Describe the mechanism of action of these drugs. 3. Tabulate the differences between High potency & Low potency anti-psychotics 4. Describe the pharmacological effects of anti-psychotics
13.	<p>Antipsychotic drugs-II By the end of lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Enumerate the psychiatric and non-psychiatric indications of Anti-Psychotics 2. Discuss the adverse effects of Anti-Psychotics 3. Tabulate differences between typical and atypical anti-psychotics 4. Identify the distinctive pharmacokinetic features of lithium, and list its adverse effects and toxicities
14.	<p>Anti depressants-I By the end of lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Classify different classes of Anti-depressants 2. Describe the mechanism of Action of TCAs & SNRIs 3. Enlist the therapeutic applications of Anti- depressants 4. Outline major adverse effects of TCAs 5. Describe mechanism of action & adverse effects of SSRIs 6. Explain serotonin syndrome and its treatment
15.	<p>Anti depressants-II By the end of lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Explain mechanism of action of MAO Inhibitors in depression 2. Describe cheese reaction and other drug interactions of MAO inhibitors 3. Classify 5HT₂ receptor antagonists for depression 4. Explain mode of action with side effects of Amoxapine and Mirtazapine
16.	<p>Drugs used in Parkinsonism –I By the end of lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Describe the neurochemical imbalance underlying the symptoms of Parkinson’s disease 2. Classify anti-parkinsonian drugs 3. Explain the mechanisms by which levodopa, dopamine receptor agonists act 4. Identify drugs that inhibit Dopa decarboxylase and describe their uses along with their adverse effect

17.	<p>Drugs used in Parkinsonism –II By the end of lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Describe the mechanism of action of MAO and COMT Inhibitors in Parkinsonism 2. Enumerate their toxicity and drug interactions 3. Explain the role of anti muscarinic drugs in parkinsonism 4. Identify the drugs used in the management of essential tremor, Huntington's disease, drug- induced dyskinesias, restless legs syndrome, and Wilson's disease
18.	<p>Analgesics:- Introduction, Classification, Morphine By the end of the lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Explain physiology of pain: pathway and neurochemical mediators. 2. Enlist commonly used analgesic drug classes and individual drugs. 3. Classify opioids on the basis of source and effect on their receptor. 4. Describe opioid receptor distribution. 5. Describe the mechanism of action of opioid analgesics. 6. Explain the pharmacological features of Morphine (prototype). 7. Enlist important clinical uses and side-effects of this drug. 8. Discuss the management of morphine toxicity
19.	<p>Analgesics:- Semisynthetic/synthetic opioids & opioid antagonists By the end of the lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Describe briefly some important aspects of some semisynthetic/synthetic opioids. 2. Recall the signs and symptoms of an opioid overdose. 3. Compare in brief the actions and indications of opioid antagonists.
20.	<p>NSAIDs: Classification, Mechanism of action By the end of the lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Recall the role of cyclooxygenase enzyme in the synthesis of prostaglandins and leukotrienes. 2. Explain the mechanism of action of NSAIDs. 3. Classify NSAIDs according to the enzyme selectivity.
21.	<p>Aspirin and other salicylates, Propionic acid, Acetic acid derivatives. Paracetamol By the end of the lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Relate chemistry of aspirin with its mechanism of action and actions. 2. Explain the pharmacological effects of aspirin on different organ systems of the body. 3. Describe important pharmacokinetic features of aspirin. 4. Enumerate the therapeutic uses of aspirin. 5. Enumerate side-effects and salient features of aspirin intoxication with its management. 6. Explain the pathophysiology behind paracetamol poisoning and its management
22.	<p>Analgesics : Anti-Rheumatoid drugs and Anti-gout drugs By the end of the lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Classify the drugs used in Rheumatoid arthritis. 2. Describe briefly some important pharmacokinetic and pharmacodynamic aspects of various anti-rheumatoid drugs. 3. Classify drugs used in acute and chronic Gout



4. Enlist adverse effects of allopurinol and colchicines

CVS

The students, on completion of this course should be able to correlate the actions of cardio active drugs with the electro-physiological properties of heart and should understand the basis of actions of these drugs in common cardio-vascular diseases. They must be able to classify different drug groups, enlist their clinical uses, side-effects and major contraindications.

S.NO.	TITLE OF LECTURES WITH LEARNING OBJECTIVES
1.	<p>Physiology of heart. By the end of the lecture the student will be able to</p> <ol style="list-style-type: none"> 1. Recall the physiologic principles which govern the function of the heart and the alterations induced by functional and structural abnormalities. 2. Name the elements of the intrinsic conduction system of the heart and describe the pathway of impulses through this system. 3. Enumerate and describe properties of the cardiac muscle 4. Explain the salient events in the action potential generation of cardiac muscle.
2.	<p>Drug treatment for heart failure By the end of the lecture the student will be able to</p> <ol style="list-style-type: none"> 1. Explain briefly the pathophysiology of heart failure. 2. Recall the compensatory mechanisms in a failing heart. 3. Outline a treatment plan for patients with compensated or decompensated CHF. 4. Enlist major drug groups used for management of congestive heart failure. 5. Explain the role of diuretics, angiotensin-converting enzyme inhibitors and beta blockers, in treating patients with congestive heart failure.
3.	<p>Cardiotonic drugs: Management of cardiotoxicity of cardiac glycosides By the end of the lecture the student will be able to</p> <ol style="list-style-type: none"> 1. Discuss digoxin and its use in long-term management of congestive heart failure. 2. Describe the mechanism of action of Digoxin. 3. Recount the mechanical and electrical effects of Digoxin. 4. Enumerate and explain the clinical uses of Digoxin. 5. Describe the important side-effects, contraindications & drug interactions of Digoxin. 6. Explain the treatment and management of digitalis toxicity.
4.	<p>Anti-anginal drugs-I By the end of the lecture the student will be able to</p> <ol style="list-style-type: none"> 1. Define angina pectoris 2. Recall the relevant physiological aspects of coronary circulation 3. Enumerate and explain briefly the pathophysiology of different types of anginas. 4. Classify the drugs used in the management of angina pectoris
5.	<p>Anti-anginal drugs-II By the end of the lecture the student will be able to</p> <ol style="list-style-type: none"> 1. Describe important pharmacokinetic aspects of nitrates. 2. Explain mechanism of action of nitrates. 3. Describe other important actions of nitrates. 4. Enumerate and describe important side-effects of nitrates.
6.	<p>Anti-hypertensive drugs-I Sympatholytic drugs, Diuretics, Ca⁺⁺ Channel blockers By the end of the lecture the student will be able to</p>

	<ol style="list-style-type: none"> 1. Recall the basic physiology of blood pressure regulation. 2. Classify antihypertensives according to site and mechanism of action. 3. Describe the role of sympatholytic drugs in hypertension. 4. Recall the role of diuretics in hypertension. 5. Recount the relevance of calcium channel blockers in hypertension
7.	<p>Anti-hypertensive drugs-II ACE inhibitors, AT receptor antagonist, Direct acting vasodilators</p> <p>By the end of lecture, the students will be able to</p> <ol style="list-style-type: none"> 1. Classify vasodilators on the basis of site, route & mechanism of action. 2. Describe the pharmacokinetic properties and side effects of vasodilators. 3. Classify the drugs acting on RAS. 4. Explain their mechanisms of action. 5. Describe the clinical indications and contraindications. 6. Mention their side effects and interactions.
8.	<p>Anti-arrhythmic drugs-I</p> <p>By the end of the lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Recall physiological aspects relevant to the understanding of anti-arrhythmic drugs. 2. Classify anti-arrhythmic drugs. 3. Describe cardiac, noncardiac effects of class I drugs (all subgroups). 4. Enumerate therapeutic uses and major side-effects of all class I anti-arrhythmic drugs. 5. Describe the important anti-arrhythmic actions of class II drugs. 6. Enumerate clinical indications and side-effects of class II drugs.
9.	<p>Anti-arrhythmic drugs-II</p> <p>By the end of the lecture the student will be able to</p> <ol style="list-style-type: none"> 1. Explain the actions, uses and side-effects of class III drugs (amiodarone). 2. Describe the actions, uses and adverse effects of calcium channel blockers (class IV drugs). 3. Describe briefly the salient features of adenosine as an anti-arrhythmic and its toxicity.

DRUGS AFFECTING WATER AND ELECTROLYTE BALANCE

At the end of the course the student must be able to classify different drug groups acting as diuretics, describe their mechanism of action and enumerate their clinical uses and major side-effects with important contra-indications

1.	<p>Diuretics: Introduction, Classification. Carbonic Anhydrase Inhibitors, Thiazides</p> <p>By the end of the lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Classify diuretics on the basis of mechanism and site of action. 2. Enumerate carbonic anhydrase inhibitors. 3. Describe the mechanism of action of CAIs. 4. Enumerate & explain therapeutic uses of CAIs. 5. Describe the important side-effects & contraindications of CAIs. 4. Describe the mechanism of action of thiazide diuretics. 5. Enumerate & explain therapeutic uses of thiazide diuretics. 6. Describe the important side-effects & contraindications of thiazide diuretics.
2.	<p>Diuretics: Loop Diuretics and Potassium sparing diuretics</p> <p>By the end of the lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Enumerate loop diuretics and 2. Describe the mechanism of action of loop diuretics. 3. Enumerate & explain their therapeutic uses.

	<ol style="list-style-type: none"> 4. Describe the important side-effects, contraindications & drug interactions of loop diuretics. 5. Enumerate K^+ sparing diuretics. 6. Describe the mechanism of action of K^+ sparing diuretics. 7. Enumerate & explain their therapeutic uses. 8. Describe the important side-effects, contraindications & drug interactions of K^+ sparing diuretics
3.	<p>Osmotic and miscellaneous groups</p> <p>By the end of the lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Enumerate osmotic diuretics 2. Describe the mechanism of action of osmotic diuretics. 3. Enumerate & explain their therapeutic uses. 4. Describe their important side-effects, contraindications & drug interactions. 5. Name and recall salient features of vaptans.

CHEMOTHERAPY

The student should be imparted knowledge about the mechanisms of action, spectrum of activity, clinical uses and adverse effects of therapeutic agents. Stress should be laid on prevention of emergence of resistance by rational use of chemotherapy. At the end of course the student must be able to classify different antimicrobials, antifungal, and anti-neoplastic. They may be able to describe their mechanism of action and enumerate their clinical uses and major side-effects with important contra-indications.

S.NO.	TITLE OF LECTURES WITH LEARNING OBJECTIVES
1.	<p>Introduction, General principles of Chemotherapy.</p> <p>By the end of the lecture the student will be able to</p> <ol style="list-style-type: none"> 1. Define chemotherapy, anti-microbial and antibiotics. 2. Differentiate between empiric, definitive and prophylactic therapy. 3. Explain the basis of combination therapy and causes of failure of chemotherapy. 4. Classify the chemotherapeutic agents on the basis of their mechanism of action. 5. Explain post-antibiotic effect. 6. Differentiate between time-dependent killing and concentration dependent killing. 7. Describe genetic and biochemical basis of drug resistance
2.	<p>Sulfonamides</p> <p>By the end of the lecture the student will be able to</p> <ol style="list-style-type: none"> 1. Classify sulfonamides on the basis of their therapeutic uses. 2. Describe their spectrum, mechanism of action and resistance. 3. Enumerate their adverse effects. 4. Enlist their relevant clinical indications.
3.	<p>Trimethoprim & Co-trimoxazole</p> <p>By the end of the lecture the student will be able to</p> <ol style="list-style-type: none"> 1. Describe the spectrum, mechanism of action and resistance of trimethoprim. 2. Explain rationale and advantages of combination of trimethoprim and sulfamethoxazole in co-trimoxazole. 3. Enlist adverse effects of trimethoprim 4. Enumerate clinical uses of Co-trimoxazole
4.	<p>Antibiotics, Penicillins</p> <p>By the end of the lecture the student will be able to</p> <ol style="list-style-type: none"> 1. Understand source and structure activity relationship. 2. Classify penicillins as natural and semisynthetic preparations.

	<ol style="list-style-type: none"> 3. Explain the mechanism of action and mechanism of resistance. 4. Elaborate important pharmacokinetic properties of penicillins.
5.	<p>Antibiotics, Penicillins- Semisynthetic</p> <p>By the end of the lecture the student will be able to</p> <ol style="list-style-type: none"> 1. Enumerate the clinical uses of natural and semisynthetic penicillins 2. Explain the adverse effects of penicillins 3. Enlist important drug interactions of penicillins
6.	<p>Antibiotics-Cephalosporins</p> <p>By the end of the lecture the student will be able to</p> <ol style="list-style-type: none"> 1. Classify cephalosporins on the basis of their spectrum into four generations. 2. Explain their mechanism of action and resistance. 3. Enumerate their adverse effects. 4. Enlist clinical uses of all four generations.
7.	<p>Macrolides, Antibiotics: Broad spectrum</p> <p>By the end of this lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Enumerate macrolides. 2. Describe their structure, spectrum and pharmacokinetic properties. 3. Explain their mechanism of action and resistance. 4. Enumerate adverse effects and therapeutic indications. 5. Enlist advantages and disadvantages of Clarithromycin and Azithromycin.
8.	<p>Antibiotics: Broad spectrum Tetracyclines</p> <p>By the end of lecture the students will be able to</p> <ol style="list-style-type: none"> 1 .Enumerate tetracycline. 2 .Explain their pharmacokinetic properties and spectrum of activity. 3 Describe their mechanism of action and resistance. 4 Enlist adverse effects. 5 Define their valid therapeutic indications.
09.	<p>Chloramphenicol</p> <p>By the end of the lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Explain pharmacokinetic properties and spectrum of activity. 2. Describe its mechanism of action and resistance. 3. Enumerate its adverse effects. 4. Enlist its therapeutic indications.
10.	<p>Antibiotics: Aminoglycosides</p> <p>By the end of the lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Classify aminoglycosides on the basis of their source. 2. Explain pharmacokinetic properties and spectrum of activity. 3. Describe mechanism of action, resistance and post-antibiotic effects. 4. Enumerate their adverse effects. 5. Enlist their therapeutic indications.
11.	<p>Quinolones.</p> <p>By the end of the lecture the student will be able to</p> <ol style="list-style-type: none"> 1. Classify the quinolones on the basis of their spectrum of antibacterial activity. 2. Describe their pharmacokinetics, mechanism of action and resistance. 3. Enumerate their adverse effects. 4. Enlist their therapeutic indications.
12.	<p>Misc. Drugs: Clindamycin, Fusidic acids, Vancomycin, Nitrofurantoin, Linezolid</p> <p>By the end of the lecture the student will be able to</p> <ol style="list-style-type: none"> 1. Explain their mechanism of action, resistance and spectrum of antibacterial activity. 2. Enumerate their adverse effects.

	3. Enlist their clinical indications.
13.	<p>Antituberculosis drugs – I.</p> <p>By the end of the lecture the student will be able to</p> <ol style="list-style-type: none"> 1. Understand different types of TB. 2. Enumerate first and second line drugs for TB. 3. Enlist special characteristics of Mycobacterium tuberculosis. 4. Explain mechanism of action, clinical uses and adverse effects of Isoniazid and Rifampicin.
14.	<p>Antituberculosis drugs – II</p> <p>By the end of the lecture the student will be able to</p> <ol style="list-style-type: none"> 1. Explain the mechanism of action, clinical uses and adverse effects of Ethambutol and Pyrazinamide. 2. Enumerate drugs with doses for prophylaxis of TB. 3. Explain treatment for new patient. 4. Enumerate drugs for Resistant, MDR & XDR TB.
15.	<p>Antifungal drugs-I</p> <p>By the end of the lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Classify antifungal drugs on the basis of their mechanism of action. 2. Explain their spectrum, mechanism of action and resistance of Amphotericin B and Flucytosine. 3. Enumerate their adverse effects. 4. Enlist their clinical uses.
16.	<p>Antifungal drugs – II</p> <p>By the end of the lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Enumerate azoles. 2. Explain their spectrum, mechanism of action and resistance. 3. Enumerate their adverse effects. 4. Enlist their therapeutic indications.
17.	<p>Anti-viral drugs –I</p> <p>By the end of the lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Enumerate common properties of viruses. 2. Enlist common characteristics shared by antiviral drugs. 3. Classify antiviral drugs on the basis of therapeutic indications. 4. Classify antiviral drugs on the basis of therapeutic indications 5. Understand the life cycle of virus in accordance with drugs inhibiting the various steps of cycle. 6. Explain mechanism of action, therapeutic indications and adverse effects of anti HSV and VZV drugs.
18.	<p>Anti-viral drugs –II</p> <p>By the end of the lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Describe some important properties of anti CMV drugs. 2. Explain HHART. 3. Elaborate mechanism of action and A/R of fusion and entry inhibitors. 4. Enumerate group properties of NRTI, NNRTI, and INSTIs. 5. Explain Mechanism of action and A/R of PIs. 6. Explain mechanism of action, A/R and contraindications of INF-α. 7. Elaborate drugs for influenza type A & B virus. 8. Describe mechanism of action, spectrum,A/R and CI of Ribavirin
19.	<p>Anti-Malarial - I.</p> <p>By the end of the lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Enumerate species of malaria and understand life cycle of malarial parasite.

	<ol style="list-style-type: none"> 2. Classify antimalarial drugs on basis of chemical structure and therapeutic indications. 3. Explain mechanism of action and resistance of chloroquine. 4. Elaborate the salient pharmacokinetic features of chloroquine. 5. Enumerate its adverse effects and therapeutic indications.
20.	<p>Anti-Malarial - II. By the end of the lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Explain mechanism of action and resistance of Mefloquine, Primaquine, and Quinine. 2. Elaborate their pharmacokinetics. 3. Enumerate their adverse effects. 4. Enlist their therapeutic indications. 5. Enumerate artemisinin 6. Enlist WHO recommendations of treatment of Falciparum malaria. 7. Describe rationale for combination of antimalarial drugs.
21.	<p>Anti-Amoebic drugs-I By the end of the lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Define amoebiasis and understand life cycle of an amoeba histolytica. 2. Classify anti amoebic drugs on basis of chemical structure and therapeutic indications. 3. Explain mechanism of action of metronidazole. 4. Enlist its adverse effects. 5. Enumerate its therapeutic indications with spectrum of activity.
22.	<p>Anti-Amoebic drugs-II By the end of the lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Explain mechanism of action of luminal anti amoebic drugs. 2. Enumerate their adverse effects. 3. Describe the rationale for combination of luminal with tissue anti amoebic drugs.
23.	<p>Anthelmintics By the end of the lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Enumerate drugs for Nematodes, Trematodes and Cestodes. 2. Explain mechanism of action of Albendazole and Niclosamide. 3. Enlist their adverse effects and therapeutic indications.
24.	<p>Antineoplastics – I. Alkylating agents By the end of the lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Define cancer and enlist its causes. 2. Describe different treatment modalities and types of chemotherapy for cancer. 3. Enumerate different mechanism of resistance of anticancer drugs. 4. Explain toxicity of anticancer drugs with their management. 5. Classify anticancer drugs. 6. Elaborate mechanism of action of alkylating agents with their adverse effects and therapeutic indications.
25.	<p>Antineoplastics – II. Antimetabolites, Vinca Alkaloids, Antibiotics & Hormones By the end of the lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Explain mechanism of action and resistance of Methotrexate. 2. Enumerate its adverse effects with rescue therapy. 3. Enlist cancerous and non-cancerous uses of Methotrexate. 4. Explain mechanism of action, adverse effects and therapeutic indications of 5-FU and Anthracyclines. 5. Explain mechanism of action of Vinca alkaloids.

6. Enumerate their adverse effects and uses

ENDOCRINOLOGY

The objective of this section is to educate the students about use of various hormones in replacement therapy and other diseases. Basic and applied aspects of other drugs used in commonly occurring endocrine disorders should also be covered. At the end of the course the student must be able to classify different drug groups acting on various endocrine organs, describe their mechanism of action and enumerate their clinical uses and major side-effects with important contra-indications.

S.NO.	TITLE OF LECTURES WITH LEARNING OBJECTIVES
1.	<p>Antidiabetic drugs: Introduction Classification.</p> <p>By the end of the lecture the student will be able to</p> <ol style="list-style-type: none"> 1. Review the clinical manifestations of type 1 and type 2 diabetes mellitus and its diagnostic criteria. 2. Outline the drug management for diabetes.
2.	<p>Antidiabetic drugs: Insulin</p> <p>By the end of the lecture the student will be able to</p> <ol style="list-style-type: none"> 1. Understand the major effects of endogenous insulin on body tissues. 2. Classify different types of insulin on the basis of source and mechanism of action. 3. Describe characteristics of various insulins and its analogues. 4. Explain the mechanism of action, uses, adverse effects, contraindications insulin. 5. Review the SGLT 2 inhibitors, incretin mimetics, and dipeptidyl peptidase 4 (DPP-4) inhibitors including mechanisms of action, indications for use and adverse effects. 6. Enlist the common side effects and contraindications of these drugs.
3	<p>Antidiabetic drugs: Oral antidiabetic agents</p> <p>By the end of the lecture the student will be able to</p> <ol style="list-style-type: none"> 1. List the main groups of oral anti-diabetic drugs. 2. Give a brief description of the pharmacological action of these drugs. 3. Understand the mechanisms by which these drugs lower the blood glucose level. 4. Enlist the common side effects and contraindications of these drugs. 5. Enumerate which drugs interact with oral anti-diabetic drugs.
4.	<p>Thyroid hormones, Antithyroid drugs</p> <p>By the end of the lecture the student will be able to</p> <ol style="list-style-type: none"> 1. Recall the pathway for thyroid hormone synthesis, release, its site of action and mechanism. 2. Review the pharmacological effects of thyroid hormone. 3. Enlist drugs for the treatment of hypothyroidism. 4. Describe the mechanism of action of antithyroid drugs. 5. Explain the role of Iodides and beta blockers in hyperthyroidism. 6. Outline the major toxicities of antithyroid drugs.
5.	<p>Adrenal hormones-I</p> <p>By the end of the lecture the student will be able to</p> <ol style="list-style-type: none"> 1. Recall the naturally occurring adrenal steroid hormones, their synthesis and release. 2. Enlist some important synthetic glucocorticoids and mineralocorticoids. 3. Classify glucocorticoids according to the duration of action. 4. Enumerate the glucocorticoids given through inhalational route.

6.	<p>Adrenal hormones-II</p> <p>By the end of this lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Describe the pharmacological effects of glucocorticoids. 2. Elaborate their therapeutic uses. 3. Outline their adverse effects, contraindications and cautions. 4. Briefly describe the salient features of glucocorticoid antagonists.
7.	<p>Sex Hormones: Estrogens & Progestins, Anabolics</p> <p>By the end of lecture, the students will be able to</p> <ol style="list-style-type: none"> 1. Recall the synthesis, release and regulation of hormones produced by ovaries and testes. 2. Classify estrogens and progesterone. 3. Explain the pharmacokinetic and pharmacodynamic properties of estrogens and progesterone. 4. Enumerate their clinical indications, adverse effects and contraindications. 5. Name anti-estrogens and anti-progestins along with their indications and side effects. 6. Describe the salient features of androgens and anti-androgens.
8.	<p>Hormonal contraceptives</p> <p>By the end of the lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Enlist various types of hormonal contraceptive preparations. 2. State the mechanism of action and pharmacological effects of hormonal contraceptives. 3. Explain their uses, adverse effects and contraindications. 4. Cite important drug interactions that may occur.

DRUGS ACTING ON BLOOD

Treatment of anaemia should receive maximum attention of the teachers and students. Basic and applied aspects of anticoagulants should be covered. Role of aspirin as Antiplatelet agent should be highlighted. Students should be made to understand the part played by non-pharmacological measures in the treatment of hyperlipaemias. At the end of the course the student must be able to classify different drug groups acting on blood, describe their mechanism of action and enumerate their clinical uses and major side-effects with important contra-indications

S.NO.	TITLE OF LECTURES WITH LEARNING OBJECTIVES
1.	<p>Haematinics-I</p> <p>By the end of lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Name the 2 most common types of nutritional anemia and describe their biochemical causes. 2. Draw the normal pathways of absorption, transport, and storage of iron in the human body. 3. Name the anemias for which iron supplementation is indicated and those for which it is contraindicated. 4. List the acute and chronic toxicities of iron and role of Desferrioxamine
2.	<p>Haematinics-II</p> <p>By the end of lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Sketch the dTMP cycle and show how deficiency of folic acid and vitamin B12 affects the normal cycle. 2. Explain hazards of folic acid as sole therapy for megaloblastic anemia 3. Name hematopoietic growth factors with clinical uses and toxicity 4. Explain the advantage of polyethylene glycol to filgrastim. 5. Summarize the role of Epoetin Alfa in treating anemia

3.	<p>Anticoagulants. Introduction, Classification. Heparin By the end of lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Classify major Anticoagulants for treatment of various arterial and venous thrombosis 2. Compare the standard heparin, and LMW heparins with respect to Pharmacokinetics, mechanisms, and toxicity. 3. Explain mechanism of action of Buvalirudin, argatroban, and dabigatran with their toxicity 4. Describe the term HIT (Heparin induced thrombocytopenia)
4.	<p>Oral Anticoagulants By the end of lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Describe the mechanism of action of Warfarin 2. Explain its therapeutic applications in various thrombo-embolic events 3. Enumerate its adverse effects, drug interactions and antidotes in case of poisoning 4. Differentiate between Heparin and Warfarin
5	<p>Thrombolytics By the end of lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Classify Thrombolytic Agents and their routes of administration 2. Explain the mechanism of action of Streptokinase in coronary artery thrombosis 3. Enlist uses of Alteplase and other thrombolytic agents 4. Summarize the toxicity of these agents
6	<p>Antiplatelet drugs By the end of lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Diagram the function of activated platelets at the site of a damaged blood vessel wall and show where the 4 major classes of antiplatelet drugs act. 2. Compare the pharmacokinetics, uses, and toxicities of the major antiplatelet drugs 3. Explain mode of action of Aspirin as an antiplatelet drug. 4. Describe the mechanism of action and side effects of Clopidogrel, Ticlopidine 5. Summarize mode of action, uses with side effects of Dipyridamole
7	<p>Anti Hyperlipoproteinaemics-I By the end of lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Explain the role of lipoproteins in the formation of atherosclerotic plaques. 2. Summarize the types of lipoproteins and their functions 3. Describe the dietary management of hyperlipidemia 4. Propose a rational drug treatment regimen for different hyperlipidemias
8	<p>Anti Hyperlipoproteinaemics-II By the end of lecture the students will be able to</p> <ol style="list-style-type: none"> 1. List the 5 main classes of drugs used to treat hyperlipidemia. 2. Explain the mechanism of action and adverse effects of Statins 3. Describe mode of action and toxicity of Fibrates 4. Highlight role of bile acid binding resins in hyperlipidemia along with their toxicity 5. Explain role of Sterol absorption inhibitor (Ezetimibe) in treating hyperlipidemia 6. Enlist its pharmacokinetic and Pharmacodynamic properties in treating hyperlipidemia

	7. Describe the mechanism of action of Niacin
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DRUGS ACTING ON GIT

Stress should be laid on the rational treatment of diarrhea. Limitations of purgatives/laxatives in management of habitual constipation should be highlighted. Cost-effective approach in selection of anti-peptic ulcer drugs and treatment of associated H pylori infection should be emphasized. At the end of the course the student must be able to classify different drug groups acting on GIT, describe their mechanism of action and enumerate their clinical uses and major side-effects with important contra-indications.

S.NO.	TITLE OF LECTURES WITH LEARNING OBJECTIVES
1.	<p>Anti-emetics By the end of the lecture the student will be able to</p> <ol style="list-style-type: none"> 1. Explain Pathophysiology of vomiting. 2. Describe Reflex Mechanisms of vomiting. 3. Explain Neuronal Pathways,transmitters and receptors involved in nausea and vomiting. 4. Enlist causes of vomiting. 5. Classify anti-emetic drugs 6. Describe Mechanism of action, clinical uses and adverse effects of Metoclopramide and other drugs.
2.	<p>Anti-diarrheals By the end of the lecture the student will be able to</p> <ol style="list-style-type: none"> 1. Define diarrhea. 2. Enlist causes of diarrhea. 3. Recall the pathogenesis of diarrhea. 4. Explain the rational treatment of diarrhea. 5. Classify agents used for management of diarrhea. 6. Explain the mechanism of action, uses and adverse effects of each group/drugs.
3.	<p>Purgatives/Laxatives By the end of the lecture the student will be able to</p> <ol style="list-style-type: none"> 1. Recall normal functions of colon 2. Differentiate between laxative and purgative 3. Explain non-pharmacological measures for constipation 4. Classify laxatives into 4 major groups 5. Understand the mechanism of action and enumerate the clinical indications and adverse effects of each group of laxatives
4.	<p>Drugs used in peptic ulcer-I By the end of the lecture the student will be able to</p> <ol style="list-style-type: none"> 1. Recall the pathogenesis of acid peptic disease. 2. Classify various drugs used in acid peptic disease. 3. Describe the mechanism of action of proton pump inhibitors. 4. Enumerate & explain their therapeutic uses. 5. Enlist the important side-effects & drug interactions of this drug groups. 6. Explain the regimens for H. pylori eradication
5.	Drugs used in peptic ulcer-II

	<p>By the end of the lecture the student will be able to</p> <ol style="list-style-type: none"> 1. Enumerate H₂ receptor blockers. 2. Describe the mechanism of action of H₂ receptor blockers. 3. Enumerate & explain their therapeutic uses. 4. Describe their important side-effects and drug interactions. 5. Identify common uses and adverse effect of antacids. 6. Know the cytoprotective drugs mainly Misoprostol and its use in NSAID induced peptic ulcer
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DRUGS ACTING ON RESPIRATORY SYSTEM

Common irrationalities in the use of expectorants/mucolytics should be highlighted. Limitations of antitussives should be stressed. Use of Anti-asthmatics in various forms and manifestations of the disease should receive maximum priority. At the end of the course the student must be able to classify different drug groups acting on Respiratory Tract, describe their mechanism of action and enumerate their clinical uses and major side-effects with important contra-indications

1.	<p>Expectorants & Antitussives</p> <p>By the end of the lecture the students will be able to</p> <ol style="list-style-type: none"> 1- Recall the physiology of cough reflex. 2- Enumerate causes of cough. 3- Classify drugs as antitussives, expectorants and mucolytics 4- Explain mechanism of action and adverse drug reactions of each group
2.	<p>Anti-asthmatics-I</p> <p>By the end of the lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Recall the pathophysiology of asthma. 2. Describe the strategies for the treatment of Asthma. 3. Enumerate drugs used for prophylaxis of asthma. 4. Classify the drugs used to treat asthma. 5. Explain the mechanism of action, clinical uses and side effects of β_2 agonists in asthma.
3.	<p>Anti-asthmatics-II</p> <p>By the end of the lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Explain salient features and adverse effects of Methyl xanthines. 2. Understand the effects of antimuscarinic, mast cell stabilizers, and LTIs. 3. Elaborate the anti-inflammatory effects of corticosteroids in asthma. 4. Explain management of acute attack of asthma.

MISC

At the end of the course the student must be able to classify different drug groups in this last portion of the course, describe their mechanism of action and enumerate their clinical uses and major side-effects with important contra-indications.

1.	<p>Antihistamines-I:</p> <p>By the end of the lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Recall the histamine receptor subtypes and its mechanism of action. 2. Briefly explain the pharmacological effects and potential indications of histamine. 3. Enlist different types of histamine antagonists. 4. Classify anti-histamines.
2.	<p>Antihistamines-II</p> <p>By the end of the lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Discuss the pharmacology of H₁ antihistaminic with emphasis on clinical uses, adverse drug reactions and interactions.

	2. Explain the differences between 1 st and 2 nd generation histamine antagonists.
3.	<p>Autacoids and Prostaglandins</p> <p>By the end of the lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Discover and distinguish relationships between different types of eicosanoid molecules. 2. Recall the knowledge of enzymes that create PGs and TXs (cox-1 and -2) 3. Explain the mechanism of action and physiological functions of these molecules. 4. Discuss their clinical uses.
4.	<p>Drug treatment of migraine</p> <p>By the end of the lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Differentiate between different types of headaches. 2. Classify migraine. 3. Explain the causes, symptoms and pathophysiology of migraine. 4. Describe the drugs used for the <i>prevention</i> (prophylactic treatment) of migraine. 5. Classify the drugs used for the <i>acute management</i> of migraine. 6. Explain the pharmacological actions, clinical indications and adverse effects of Triptans and ergot alkaloids.

DENTAL PHARMACOLOGY

This course deals with the study of the essential and most commonly used drugs in dental practice. By the end of the course students will be able to list the indications, contraindications, interactions, and adverse reactions of commonly used drugs in dental practice. This course will enable the students to prescribe drug for common dental ailments as well as to solve dose and percentage calculation pertaining to dental practice.

Sr. No	Title of Lecture
1	<p>Antimicrobial agents used in dentistry, Analgesics used in dentistry</p> <p>By the end of the lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Classify Antimicrobials according to routes of administration. 2. Explain the mechanism of action of various locally applied anti microbials 3. Enlist therapeutic uses and side effects of local antimicrobials. 4. Classify systemic and local analgesics. 5. Explain the mechanism of action of local analgesics. 6. Enlist therapeutic uses and side effects of local analgesics
2	<p>Antiseptics and disinfectants</p> <p>By the end of the lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Define different methods of disinfection used in dentistry. 2. Classify antiseptics and disinfectants according to chemistry. 3. Enumerate requirements for an ideal antiseptic and disinfectant. 4. Explain each group including its efficacy, uses and side effects
3	<p>Agents used for maintenance of oral hygiene, Dentine desensitizing agent, Local anesthetics used in dentistry</p> <p>By the end of lecture students will be able to</p> <ol style="list-style-type: none"> 1. Classify agents used for oral hygiene. 2. Enumerate and describe the components of oral hygiene agents. 3. Classify desensitizing agents. 4. Describe mechanisms of action of desensitizing agents.

	<ol style="list-style-type: none"> 5. Classify local anesthetics based on duration of action. 6. Describe the mechanism of action of lignocaine and write the adverse effects. 7. Explain the basis for combining adrenaline along with local anesthetics.
4	<p>Artificial salivary preparations, Hemostatic agents used in dentistry</p> <p>By the end of lecture students will be able to</p> <ol style="list-style-type: none"> 1. Enumerate artificial salivary preparations. 2. Describe mechanism of action of salivary preparations. 3. Enumerate the hemostatic agents that are applied topically in dentistry. 4. Describe the mechanism of action of topical hemostatic agents.
5	<p>Drugs used in Root canal Therapy</p> <ol style="list-style-type: none"> 1. Classify the drugs used in root canal treatment. 2. List the indications, contra-indications and uses of each drug/agent. 3. Describe the mechanism of action of various drugs used in root canal treatment. 4. Define and classify obtundents. 5. List the properties and uses of various obtundents. 6. Define and enumerate mummifying agents.
6	<p>Agents used for the prevention of Dental caries and Anti calculus Drugs</p> <p>By the end of the lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Enumerate anti caries agents. 2. Explain the mechanism of action of fluoride as anti caries agent. 3. Discuss the use of systemic fluoride with its optimal range value With its adverse reactions 4. Discuss types of topical fluoride available with dosage forms Actions,uses and side effects 5. Describe the different anti calculus agents used with their mechanism of action.



**LIST OF PRACTICALS FOR 2ND YEAR BDS
DEPARTMENT OF PHARMACOLOGY
SHARIF MEDICAL & DENTAL COLLEGE LAHORE**

- 1) **Routes of administration:** advantages & disadvantages of different routes of administration with basic techniques employed for different routes are explained to the students. Four sessions, each of 02 hrs duration
- 2) **Dosage forms :** Various dosage forms are discussed with their advantages and shown to the students in four sessions each of 02 hrs duration
- 3) **Pharmaceutical calculations:** Following topics are discussed with calculation exercises. One topic in one session of 02 hrs duration
 - a) Dilution of stock solutions
 - b) Fractional solutions
 - c) Percentage solutions and powders like ORS.
 - d) Molar solutions
 - e) Equivalent solutions
- 4) **Basic Biostatistics:** Following topics are discussed with exercises. One topic in one session of 02 hrs duration.
 - a) Basic Terminology of biostatistics, Central tendencies, frequencies etc.
 - b) Variance, Standard deviation
 - c) Standard Error of Mean
 - d) Student's 'test' and estimation of value of "P".
- 5) **Prescription writing:** Five sessions of 02 hrs each in duration for giving the WHO concept of 'P' Drugs, Importance and parts of prescription and actual prescriptions of common diseases like Acute Gingivitis, Trigeminal Neuralgia, Oral candidiasis, acute Pharyngitis acute Rhinitis and peptic ulcer are taught to the students in these sessions.
- 6) **Standardization of Drugs:** Two sessions of 02 hrs each are reserved for acquainting the students about the importance of standardization of drugs and different methods employed for it are discussed.
- 7) **Pharmacy Practicals:** One practical per session of 02 hrs duration is performed under the supervision of all the members of the faculty. The practicals are
 - a) **Prepare and dispense 50 grams of 10% sulfur ointment.**
 - b) Prepare and dispense 20 ml of KMNO₄ lotion
 - c) Prepare and dispense 100 ml of 5% Dextrose water.
 - d) Prepare and dispense 100 ml of 0.9% Normal saline.
 - e) Prepare and dispense 5 doses of APC powder
 - f) Prepare and dispense 50 ml of carminative mixture.



ASSESSMENT PLAN

DEPARTMENT OF PHARMACOLOGY

SHARIF MEDICAL AND DENTAL COLLEGE LAHORE

Following modes of assessment are planned for 2nd year BDS class in the subject of Pharmacology and Therapeutics. This plan has been designed keeping in view the university curriculum and hopefully will facilitate the students in preparing for professional examinations in the subject.

Chapter Tests:

These will be conducted at the completion of every chapter. The test will comprise of MCQs and SEQs on the pattern of university examinations. A preparatory time of at least 10 days shall be given prior to these tests. Each test will be followed by viva voce, for which the class will be divided into smaller batches.

Pre-tutorial Tests:

Tutorial topics will be notified minimum one week before the tutorial class. A small test of 10 -15 minutes duration, comprising of MCQs, true or false statements or fill in the blanks will be held before the start of each tutorial. The topic will be then discussed by a senior instructor in detail. This will be an interactive session. The paper of the PTT will be marked by demonstrators in quick time and the papers will be returned before the conclusion of each class.

OSPE Tests:

In order to prepare the students for practical examinations at least two OSPE tests will be conducted on the pattern of university examinations.

Term Tests:

Two term tests shall be conducted in coordination with other subjects. This will comprise of theory, practical and viva segments and a sizeable portion of the total course will be included in each of them.

Pre-annual Exam:

This will be undertaken in coordination with other departments, exactly following the format of university professional examinations. It will comprise of MCQs, SEQs, OSPE and Viva voce.

Internal Assessment:

Internal assessment will be calculated out of 20 on the basis of all these tests that will be conducted throughout the year.



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PRESCRIBED TEXT BOOKS & REFERENCES

RECOMMENDED BOOKS:

Text Books

1. Basic and Clinical Pharmacology 14th Edition by Bertram Katzung.
2. Katzung & Trevor's Pharmacology Examination and Board Review, 12th Edition by Anthony Trevor, Bertram Katzung, Marieke Knudering-Hall.
3. Lippincott Illustrated Reviews: Pharmacology (Lippincott Illustrated Reviews Series) 7th Edition by Karen Whalen PharmD BCPS.

Reference Book

1. Goodman & Gilman's: The Pharmacological Basis of Therapeutics, 13 Edition Laurence L. Brunton, Randa Hilal-Dandan, Björn C. Knollmann.

PRACTICAL COPIES:

1. Handbook of applied pharmacology
2. A manual of experimental pharmacology and pharmacy