

The Draft CBME Curriculum for PG Paraclinical is being Circulated for Comments and Suggestions. The Suggestions are to be sent to RGUHS. And to be mailed to dcd.rguhs@gmail.com

**Rajiv Gandhi University of Health Sciences,
Bangalore, Karnataka**

**Competency Based Undergraduate Medical Education (CBME)
Curriculum**

PHARMACOLOGY

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Goals and Departmental objectives for the undergraduate MBBS curriculum in Pharmacology

Preamble:

Pharmacology is about treating the patients with the required medications, at the right dose, for the right duration and at an appropriate cost. The knowledge of the molecular basis of drug action, the adverse effects caused by the medications, its prevention and treatment and the effects of administering two or more drugs to a patient will be learnt in the context of its clinical application and not just as facts. The emphasis is on the clinical relevance of pharmacological knowledge.

Goals:

The broad goal of Pharmacology curriculum is to equip the Indian Medical Graduate (IMG) with the knowledge of the scientific basis of therapeutics and the skills of rational prescribing during the second year of MBBS.

Objectives:

Knowledge:

At the end of the course, the student should be able to:

1. Describe the pharmacokinetics and Pharmacodynamics of essential and commonly used drugs
2. Apply the knowledge of indications, contraindications, interactions and adverse reactions of commonly used drugs in therapeutics
3. Describe the principles of prescribing and calculate the dosage in special medical situations such as pregnancy, lactation, children, elderly and patients with renal dysfunction
4. Describe the basis of Evidence Based Medicine
5. Apply the concept of rational drug therapy and P drugs in clinical pharmacology
6. Describe the clinical presentation, diagnosis and management of common poisonings, insecticides, common sting and bites
7. Describe drugs of abuse and the process of de-addiction
8. Describe the phases and the regulations involved in the development and introduction of new drugs
9. Explain the concepts and clinical relevance of Essential medicines, Fixed dose combinations, Over the counter drugs, herbal medicines, dietary supplements and nutraceuticals
10. Describe occupational and environmental pesticides, food adulterants, pollutants and insect repellents

Skills:

At the end of the course, the student should be able to:

1. Write a rational prescription for a given condition and communicate the same to the patient
2. Recognise and report an adverse drug reaction of commonly used medications
3. Demonstrate the effects of drugs on blood pressure through computer-aided learning and interpret the graph
4. Perform a critical evaluation of the drug promotional literature
5. Administer drugs through various routes in a simulated environment

Ethics, Attitude and communication:

At the end of the course, the student should be able to:

1. Communicate effectively with the patient with regards storage and use of common medications
2. Explain to the patients the right way to use the various drug formulations
3. Communicate the importance of adherence to medications and motivate the patients
4. Demonstrate an understanding of the legal and regulatory aspects of prescribing medications.
5. Understand and follow the ethical principles involved in prescribing medications.

EXPLANATION OF TERMS USED IN THE MANUAL

1. LECTURE

Any instructional large group method, including traditional lecture and interactive lecture.

2. SMALL GROUP DISCUSSION

Any instructional method involving small groups of students in an appropriate learning context.

3. DOAP (Demonstration- Observation - Assistance - Performance)

A practical session that allows the student to observe a demonstration, assist the performer, perform in a simulated environment, perform under supervision or perform independently.

4. SELF DIRECTED LEARNING

A process in which individuals take the initiative, with or without the help of others in diagnosing their learning needs, formulating learning goals, identifying human and material sources for

learning, choosing and implementing appropriate learning methods.

5. SKILL ASSESSMENT

A session that assesses the skill of the student, including those in the practical laboratory, skills lab, skills station that uses mannequins/ paper case/simulated patients/real patients as the context demands.

6. CORE

A competency that is necessary in order to complete the requirements of the subject (traditional must know)

7. NON – CORE

A competency that is optional in order to complete the requirements of the subject (traditional nice (good) to know/ desirable to know)

SUGGESTED GUIDELINES FOR THE TEACHING AND LEARNING METHODS

LECTURE: Suggested topics for didactic and interactive lectures have been included along with specific learning objectives linked to each competency. Lectures should cover the core competencies with appropriate pictures, charts or diagrams.

SMALL GROUP DISCUSSION: Topics for small group discussion have suggested. These topics included are those where more intensive and interactive learning sessions are required.

SELF DIRECTED LEARNING: Non-core competencies are suggested to be taken as topics for self-directed learning. At the end of the session, the teacher moderates the discussion and the learning is recorded in the logbook.

DOAP (Demonstration- Observation - Assistance - Performance)

Practicals are in the form of Demonstration- Observation – Assistance - Performance)

1. All sessions will have specific learning objectives which are linked to the relevant competencies and are assessed as described in the
2. Assessment module.
3. All sessions will be done with the faculty as the facilitator.
4. The students will be encouraged to observe the demonstrations and perform the requisite skills either independently or with assistance as required.

Emphasis will be on acquiring clinically relevant skills. Thus, case-based learning and discussions will be encouraged.

MINIMUM TEACHING HOURS

Lectures: 80hrs

Small group learning (tutorials/seminars): 138hours- **Practical:** 80 hours & **SGD:** 58 hours

Self-directed learning: 12 hours

Total: 230 hours

THEORY:

Sl no	Topic	Competency	Theory	SGD	SDL	Procedures requiring certification
1	General Pharmacology Toxicology Clinical Pharmacology and rational drug use	PH 1.1 to PH 1.12	10	6	0	Nil
2	Autonomic Nervous System	PH 1.13 to PH1.14	9	2	0	Nil
3	Autacoids	PH1.16	3	2	1	Nil
4	Drugs in anaesthetic practice	PH 1.15, PH1.17 to PH 1.18	4	0	0	Nil
5	Central Nervous System	PH 1.19 to PH 1.23	8	4	0	Nil
6	Diuretics	PH 1.24	3	1	1	Nil
7	Drugs affecting blood and blood formation	PH 1.25, PH 1.35	3	2	2	Nil
8	Cardiovascular System	PH 1.26 to PH 1.31	9	2	3	Nil
9	Respiratory System:	PH 1.32 to PH 1.33	2	1	0	Nil
10	Gastrointestinal System	PH 1.34	1	2	1	Nil
11	Endocrine System	PH 1.36 to PH 1.41	8	4	1	Nil
12	Chemotherapy	PH 1.42 to PH 1.49	17	5	0	Nil
13	Miscellaneous	PH 1.50 to PH 1.64	3	5	3	Nil
	CBME requirement		80 hours	36 hours	12 hours	Nil

PRACTICAL

Topic	Competency	Description	Practical hours	Competencies	Certification
Clinical Pharmacy	PH 2.1	Demonstrate understanding of the use of various dosage forms (oral/local/parenteral; solid/liquid)	14 hours		
	PH 2.2	Prepare oral rehydration solution from ORS packet and explain its use	4 hours		
	PH 2.3	Demonstrate the appropriate setting up of an intravenous drip in a simulated environment.	4 hours		
	PH 2.4	Demonstrate the correct method of calculation of drug dosage in patients including those used in special situations	4 hours		
Clinical Pharmacology	PH 3.1-C	Write a rational, correct and legible generic prescription for a given condition and communicate the same to the patient	6 hours	5	Certification
	PH 3.2-C	Perform and interpret a critical appraisal (audit) of a given prescription	6 hours	3	Logbook & Certification
	PH 3.3-C	Perform a critical evaluation of the drug promotional literature	6 hours	3	Logbook & Certification
	PH 3.4- L	To recognise and report an adverse drug reaction	4 hours		Logbook
	PH 3.5-C	To prepare and explain a list of P-drugs for a given case/condition	6 hours	3	Logbook & Certification
	PH 3.6-L	Demonstrate how to optimize interaction with a pharmaceutical representative to get authentic information on drugs	2 hours		Logbook
	PH 3.7-L	Prepare a list of essential medicines for a healthcare facility	4 hours		Logbook
	PH 3.8	Communicate effectively with a patient on the proper use of prescribed medication	4 hours		

Experimental Pharmacology	PH 4.1	Administer drugs through various routes in a simulated environment using mannequins	10 hours		
	PH4.2	Demonstrate the effects of drugs on blood pressure (vasopressor and vaso-depressors with appropriate blockers) using CAL	6 hours		
Communication	PH5.1	Communicate with the patient with empathy and ethics on all aspects of drug use	SGD 2 hours		
	PH5.2	Communicate with the patient regarding optimal use of a) drug therapy, b) devices and c) storage of medicines	SGD 4 hours		
	PH5.3	Motivate patients with chronic diseases to adhere to the prescribed management by the health care provider	SGD 4 hours		
	PH5.4	Explain to the patient the relationship between cost of treatment and patient compliance	SGD 2 hours		
	PH5.5	Demonstrate an understanding of the caution in prescribing drugs likely to produce dependence and recommend the line of management	SGD 4 hours		
	PH5.6	Demonstrate ability to educate public & patients about various aspects of drug use including drug dependence and OTC drugs	SGD 4 hours		
	PH5.7	Demonstrate an understanding of the legal and ethical aspects of prescribing drugs	SGD 2 hours		
CBME requirement			Practicals -80 hours SGD-22 hours		

C- Needs certification- 4 no

L- Needs Maintenance of a logbook- 3 no.

Note: Spotters can be done concomitantly during the teaching hours.

Model Time table for Phase II MBBS

DRAFT

TIME TABLE

BLOCK 1: 15 WEEKS (OCT-JAN)

	8-11	11.30-12.30	12.30-1.30	2-4
Monday	Postings	PH-L	OBG-L	PH-A, CM-B
Tuesday	Postings	PH-L	FM-L	FM-A,
Wednesday	Postings	MIC-L	PA-L	PA-A, MIC-B
Thursday	Postings	CM-L	PH-SGD	PA-B, MIC-A
Friday	Postings	MIC-L	PA-L	PH-B, CM-A
Saturday	Clinical training and Skills	G.MED-L	SUR-L	FM-B,

SECOND BLOCK 15 WEEKS (FEB-MAY)

	8-11	11.30-12.30	12.30-1.30	2-4
Monday	Postings	MIC-L	PA-SGD	PH-A,PA-B-SGD
Tuesday	Postings	PH-L	MIC-SGD	PH-SGD
Wednesday	Postings	PA-L	MIC-L	PA-A,MIC-B
Thursday	Postings	PH-L		PH-B, PA-A SGD
Friday	Postings	PA-L	MIC-SGD	PA-B,MIC-A
Saturday	Clinical training and Skills	AETCOM	AETCOM	

THIRD BLOCK 10 WEEKS (JUN-AUG)

	8-11	11.30-12.30	12.30-1.30	2-4	4-5
Monday	Postings	PA-L	MIC-L	PH-SGD	PA-SDL
Tuesday	Postings	PA-L	MIC-L	PA-A, MIC-B	PH-SDL
Wednesday	Postings	PH-L		PH-A, PA-B SGD	MIC-SDL
Thursday	Postings	PH-L		PH-B, PA-A SGD	CM-SDL
Friday	Postings	CM-L		PA-B, MIC-A	AETCOM-SDL
Saturday	Clinical training and Skills	SUR-L	OBG	G.M-L	

	TERM-1-OCT-JAN(15 WK)			TERM-2-FEB-MAY(15 WK)			TERM-3- JUN-AUG(10 WK)			TOTAL		
	THEORY	PRAC T	SGT/ TUTORIAL	THEORY	PRAC T	SGT/ TUTORIAL	THEORY	PRAC T	SGT/ TUTORIAL	THEORY	PRAC T	SGT/ TUTORIAL
PATH	30	15	15	30	30	45	20	20	20	80	65	80
PHARM	30	30	15	30	30	30	20	20	20	80	80	65
MICRO	30	30	0	30	30	30	20	20	0	80	80	30
CM	15	0	30	0	0	0	10	0	0	25	0	30
FM	15	0	30	0	0	0	0	0	0	15	0	30
G.MED	15	0	0	0	0	0	10	0	0	25	0	0
G.SUR	15	0	0	0	0	0	10	0	0	25	0	0
OBG	15	0	0	0	0	0	10	0	0	25	0	0
AETCOM				AETCOM 30						AETCOM 30		

NOTE: To be prepared at the convenience of the respective institutions.

Rajiv Gandhi University of Health Sciences
Competency Based Undergraduate Medical Education (CBME) Curriculum
Specific Learning Objectives in Pharmacology

THEORY
(Competency no-1.1 to 1.64)

General pharmacological Principles

- **Lecture - 1 Hour** **Assessment:** Written, Viva voce

PH 1.1 Define and describe the principles of pharmacology and pharmacotherapeutics

- 1.1.1 Define a drug
- 1.1.2 Explain the terms Pharmacology, clinical pharmacology & therapeutics
- 1.1.3 Enlist and explain about various branches of Pharmacology
- 1.1.4 List out sources of drugs with examples
- 1.1.5 List out sources of drug information & Explain each source briefly
- 1.1.6 Recognize the importance of Clinical pharmacology towards rational approach to prescribing medicine
- 1.1.7 Explain the evolution of Pharmacology from medieval to contemporary times

- **SGD - 1 Hour** **Assessment:** Written, Viva voce

PH 1.2 Describe the basis of Evidence based medicine and Therapeutic drug monitoring

Evidence based Medicine

- 1.2.1 Identify reliable sources for research evidence
- 1.2.2 Understand research study designs and the hierarchy for research evidence
- 1.2.3 Ascertain strength of evidence for treatments and understand guidelines in different therapeutic areas
- 1.2.4 Explain the importance of keeping prescribing practice up to date with advances in medical knowledge

Therapeutic Drug Monitoring

- 1.2.5 Understand the purpose of TDM
- 1.2.6 Explain the methods in therapeutic drug monitoring
- 1.2.7 Enlist the drugs that require TDM
- 1.2.8 Understand the purpose for and methods in therapeutic drug monitoring
*TDM to be covered after PK/PD

- **SGD/Practical - 1 Hour** **Assessment:** Written, Viva voce

PH 1.3 Enumerate and identify drug formulations and drug delivery systems

- 1.3.1 Define dosage form, formulation and excipient
- 1.3.2 List out different drug formulations with an example of each.
- 1.3.3 Choose appropriate formulation based on clinical need
- 1.3.4 Explain the advantages and disadvantages of different drug delivery systems
- 1.3.5 Enlist the new drug delivery system and discuss their utility

- **Lecture - 5 Hours** **Assessment:** Written, Viva voce

PH 1.4 Describe absorption, distribution, metabolism & excretion of drugs

Pharmacokinetics (PK)

- 1.4.1 Explain the term Pharmacokinetics
- 1.4.2 Explain the four phases of PK
- 1.4.3 Explain why the understanding of PK is relevant to prescribers

Drug Absorption

- 1.4.4 Explain the principles involved in drug absorption
- 1.4.5 Explain the concept of bioavailability and describe the factors affecting bioavailability
- 1.4.6 Describe the importance of bioequivalence

Drug Distribution

- 1.4.7 Explain the distribution of drugs across body compartments
- 1.4.8 Define apparent volume of distribution
- 1.4.9 Explain the clinical significance of drug distribution
- 1.4.10 Explain the clinical significance of plasma protein binding of drugs
- 1.4.11 Describe redistribution of drugs with clinical application

Biotransformation

- 1.4.12 Define biotransformation
- 1.4.13 Describe first-pass metabolism and its importance
- 1.4.14 Describe phase 1 and phase 2 reactions
- 1.4.15 Explain factors affecting biotransformation
- 1.4.16 Explain the clinical significance of enzyme induction and inhibition

Drug Excretion

- 1.4.17 Describe the various routes of excretion of drugs
- 1.4.18 Explain factors affecting renal excretion
- 1.4.19 Explain plasma half-life and its clinical significance
- 1.4.20 Explain steady-state concentration and its significance
- 1.4.21 Explain the different kinetics of elimination and their clinical significance
- 1.4.22 Apply the knowledge of clearance, loading dose and maintenance dose in calculating the dose for a patient
- 1.4.23 Explain various methods of prolonging drug action
- 1.4.24 Explain the PK factors that determine the choice of dose, route, and frequency of Drug administration.

- **Lecture/SGD - 4 Hours**

Assessment: Written, Viva voce

PH 1.5 Describe general principles of mechanism of drug action

Pharmacodynamics

- 1.5.1 State different mechanisms by which a drug acts giving an example of each
- 1.5.2 Enlist different types of receptors giving examples of drugs acting through them
- 1.5.3 Explain the terms – ‘up-regulation’ and ‘down-regulation’ of receptors
- 1.5.4 Explain the terms –affinity, efficacy, intrinsic activity & potency
- 1.5.5 Define the terms –agonist, antagonist, partial agonist & inverse agonist. Give examples of drugs for each
- 1.5.6 Describe the dose-response relationship and interpret dose-response curves
- 1.5.7 Explain drug synergism with examples
- 1.5.8 Describe the different types of drug antagonism with examples
- 1.5.9 Describe factors modifying drug action and its clinical implications
- 1.5.10 Explain therapeutic index and therapeutic range with clinical significance

- **SGD/ Practical - 1 Hour**

Assessment: Written, Viva voce

PH 1.6 Describe principles of Pharmacovigilance & ADR reporting systems

- 1.6.1 Define the basic terminologies (ADR, Serious ADR, AE, Toxicity, Pharmacovigilance and Causality assessment)
- 1.6.2 Explain the history, need and principles of pharmacovigilance
- 1.6.3 Discuss various methods/systems of ADR reporting
- 1.6.4 Discuss Pharmacovigilance program of India
- 1.6.5 Report ADRs to a Pharmacovigilance Centre by filling the ADR reporting form
- 1.6.6 Discuss the importance of prescriber’s responsibility in Pharmacovigilance

- **SGD - 1 Hour** **Assessment: Written, Viva voce**

PH 1.7 Define, identify and describe the management of adverse drug reactions (ADR)

- 1.7.1 Define an ADR
- 1.7.2 Explain the frequency of ADRs and their impact on public health
- 1.7.3 Describe the common classification of ADRs with examples
- 1.7.4 Describe the management of ADRs.
- 1.7.5 Describe the important risk factors that predict susceptibility to ADRs.
- 1.7.6 Explain the importance of monitoring in prevention of ADRs.

- **SGD - 1 Hour** **Assessment: Written, Viva voce**

PH 1.8 Identify and describe the management of drug interactions

- 1.8.1 Define Drug interactions.
- 1.8.2 Describe the types of Drug interactions as In vivo, In vitro & PK and PD with suitable examples
- 1.8.3 Describe the useful and harmful drug interactions with suitable examples
- 1.8.4 Describe Drug-drug; drug-food; Drug-alcohol; drug–tobacco; Drug-complementary/alternative medicine interactions with examples
- 1.8.5 Explain how to predict and avoid harmful drug interactions in clinical practice
- 1.8.6 Management of DI.
- 1.8.7 Identify the sources of information about DI to inform prescribing

- **SGD - 1 Hour** **Assessment: Written, Viva voce**

PH 1.9 Describe nomenclature of drugs, i.e. generic, branded drugs

- 1.9.1 Describe the chemical name, non-proprietary and Proprietary name of a drug
- 1.9.2 Discuss the importance of using non-proprietary name in prescribing.

- **SGD - 1 Hour** **Assessment: Written, Viva voce**

PH 1.10 Describe parts of a correct, complete and legible generic prescription. Identify errors in prescription and correct appropriately

- 1.10.1 Define a prescription along with the importance of each part of a prescription
- 1.10.2 Describe the format of prescription as per MCI model.
- 1.10.3 Write an unambiguous, legible, complete and legally valid prescription
- 1.10.4 Identify and correct prescription writing errors
- 1.10.5 Describe the importance of maintaining records of prescriptions.

- **SGD - 1 Hour** **Assessment: Written, Viva voce**

PH 1.11 Describe various routes of drug administration, e.g., oral, SC, IV, IM, SL

- 1.11.1 List the various routes of drug administration-oral, parenteral and topical with examples
- 1.11.2 Describe the merits and demerits of each route
- 1.11.3 Choose the correct route of drug administration in a given clinical scenario

- **SGD/Practical - 1 Hour** **Assessment: Written, Viva voce**

PH 1.12 Calculate the dosage of drugs using appropriate formulae for an individual patient, including children, elderly and patient with renal dysfunction

- 1.12.1 Calculate appropriate doses for individual patients based on age, body weight, and surface area.
- 1.12.2 Calculate the dose of drug using appropriate formulae in a given clinical case in children
- 1.12.3 Calculate the dose of drug using appropriate formulae in a given clinical case in elderly
- 1.12.4 Calculate the dose of drug using appropriate formulae in a given clinical case in patients with renal dysfunction and other pathological conditions like CCF, Liver disease.

Drugs acting on Autonomic Nervous system

- **Lecture/SGD- 6/3 Hours**

Assessment: Written, Viva voce

PH 1.13 Describe the mechanism of action, types, doses, side effects, indications and contraindications of adrenergic and anti-adrenergic drugs

- 1.13.1 Describe the organization of the autonomic nervous system
- 1.13.2 Describe the steps involved in neurotransmission
- 1.13.3 Describe the synthesis, storage, release and fate of adrenergic transmitters
- 1.13.4 Classify adrenergic receptors with respect to their structure, localization and second messenger system

Adrenergic drugs

- 1.13.5 Classify adrenergic agonists based on their therapeutic uses and actions.
- 1.13.6 Describe the pharmacological effects of adrenaline and correlate the effects of their therapeutic uses and adverse effects
- 1.13.7 State the salient Pharmacokinetic features of adrenaline
- 1.13.8 Differentiate between adrenaline, nor-adrenaline, isoprenaline and dopamine with respect to pharmacological effects, adverse effects and therapeutic uses. (Enumerate the Adverse effects, therapeutic uses and contraindication of most commonly used Adrenergic Drugs in therapy.)
- 1.13.9 Compare and contrast directly and indirectly acting sympathomimetics with examples
- 1.13.10 State the therapeutic uses and ADRs of indirectly acting sympathomimetics
- 1.13.11 State the precautions and contraindications of sympathomimetics

Antiadrenergic drugs

- 1.13.12 Classify alpha-adrenergic receptor antagonists, and compare and contrast selective alpha1 antagonists with non-selective alpha antagonists
- 1.13.13 Describe the pharmacological effects and applied pharmacokinetics, ADRs, precautions and therapeutic uses of prazosin
- 1.13.14 State the advantages of other selective alpha1 antagonists over prazosin, co-relating the same with their therapeutic use
- 1.13.15 Classify beta-adrenergic receptor antagonists with examples
- 1.13.16 Describe the pharmacological effects, pharmacokinetics, ADRs, precautions and contraindications of beta-adrenergic receptor antagonists
- 1.13.17 State the therapeutic uses of beta-blockers giving the pharmacological basis for their use
- 1.13.18 State the advantages of selective beta1 antagonists over non-selective beta antagonists correlating the same with their therapeutic uses and ADRs
- 1.13.19 Mention the beta-blockers with (ISA) intrinsic sympathomimetic activity giving their advantages and indications
- 1.13.20 Mention the beta-blocker of choice with rationale for the following clinical conditions- Glaucoma, CHF, angina, hypertension, thyrotoxicosis, pheochromocytoma, arrhythmias
- 1.13.21 List the various preparations of beta-blockers with their routes of administration. (State the beta-blockers that can be given by IV route)

- **Lecture - 3 Hours**

Assessment: Written, Viva voce

PH 1.14 Describe the mechanism of action, types, doses, side effects, indications and contraindications of cholinergic and anticholinergic drugs

Cholinergic transmission and Cholinergic drugs

- 1.14.1 Describe the synthesis, storage, release and fate of cholinergic transmitters
- 1.14.2 List the sites where acetylcholine is released
- 1.14.3 Classify cholinergic receptors with their structure, localization and second messenger system
- 1.14.4 Classify cholinomimetic drugs
- 1.14.5 Describe the pharmacological effects of directly acting cholinomimetic drugs
- 1.14.6 Compare the effects of muscarinic agonists on the basis of selectivity and therapeutic uses, adverse effects and contraindications
- 1.14.7 Describe the metabolism of acetylcholine
- 1.14.8 Classify anti-cholinesterase agents
- 1.14.9 Compare the various reversible anti-cholinesterases with respect to their pharmacological properties and therapeutic uses

- 1.14.10 Outline the management of myasthenia gravis
- 1.14.11 State the signs and symptoms of organophosphate compound poisoning
- 1.14.12 Outline the treatment of organophosphorus poisoning with rationale
- 1.14.13 Explain the term enzyme ageing and its clinical significance
- 1.14.14 Explain how the treatment of organochlorine compound poisoning differs from that of organophosphate compound poisoning

Anticholinergic drugs

- 1.14.15 Classify cholinergic receptor antagonists giving examples of muscarinic and nicotinic (Nm: ganglion, Nn: Neuromuscular) blockers
- 1.14.16 List the anticholinergic side effects
- 1.14.17 Compare and contrast atropine and hyoscine
- 1.14.18 State the salient pharmacokinetic features of atropine and its Substitutes
- 1.14.19 List the adverse drug reactions of anticholinergic drugs
- 1.14.20 List the contraindications to anticholinergic drugs
- 1.14.21 State the advantages of atropine substitutes over atropine and state their clinical uses giving suitable examples
- 1.14.22 List the major clinical indications of atropine

Skeletal Muscle Relaxants

- **Lecture - 1 Hour**

Assessment: Written / Viva voce

PH 1.15 Describe mechanism/ s of action, types, doses, side effects, indications and contraindications of skeletal muscle relaxants

- 1.15.1 Define skeletal muscle relaxant.
- 1.15.2 Classify skeletal muscle relaxants.
- 1.15.3 Explain mechanisms of action of skeletal muscle relaxants
- 1.15.4 Compare and contrast (competitive) non-depolarizing blockers and persistent depolarizing blockers.
- 1.15.5 Describe the pharmacokinetics of skeletal muscle relaxants.
- 1.15.6 Uses of skeletal muscle relaxants.
- 1.15.7 Describe the important drug interactions and adverse effects that occur with skeletal muscle relaxants.
- 1.15.8 Discuss the advantages of newer neuromuscular blockers over the older ones.
- 1.15.9 Compare centrally and peripherally acting skeletal muscle relaxants.

Autocoids and related Drugs

- **Lecture/SGD/SDL - 3/4/1 Hour**

Assessment: Written / Viva voce

PH 1.16 Describe mechanism/ s of action, types, doses, side effects, indications and contraindications of the drugs which act by modulating autocoids, including anti-histaminic, 5-HT modulating drugs, NSAIDs, drugs for gout, anti-rheumatic drugs, drugs for migraine

Histamine and Antihistaminics

- 1.16.1 Understand the role of histamine and bradykinin in various physiological and pathophysiological processes.
- 1.16.2 Understand the mechanisms of action of drugs that act as antagonists of the H1 receptor.
- 1.16.3 Know the therapeutic utility of H1-receptor antagonists, alone and in combination with other agents.
- 1.16.4 Know the important adverse effects of H1-receptor antagonists, and the difference between first- and second-generation H1 antihistamines with regard to adverse effects.
- 1.16.5 Outline the treatment of Vertigo.

5-Hydroxytryptamine, its Antagonists and Drug Therapy of Migraine

- 1.16.6 Describe the synthesis, storage and destruction of 5-Hydroxytryptamine.
- 1.16.7 Name and describe the salient features of important 5-HT receptor subtypes.
- 1.16.8 Describe the pharmacological actions and pathophysiological roles of 5-Hydroxytryptamine
- 1.16.9 Describe drugs affecting the 5HT system.
- 1.16.10 Describe the mechanism of action, therapeutic uses and side effects of 5HT modulating drugs.

- 1.16.11 Understand the pathophysiology of migraine.
- 1.16.12 Describe the mechanism of action, adverse effects, contraindications and important drug interactions of anti-migraine drugs
- 1.16.13 Describe the management of migraine and the drugs used for prophylaxis of migraine

Nonsteroidal Anti-inflammatory Drugs and Antipyretic-Analgesics

- 1.16.14 Classify Non-steroidal Anti-inflammatory drugs based on the selectivity of COX enzyme.
- 1.16.15 Explain the mechanisms of action of NSAIDs.
- 1.16.16 Compare and contrast features of nonselective COX inhibitors and selective COX -2 inhibitors and enumerate the concerns with selective COX 2 inhibitors.
- 1.16.17 Describe pharmacokinetics and pharmacological actions of NSAIDs.
- 1.16.18 Describe the therapeutic uses of NSAIDs and enumerate doses of most commonly used NSAIDs.
- 1.16.19 List out the adverse effects, drug interactions, and necessary precautions and contraindications to be followed with NSAIDs.
- 1.16.20 Outline the management of Salicylate poisoning and Paracetamol poisoning.
- 1.16.21 Describe guidelines for choice of non-steroidal anti-inflammatory drugs.
- 1.16.22 Enumerate the analgesic combinations in common use and discuss about topical NSAIDs.
- 1.16.23 Discuss the rationality of analgesic combinations and topical NSAIDs.

Antirheumatoid and Antigout Drugs

- 1.16.24 Explain the pathophysiology of rheumatoid arthritis and understand the goals of drug therapy in rheumatoid arthritis.
- 1.16.25 Classify drugs used in rheumatoid arthritis.
- 1.16.26 Describe the mechanism of action and pharmacological actions of antirheumatic drugs
- 1.16.27 Describe the adverse effects of antirheumatic drugs and enumerate the doses of commonly used antirheumatic drugs.
- 1.16.28 Explain the pathophysiology of Gout.
- 1.16.29 Classify drugs used for Gout.
- 1.16.30 Describe the mechanism of action and pharmacological actions of drugs used for Gout.
- 1.16.31 Describe the therapeutic uses of drugs used for Gout and enumerate the doses of commonly used drugs for Gout.
- 1.16.32 Discuss the adverse effects, precautions and contraindications of drugs used for Gout.
- 1.16.33 Explain the management of Gout.

Local Anaesthetics

• Lecture - 1 Hour

Assessment: Written / Viva voce

PH 1.17 Describe the mechanism/ s of action, types, doses, side effects, indications and contraindications of local anaesthetics

- 1.17.1 Define local anaesthetics.
- 1.17.2 Classify local anaesthetics.
- 1.17.3 Distinguish between the comparative features of general and local anaesthesia.
- 1.17.4 Compare features of amide linked local anaesthetics and ester-linked local anaesthetics.
- 1.17.5 Describe the mechanism of action, local and systemic actions of local anaesthetics.
- 1.17.6 Describe pharmacokinetics and enumerate the doses of commonly used local anaesthetics.
- 1.17.7 Describe the adverse effects, precautions and drug interactions with local anaesthetics.
- 1.17.8 Describe the indications for local anaesthetics and various dosage forms of lignocaine.
- 1.17.9 Describe the techniques of administration of local anaesthetics and their relevance in clinical practice.
- 1.17.10 Explain the complications of spinal anaesthesia.
- 1.17.11 Explain the rationale of combining local anaesthetics with adrenaline and clinical significance

General Anaesthetics

• Lecture - 2 Hours

Assessment: Written / Viva voce

PH 1.18 Describe the mechanism/ s of action, types, doses, side effects, indications and contraindications of general anaesthetics, and pre-anaesthetic medications

- 1.18.1 Define general anaesthesia and explain the stages of General Anaesthesia.
- 1.18.2 Describe the mechanisms of action of general anaesthetics.
- 1.18.3 Enumerate the properties of ideal general anaesthetics
- 1.18.4 Classify general anaesthetics
- 1.18.5 Explain the pharmacokinetics of general anaesthetics.
- 1.18.6 Describe the pharmacological actions and important adverse effects of general anaesthetics.
- 1.18.7 Enumerate the complications and important drug interactions with general anaesthetics.
- 1.18.8 Define pre-anaesthetic medication with the aims of pre-anaesthetic medication and rationality of the use of drugs as pre-anaesthetic medication.
- 1.18.9 What is balanced anaesthesia and components
- 1.18.10 Compare and contrast nitrous oxide and halothane
- 1.18.11 Enumerate intravenous anaesthetic agents

Central Nervous System

• Lecture/SGD: 8/1 Hours

Assessment: Written / Viva voce

PH 1.19 Describe the mechanism/ s of action, types, doses, side effects, indications and contraindications of the drugs which act on CNS, (including anxiolytics, sedatives & hypnotics, anti-psychotic, anti-depressant drugs, anti-manic, opioid agonists and antagonists, drugs used for neurodegenerative disorders, antiepileptics drugs)

Sedatives – hypnotics/ Anxiolytic drugs

- 1.19.1 Define Sedatives and Hypnotics.
- 1.19.2 Describe the different phases of Sleep.
- 1.19.3 Classify Sedative and Hypnotics.
- 1.19.4 Describe the mechanism of action, pharmacokinetics and pharmacological actions of Sedative hypnotics.
- 1.19.5 Describe adverse effects and precautions with long term use and important drug interactions with Sedative and Hypnotics.
- 1.19.6 Describe the therapeutic uses of Sedative and Hypnotics.
- 1.19.7 Describe the management of different types of Insomnia.
- 1.19.8 Describe the management of Sedative and Hypnotic overdose.
- 1.19.9 Discuss the use of melatonin for disturbed biorhythms and sleep disorders.
- 1.19.10 Define Anxiety and Anxiolytics.
- 1.19.11 Classify Anxiolytics.
- 1.19.12 Describe the pharmacological actions of Anxiolytics.
- 1.19.13 Describe the management of Anxiety
- 1.19.14 Enumerate doses of commonly used sedative hypnotics & anxiolytics.

Antipsychotic drugs

- 1.19.15 Define Psychosis. And enumerate the different types of Psychiatric illness.
- 1.19.16 Explain the pathophysiology of Psychoses.
- 1.19.17 Classify Psychotropic drugs and Antipsychotic drugs.
- 1.19.18 Describe the pharmacokinetics, mechanism of action and pharmacological actions of Antipsychotic drugs.
- 1.19.19 Describe the adverse effects and drug interactions of Antipsychotic drugs.
- 1.19.20 Describe the therapeutic uses of Antipsychotic drugs.
- 1.19.21 Explain the advantages of second-generation Antipsychotics over conventional drugs.

Anti-depressants and Antimanic Drugs

- 1.19.22 Define Depression.
- 1.19.23 Explain the pathophysiology of Depression.
- 1.19.24 Classify Antidepressant drugs.
- 1.19.25 Describe the mechanism of Antidepressant action.
- 1.19.26 Describe the pharmacokinetics and pharmacological actions of Antidepressants.
- 1.19.27 Describe the adverse effects and drug interactions with Antidepressants.
- 1.19.28 Outline the management of acute poisoning with tricyclic antidepressants.
- 1.19.29 Describe therapeutic uses of Antidepressants, including those other than depression.
- 1.19.30 Define Mania.
- 1.19.31 Explain the pathophysiology of Mania.

- 1.19.32 Classify Antimanic drugs.
- 1.19.33 Describe mechanisms of action of Lithium.
- 1.19.34 Describe the pharmacokinetics and pharmacological actions of Lithium.
- 1.19.35 Describe the adverse effects and drug interactions of Lithium.
- 1.19.36 Describe the therapeutic uses of Lithium and newer drugs used for mania with their status in the management of mania
- 1.19.37 Describe Psychotomimetic drugs.

Opioid Analgesics and Antagonists

- 1.19.38 Define Algesia (Pain). Classify pain, Explain the pain pathway and WHO pain ladder.
- 1.19.39 Define and Classify Analgesics.
- 1.19.40 Classify Opioid Agonists and Antagonists.
- 1.19.41 Describe the mechanism of action of Opioid Analgesics.
- 1.19.42 Describe pharmacokinetics and pharmacological actions of Opioid Analgesics.
- 1.19.43 Describe adverse effects, precautions and contraindications with Opioid analgesics.
- 1.19.44 Describe types of Opioid receptors.
- 1.19.45 Explain about complex action Opioids-Nalorphine, Pentazocine, Butorphanol, Nalbuphine, Buprenorphine.
- 1.19.46 Describe pure Opioid antagonists and their therapeutic uses.
- 1.19.47 Enumerate endogenous Opioid peptides.
- 1.19.48 Discuss opioid deaddiction
- 1.19.49 Explain the treatment of morphine poisoning

Anti-epileptic drugs

- 1.19.50 Describe Epilepsy and the types of Epilepsy.
- 1.19.51 Classify Antiepileptic drugs.
- 1.19.52 Explain the pathophysiology of Epilepsy.
- 1.19.53 Describe the mechanism of action and pharmacological actions of Antiepileptic drugs.
- 1.19.54 Describe the adverse effects and important drug interactions of Antiepileptic drugs.
- 1.19.55 Explain the management of different types of Epilepsy, including Status Epilepticus.
- 1.19.56 Enumerate the doses of commonly used Antiepileptic drugs.
- 1.19.57 Mention the non-epileptic uses of anti-epileptic drugs

Drugs for Neurodegenerative disorders – Antiparkinsonian drugs and Cognition enhancers

- 1.19.58 Describe Parkinsonism and its pathophysiology.
- 1.19.59 Classify Antiparkinsonian drugs.
- 1.19.60 Describe the mechanism of action of Antiparkinsonian drugs.
- 1.19.61 Describe pharmacokinetics and pharmacological actions of Antiparkinsonian drugs.
- 1.19.62 Describe the adverse effects and their management, important drug interactions of Levodopa
- 1.19.63 Describe Alzheimer's disease and its pathophysiology.
- 1.19.64 Classify Cognition enhancers.
- 1.19.65 Describe drugs used in Alzheimer's disease

Alcohol

- **SGD - 1 Hour**

Assessment: Written / Viva voce

PH 1.20 Describe the effects of acute and chronic ethanol intake

- 1.20.1 Classify alcoholic beverages based on their alcohol content
- 1.20.2 Describe the pharmacological effects of acute and chronic ethanol intake.
- 1.20.3 Describe the pharmacokinetics of ethanol.
- 1.20.4 Describe the important drug interactions with ethanol principles of alcohol de-addiction.
- 1.20.5 Describe drugs used in alcohol deaddiction
- 1.20.6 Explain the therapeutic uses of alcohol.

Methanol and Ethanol poisoning

- **SGD - 1 Hour**

Assessment: Written / Viva voce

PH 1.21 Describe the symptoms and management of methanol and ethanol poisonings

- 1.21.1 Describe the symptoms of methanol poisoning.
- 1.21.2 Explain the mechanism of methanol poisoning.
- 1.21.3 Describe the management of methanol poisoning.
- 1.21.4 Describe the symptoms of ethanol poisoning.
- 1.21.5 Explain the mechanism of ethanol poisoning.
- 1.21.6 Describe the management of ethanol poisoning.

Drugs of Abuse

- **SGD - 1 Hour**

Assessment: Written / Viva voce

PH 1.22 Describe drugs of abuse (dependence, addiction, stimulants, depressants, psychedelics, drugs used for criminal offences)

- 1.22.1 Define drug addiction and drug dependence.
- 1.22.2 List the pharmacological classes of drugs of abuse.
- 1.22.3 Classify the drugs of abuse based on the CNS effects (stimulants, depressants, hallucinogens) with examples.
- 1.22.4 Give examples of hallucinogens.
- 1.22.5 Describe the source, pharmacological effects, withdrawal symptoms and the management of cocaine addiction.
- 1.22.6 Describe the source, pharmacological effects, withdrawal symptoms and the management of barbiturate addiction.
- 1.22.7 Describe the source, signs and symptoms and withdrawal symptoms of morphine addiction and its management.
- 1.22.8 Describe the source, signs and symptoms of addiction to and withdrawal symptoms and management of cannabis addiction.
- 1.22.9 Enumerate the drugs of abuse associated with criminal offences.
- 1.22.10 Enumerate club drugs, the signs and symptoms of their addiction, withdrawal symptoms and management of their addiction.

- **SGD - 1 Hour**

Assessment: Written / Viva voce

PH 1.23 Describe the process and mechanism of drug deaddiction

- 1.23.1 Outline the general principles and steps in the management of drug deaddiction
- 1.23.2 Explain the mechanism of action of the drugs used in drug deaddiction.

Drugs acting on Kidney

- **Lecture/ SDL – 3/1 Hours**

Assessment: Written, Viva voce

PH 1.24 Describe the mechanism/ s of action, types, doses, side effects, indications and contraindications of the drugs affecting renal systems including diuretics, antidiuretic s-vasopressin and analogues

- 1.24.1 Explain the transport of electrolytes at proximal convoluted tubule, the loop of Henle, distal convoluted tubule and the collecting duct.
- 1.24.2 Classify diuretics based on their efficacy with examples.
- 1.24.3 Indicate the site of action of all classes of diuretics.
- 1.24.4 Explain the mechanism of action, pharmacological actions and adverse effects of Thiazide diuretics.
- 1.24.5 Explain the mechanism of action, pharmacological actions and adverse effects of Loop diuretics
- 1.24.6 Explain the mechanism of action and pharmacological actions and adverse effects of potassium-sparing diuretics.
- 1.24.7 Explain the mechanism of action and pharmacological actions and adverse effects of osmotic diuretics.
- 1.24.8 Describe the therapeutic uses of diuretics with their rationale.

- 1.24.9 Briefly describe the carbonic anhydrase inhibitors and their current uses.
- 1.24.10 Enumerate doses, routes of administration and preparations of hydrochlorothiazide, furosemide, amiloride, eplerenone, triamterene
- 1.24.11 Classify vasopressin receptors
- 1.24.12 Describe the physiological actions of Vasopressin
- 1.24.13 Classify anti-diuretic drugs
- 1.24.14 Enumerate the vasopressin analogues
- 1.24.15 Describe the adverse effects of Vasopressin.
- 1.24.16 Describe the therapeutic uses of Vasopressin and its analogues explaining the rationale behind their use
- 1.24.17 Mention vasopressin antagonist and its clinical uses

Drugs affecting Blood

- **Lecture/ SDL – 3/ 1 Hours**

Assessment: Written, Viva voce

PH 1.25 Describe the mechanism/ s of action, types, doses, side effects, indications and contraindications of the drugs acting on blood, like anticoagulants, antiplatelets, fibrinolytics, plasma expanders

Coagulants and Anti-coagulants

- 1.25.1 Describe the coagulation cascade
- 1.25.2 Define the role of coagulants with examples
- 1.25.3 Enumerate the coagulants used clinically
- 1.25.4 Explain the mechanism of anti-coagulant action, adverse effects and therapeutic uses of Vitamin K.
- 1.25.5 Classify anti-coagulants based on their mechanism of action with examples.
- 1.25.6 Describe the pharmacological actions, pharmacokinetics and adverse effects of Heparin
- 1.25.7 Explain the therapeutic uses and contraindications to Heparin.
- 1.25.8 Describe the advantages and disadvantages of low molecular weight heparin.
- 1.25.9 Enumerate the preparations, routes and dose of Heparin.
- 1.25.10 Describe the treatment of Heparin overdose
- 1.25.11 Compare the anticoagulant actions of Heparin with fondaparinux.
- 1.25.12 Describe the mechanism of action, pharmacokinetics and actions of Warfarin
- 1.25.13 Describe the adverse effects and therapeutic uses of Warfarin.
- 1.25.14 Explain the dose regulation and monitoring of patients while on anti-coagulants with reference to parameters such as INR and APTT.
- 1.25.15 Explain the Drug interactions of warfarin
- 1.25.16 Give examples of Direct factor Xa inhibitor and explain their advantages over Warfarin.
- 1.25.17 Explain the advantages and disadvantages of dabigatran over warfarin as anti-coagulant
- 1.25.18 Describe how anticoagulant therapy is monitored

Fibrinolytic and Antifibrinolytic drugs

- 1.25.19 Define fibrinolysis and its mechanisms
- 1.25.20 Enumerate fibrinolytics
- 1.25.21 Describe the actions, adverse effects and advantages of alteplase over streptokinase
- 1.25.22 Describe the therapeutic uses of fibrinolytics
- 1.25.23 Describe the contra-indications to fibrinolytics
- 1.25.24 Describe antifibrinolytics and its application
- 1.25.25 Explain the mechanism of action, indications and therapeutic uses of Tranexamic acid

Antiplatelets

- 1.25.26 Define the functions of platelets in cardiovascular diseases
- 1.25.27 Classify anti-platelet drugs based on their mechanisms of action with examples
- 1.25.28 Compare aspirin, dipyridamole and clopidogrel as anti-platelet agents
- 1.25.29 Describe the therapeutic uses of antiplatelet agents with the rationale for their use in the conditions mentioned
- 1.25.30 Describe the indications for the use of newer antiplatelet agents
- 1.25.31 Compare the newer anti-platelet drugs with aspirin

Plasma Expanders

- 1.25.32 Define plasma expanders
- 1.25.33 Classify plasma expanders with examples
- 1.25.34 Describe the mechanism of actions of crystalloids and colloids
- 1.25.35 Explain the detailed composition of crystalloids
- 1.25.36 Compare crystalloids and colloids
- 1.25.37 Describe the adverse effects and precautions while using plasma expanders
- 1.25.38 Describe the therapeutic uses of plasma expanders

Drugs affecting Renin Angiotension and Aldosterone system

- Lecture/ SDL – 1/ 2 Hours

Assessment: Written, Viva voce

PH 1.26 Describe the mechanism of action, types, doses, side effects, indications and contraindications of the drugs modulating the renin-angiotensin and aldosterone system

- 1.26.1 Explain the physiology of the renin-angiotensin system
- 1.26.2 Describe the pathophysiological actions of Angiotensin-II with reference to the location of its receptors
- 1.26.3 Enumerate the drugs that modulate Renin-angiotensin system
- 1.26.4 Enumerate the Angiotensin-converting enzyme inhibitors (ACEIs)
- 1.26.5 Describe the mechanism of action and pharmacological actions of Angiotensin-converting enzyme inhibitors
- 1.26.6 Describe the adverse effects and therapeutic uses of ACE inhibitors explaining the rationale for their uses
- 1.26.7 Indicate the route, dose and preparations of enalapril, Lisinopril
- 1.26.8 Enumerate Angiotensin receptor blockers (ARBs) used clinically
- 1.26.9 Describe the pharmacological actions, adverse effects, and therapeutic uses of ARBs
- 1.26.10 Describe the advantages of ARBs over ACEIs
- 1.26.11 Explain the mechanism of action, pharmacokinetics therapeutic uses and adverse effects of Aliskiren

Antihypertensive Drugs and drugs used in Shock

- Lecture/ SGD – 1/ 2 Hours

Assessment: Written, Viva voce

PH 1.27 Describe the mechanism s of action, types, doses, side effects, indications and contraindications of antihypertensive drugs and drugs used in shock

- 1.27.1 Define the categories of hypertension as per JNC 7 and JNC 8 criteria
- 1.27.2 Describe the pathophysiology of hypertension
- 1.27.3 Classify anti-hypertensives with examples
- 1.27.4 Describe the mechanism of antihypertensive action, anti-hypertensive effects, adverse effects and drug interactions dose, routes of administration and uses of Diuretics in hypertension
- 1.27.5 Describe the mechanism of antihypertensive action, anti-hypertensive effects, adverse effects, drug interactions, dose, routes of administration and uses of ACE inhibitors in hypertension
- 1.27.6 Describe the mechanism of antihypertensive action, anti-hypertensive effects, adverse effects, drug interactions, dose routes of administration and uses of calcium channel blockers in hypertension
- 1.27.7 Describe the mechanism of antihypertensive action, anti-hypertensive effects, adverse effects, drug interactions, dose routes of administration and uses of beta-blockers in hypertension
- 1.27.8 Enumerate the sympatholytic used in the management of hypertension
- 1.27.9 Explain the mechanism of action, adverse effects and indications for the use of sympatholytic.
- 1.27.10 Explain the management of hypertensive crisis
- 1.27.11 Describe the mechanism of antihypertensive action, anti-hypertensive effects, adverse effects, drug interactions, and use of alpha-blockers in hypertension.
- 1.27.12 Describe the mechanism of antihypertensive action, anti-hypertensive effects, adverse effects, drug interactions, dose routes and uses of Vasodilators in hypertension

- 1.27.13 Discuss which drugs are used in combination in the management of Hypertension.
- 1.27.14 Describe which drugs are most effective in treating individual hypertensive patients with specific comorbidities, including diabetes mellitus, congestive heart failure, and renal disease.
- 1.27.15 Pharmacotherapy of Pulmonary Hypertension and Orthostatic hypotension.
- 1.27.16 Management of Hypertension during pregnancy.

Pharmacotherapy of Shock

- 1.27.17 Define shock
- 1.27.18 Enumerate the types of shock
- 1.27.19 Explain the pathophysiology of shock
- 1.27.20 Describe the pharmacological management of anaphylactic shock explaining the rationale for the use of drugs used in the management
- 1.27.21 Describe the pharmacological management of hypovolemic shock explaining the rationale for the use of drugs used in the management
- 1.27.22 Describe the pharmacological management of cardiogenic shock, explaining the rationale for the use of drugs used in the management.

Pharmacotherapy of Angina pectoris, Acute MI and PVD

- Lecture/ SGD – 2/ 1 Hours

Assessment: Written, Viva voce

PH 1.28 Describe the mechanism s of action, types, doses, side effects, indications and contraindications of the drugs used in ischemic heart disease (stable, unstable angina and myocardial infarction), peripheral vascular disease

- 1.28.1 Define angina pectoris
- 1.28.2 Explain the various types of angina pectoris describing their underlying pathology
- 1.28.3 Classify anti-anginal drugs
- 1.28.4 Describe the mechanism of action, pharmacological actions, adverse effects and therapeutic uses of nitrates
- 1.28.5 Describe the routes of administration, doses and preparations of Nitrates
- 1.28.6 Classify Calcium channel blockers.
- 1.28.7 Describe the mechanism of action, pharmacological actions, adverse effects and therapeutic uses of calcium channel blockers
- 1.28.8 Mention the routes of administration, doses and preparations of Nifedipine and amlodipine
- 1.28.9 Mention the unique features of Felodipine, Nitrendipine, Cilnidipine, Nicardipine and Nimodipine
- 1.28.10 Compare Dihydropyridines with Phenylalkylamines
- 1.28.11 Describe the anti-anginal actions, adverse effects and contraindications to beta-blockers
- 1.28.12 Describe the mechanism of action, anti-anginal actions, adverse effects and the indication for the use of potassium channel openers (nicorandil) in angina pectoris
- 1.28.13 Describe the anti-anginal actions and indications for the use of Trimetazidine in angina pectoris
- 1.28.14 Describe the anti-anginal actions and indications for the use of Ranolazine in angina pectoris
- 1.28.15 Describe the anti-anginal actions and indications for the use of Ivabradine in angina pectoris
- 1.28.16 Explain the pathophysiology of myocardial infarction
- 1.28.17 Explain the steps in the use of drugs in myocardial infarction with the rationale for using them
- 1.28.18 Describe the pathophysiology of peripheral vascular disease (PVD)
- 1.28.19 Classify the drugs used in PVD
- 1.28.20 Describe the mechanism of action, pharmacological actions, adverse effects, dose and uses of Pentoxifylline.
- 1.28.21 Describe the mechanism of action, pharmacological actions, adverse effects, dose and uses of Cilostazol.

Pharmacotherapy of Heart Failure

- Lecture – 1 Hour

Assessment: Written, Viva voce

PH 1.29 Describe the mechanism s of action, types, doses, side effects, indications and contraindications of the drugs used in congestive heart failure

- 1.29.1 Describe the stages of heart failure and the treatments that are recommended at each stage.
- 1.29.2 Describe the rationale for the use of drugs that prevent and slow the progression of heart failure

- 1.29.3 Describe the mechanism of action of inotropic drugs and how they are used to maintain left ventricular function.
- 1.29.4 Identify the major side effects and adverse drug reactions of the drugs used to treat heart failure.
- 1.29.5 Describe the Management of Digitalis Toxicity

Pharmacotherapy of Cardiac Arrhythmias (Non-Core)

- SDL/ Lecture – 1/ 1 Hour

Assessment: Written, Viva voce

PH 1.30 Describe the mechanism s of action, types, doses, side effects, indications and contraindications of the antiarrhythmics

- 1.30.1 Describe the principles of cardiac electrophysiology, especially the ion channels, exchangers, and pumps that are targets of antiarrhythmic drugs.
- 1.30.2 Describe the mechanisms that cause cardiac arrhythmias.
- 1.30.3 Describe the common and important tachyarrhythmias and their mechanisms.
- 1.30.4 Describe the mechanisms and classification of antiarrhythmic drugs.
- 1.30.5 Describe the principles of antiarrhythmic drug pharmacotherapy
- 1.30.6 Describe the pharmacological, pharmacokinetics, and adverse effects of specific antiarrhythmic agents.

Hypolipidemic drugs

- Lecture / SDL– 1/ 1 Hour

Assessment: Written, Viva voce

PH 1.31 Describe the mechanism s of action, types, doses, side effects, indications and contraindications of the drugs used in the management of dyslipidemias

- 1.31.1 Describe lipid metabolism, different classes of lipoproteins and their formation
- 1.31.2 Describe the pathophysiology of primary and secondary hyperlipidaemias
- 1.31.3 Mention the classification of hypolipidemic drugs based on mechanism of action
- 1.31.4 Describe the mechanism of action, pleiotropic effects, indications adverse effects, drug interactions of statins
- 1.31.5 Compare the features of all statins
- 1.31.6 Describe the mechanism of action, indications adverse effects, drug interactions of Resins, ezetimibe, niacin, fibric acid derivatives
- 1.31.7 Describe the combination therapy in dyslipidaemia
- 1.31.8 Discuss which patients with dyslipidaemias should be treated and when treatment should be initiated.
- 1.31.9 Discuss which drugs are most effective in treating patients with different dyslipidaemias.
- 1.31.10 Describe the non-pharmacological treatment including natural agents

Drugs used in Bronchial Asthma and COPD

- Lecture - 2 Hours

Assessment: Written, Viva voce

PH- 1.32 Describe the mechanism/ s of action, types, doses, side effects, indications and contraindications of drugs used in bronchial asthma and COPD

- 1.32.1 Describe the pathophysiology of Bronchial Asthma and COPD
- 1.32.2 Classification of anti-asthmatic drugs
- 1.32.3 Discuss the mechanism of action, pharmacokinetics, adverse effects, status, merits and demerits of beta2 agonists, methylxanthines, corticosteroids, anticholinergics, mast cell stabilizers, leukotriene antagonists, anti-IgE antibodies in asthma.
- 1.32.4 Discuss inhaled medication in bronchial asthma
- 1.32.5 Describe the stepwise management of Bronchial asthma (GINA guidelines)
- 1.32.6 Describe the management of acute severe asthma with the help of a case scenario
- 1.32.7 Enumerate the various inhalational devices available in India
- 1.32.8 Describe the advantages and disadvantages of MDI, rotahaler, use of spacer, nebulizer

Pharmacotherapy of cough

- SGD - 1 Hour

Assessment: Written/ Viva voce

PH- 1.33 Describe the mechanism of action, types, doses, side effects, indications and contraindications of the drugs used in cough (antitussive s, expectorant s/ mucolytics)

- 1.33.1 Explain the cough pathway.
- 1.33.2 Enumerate various causes of cough
- 1.33.3 State the various causes of cough
- 1.33.4 Classify the drugs used in cough
- 1.33.5 Explain the mechanism of action, indications and adverse effects of pharyngeal demulcents, expectorants, mucolytics and anti-tussive with examples
- 1.33.6 List the drugs that induce cough and bronchospasm
- 1.33.7 Comment on the preparations available in the Indian market for cough

Drugs used in Disorders of Gastrointestinal Tract

- **Lecture/ SGD/ SDL - 1/ 3/1 Hours**

Assessment: Written/ Viva voce

PH- 1.34- Describe the mechanism/s of action, types, doses, side effects, indications and contraindications of the drugs used as below:

1. Acid- peptic disease and GERD
2. Antiemetics and prokinetics
3. Antidiarrhoeals
4. Laxatives
5. Inflammatory Bowel Disease
6. Irritable Bowel disorders, Biliary and Pancreatic disorders.

- 1.34.1 Explain the physiology of vomiting and the role of various neurotransmitters
- 1.34.2 Classification of anti-emetics based on mechanism of action
- 1.34.3 Describe the mechanism of action, pharmacological effects, adverse effects and indications of antidopaminergics, antihistaminic, anticholinergics, 5HT3 antagonists, NK1 antagonists, cannabinoid receptor antagonists, steroids which are used as antiemetics
- 1.34.4 Enumerate the drug of choice for various clinical scenarios, such as post-operative vomiting, cancer chemotherapy-induced vomiting etc
- 1.34.5 Enumerate drugs used in vomiting during pregnancy
- 1.34.6 Enumerate the drugs that cause emesis.
- 1.34.7 Compare and contrast Metoclopramide and Domperidone
- 1.34.8 Pathophysiology of gastric acid secretion
- 1.34.9 Identify the sites in the gastric parietal cell where drugs act to suppress acid secretion.
- 1.34.10 Describe the mechanism of action of proton pump inhibitors, H₂ receptor antagonists, and prostaglandin analogues to suppress gastric acid secretion.
- 1.34.11 Describe the limitations to the use of H₂ receptor antagonists in chronic acid suppression.
- 1.34.12 Identify potential drug interactions with proton pump inhibitors and H₂ receptor antagonists
- 1.34.13 Describe the mechanism of action of drugs that enhance gastric cytoprotection.
- 1.34.14 Describe the recommendations for therapy of gastroesophageal reflux disease (GERD)
- 1.34.15 Explain the pathophysiology of constipation
- 1.34.16 Classify laxatives/purgatives
- 1.34.17 Explain the mechanism of action, indications, contraindications and adverse effects of bulk laxatives, stool softener, stimulant purgative, osmotic purgative and 5HT₄ agonists
- 1.34.18 Mention the laxative of choice in bedridden patients, pregnancy, post-operative, functional constipation
- 1.34.19 Classify antidiarrheal agents.
- 1.34.20 Enumerate the principles of management of Diarrhea with rationale for its composition
- 1.34.21 Discuss the advantages of New formula WHO-ORS versus the older composition.
- 1.34.22 Explain the role of Zinc in pediatric diarrhoea
- 1.34.23 Explain the mechanism of action, indications, contraindications and adverse effects of opioids, anticholinergics, PG inhibitors, chloride channel inhibitor, racecadotril and probiotics
- 1.34.24 Explain the pathophysiology and pharmacotherapy of Irritable bowel syndrome
- 1.34.25 Explain the pathophysiology and pharmacotherapy of Inflammatory bowel disorder, Acute pancreatitis
- 1.34.26 Explain the pancreatic enzyme replacements and drugs that inhibit the formation of gall stones

Drugs affecting Blood Formation

- **SDL/ SGD - 1/2 Hours**

Assessment: Written/ Viva voce

PH 1.35 - Describe the mechanism/ s of action, types, doses, side effects, indications and contraindications of drugs used in haematological disorders like:

- 1. Drugs used in anaemias**
- 2. Colony Stimulating factors**

- 1.35.1 Define anaemias and describe the types and causes of anaemia
- 1.35.2 State the role of iron, its sources, requirements, iron absorption, factors that reduce and enhance iron absorption
- 1.35.3 List the oral and parenteral iron preparations with merits and demerits and specific indications
- 1.35.4 Define megaloblastic anaemia
- 1.35.5 State the role of vitamin B12, Folic acid, along with sources and daily requirements
- 1.35.6 State the vitamin B12 preparations
- 1.35.7 State the indications for the use of erythropoietin
- 1.35.8 Describe the various types of colony-stimulating factors with their approved indications (Cancer chemotherapy)

Drugs used in Endocrine Disorders

- Lecture/ SDL/ SGD - 3/1/1 Hours

Assessment: Written/ Viva voce

PH 1.36 - Describe the mechanism of action, types, doses, side effects indications and contraindications of drugs used in endocrine disorders (diabetes mellitus, thyroid disorders and osteoporosis)

Diabetes Mellitus

- 1.36.1 Describe the mechanisms of action of insulin and oral antidiabetic drugs.
- 1.36.2 Describe the components for the management of the diabetic patient, including the goals of therapy.
- 1.36.3 Describe the pharmacotherapeutic options for the treatment of patients with type 1 or type 2 diabetes.
- 1.36.4 Describe the adverse effects of insulin and oral antidiabetic drugs.
- 1.36.5 Describe the treatment of hypoglycemia.
- 1.36.6 Discuss the management of diabetic ketoacidosis and hyperosmolar (nonketotic) coma

Thyroid disorders

- 1.36.7 Discuss the principles of thyroid hormone regulation.
- 1.36.8 Describe the diagnosis and treatment of hypothyroidism and hyperthyroidism, including during pregnancy.
- 1.36.9 Describe the treatment options for well-differentiated thyroid cancer.

Osteoporosis

- 1.36.10 Describe calcium and phosphorous homeostasis.
- 1.36.11 Describe the roles of PTH, calcitonin, and vitamin D in calcium homeostasis.
- 1.36.12 Understand the concept of bone resorption and bone formation.
- 1.36.13 Describe the mechanism of action and untoward effects of bisphosphonates.
- 1.36.14 Describe the role of bisphosphonates in the prevention and treatment of osteoporosis.
- 1.36.15 Describe the pharmacological management of hypocalcemia and hypercalcemia.

- Lecture/SGD- 2/2 hours

Assessment: Written/ Viva voce

PH 1.37 Describe the mechanism s of action, types, doses, side effects, indications and contraindications of the drugs used as sex hormones, their analogues and anterior Pituitary hormones

Pituitary Hormones

- 1.37.1 Describe the functioning of the hypothalamic-pituitary axis
- 1.37.2 Describe the pharmacotherapy of GH excess and GH deficiency.
- 1.37.3 Develop knowledge of the clinical uses of gonadotropin-releasing hormone (GnRH) and its analogues.

Androgens and antiandrogens

- 1.37.4 Describe physiological secretion and regulation of androgens (natural and synthetic)
- 1.37.5 Describe the mechanism of action, uses and adverse effects of different preparations of testosterone
- 1.37.6 Explain the mechanism of action, uses and adverse effects of anabolic steroids and anti-androgens
- 1.37.7 Describe drug therapy of erectile dysfunction

Estrogens and Progestins

- 1.37.8 Describe physiological secretion and regulation of estrogen and progesterone
- 1.37.9 Describe the therapeutic uses and ADRs of postmenopausal hormonal replacement therapy
- 1.37.10 Describe the mechanism of action, uses and adverse effects of selective estrogen receptor modulators, anti-estrogens and aromatase inhibitors
- 1.37.11 Describe the mechanism of action, uses, adverse effects and contraindications of anti progestins
- 1.37.12 Explain various drugs used in the treatment of infertility

• **Lecture - 1 Hour**

Assessment: Written/ Viva voce

PH 1.38 Describe the mechanism of action, types, doses, side effects, indications and contraindications of corticosteroids

- 1.38.1 Explain the physiology of biosynthesis, actions, hypo and hypersecretion of corticosteroids
- 1.38.2 Classify corticosteroid preparations
- 1.38.3 Describe distinctive features, uses, adverse effects and contraindications of various corticosteroid preparations
- 1.38.4 Understand the effect of abrupt cessation of glucocorticoid therapy.

• **SGD - 2 Hours**

Assessment: Written/ Viva voce

PH 1.39 Describe the mechanism of action, types, doses, side effects, indications and contraindications the drugs used for contraception

- 1.39.1 Classify female contraceptives preparations
- 1.39.2 Explain all types with the mechanism of action, uses adverse effects, contraindications and practical considerations of female contraceptives.

• **Lecture – 2 Hours**

Assessment: Written/ Viva voce

PH 1.40 Describe the mechanism of action, types, doses, side effects, indications and contraindications of

1. Drugs used in the treatment of infertility, and
2. Drugs used in erectile dysfunction

- 1.40.1 Describe the causes of infertility
- 1.40.2 Enumerate drugs used in the treatment of infertility
- 1.40.3 Describe the mechanism of action of drugs used in the treatment of infertility
- 1.40.4 Describe the therapeutic uses of drugs used in the treatment of infertility
- 1.40.5 Describe the precautions and contraindications of drugs used in the treatment of infertility
- 1.40.6 Describe the adverse effects of drugs used in the treatment of infertility
- 1.40.7 Describe the drug interactions of drugs used in the treatment of infertility
- 1.40.8 Describe the causes of erectile dysfunction
- 1.40.9 Enumerate drugs used in erectile dysfunction
- 1.40.10 Describe the mechanism of action of drugs used in erectile dysfunction
- 1.40.11 Describe the therapeutic uses of drugs used in erectile dysfunction

• **SGD - 1 Hour**

Assessment: Written/ Viva voce

PH 1.41 Describe the mechanisms of action, types, doses, side effects, indications and contraindications of uterine relaxants and stimulants

- 1.41.1 Classify uterine stimulants
- 1.41.2 Explain the mechanism of action, uses, adverse effects and contraindications of each group
- 1.41.3 Classify uterine relaxants.
- 1.41.4 Explain the mechanism of action, uses, adverse effects and contraindications of each group

Chemotherapy

• **Lecture/SGD- 2/2 hours**

Assessment: Written/ Viva voce

PH 1.42 Describe general principles of chemotherapy

General Principals

- 1.42.1 Classify the chemotherapeutic agents based on chemical structure, mechanism of action, source
- 1.42.2 Describe common problems encountered with the use of chemotherapeutic agents
- 1.42.3 Describe anti-microbial resistance and discuss monitoring of antimicrobial therapy
- 1.42.4 Enumerate the factors to be considered for choosing an antimicrobial agent
- 1.42.5 Mention the advantages and disadvantages of antimicrobial combination with examples

Sulfonamides & Quinolones

- 1.42.6 Explain the mechanism of action of sulfonamides drugs.
- 1.42.7 Explain the various sulfonamide drugs and categorize them according to their absorption from the gastrointestinal (GI) tract.
- 1.42.8 Explain the therapeutic uses and untoward effects of sulfonamide drugs, including trimethoprim-sulfamethoxazole.
- 1.42.9 Describe the therapeutic uses, mechanisms of action, and toxicities of quinolone antibiotic drugs.

Beta lactams

- 1.42.10 Explain the mechanisms of action of the penicillins, cephalosporins, and other β -lactam antibiotics.
- 1.42.11 Explain the mechanisms of resistance of the penicillins, cephalosporins, and other β -lactam antibiotics.
- 1.42.12 Describe the therapeutic effects of the penicillins, cephalosporins, and other β -lactam antibiotics.
- 1.42.13 Describe the untoward effects and contraindications of the penicillins, cephalosporins, and other β -lactam antibiotics.

Aminoglycosides

- 1.42.14 Explain aminoglycoside mechanisms of action and resistance.
- 1.42.15 Describe the advantages and disadvantages of multiple daily dosing versus once-daily extended-interval dosing regimens for aminoglycosides.
- 1.42.16 Describe the rationale and the methods of plasma concentration monitoring of aminoglycoside therapy.
- 1.42.17 Describe the causes and clinical signs of aminoglycoside ototoxicity and nephrotoxicity, and the best means of monitoring therapy to avoid these serious toxicities.
- 1.42.18 Explain the unique clinical differences among the aminoglycosides.

- 1.42.19 Describe the mechanisms of action and resistance of tetracyclines, macrolides, vancomycin, linezolid, daptomycin, and quinupristin/dalfopristin
- 1.42.20 Describe the unique toxicities of antibiotics that are inhibitors of bacterial protein synthesis
- 1.42.21 Describe the uses and untoward reactions of vancomycin
- 1.42.22 Explain the drug-drug interactions that occur with some of these antibiotics
- 1.42.23 Explain how linezolid, daptomycin, and quinupristin/dalfopristin are used to treat methicillin-resistant and vancomycin-resistant organisms

- **SGD – 4 Hour**

Assessment: Written, Viva voce

PH 1.43 - Describe and discuss the rational use of antimicrobials including antibiotic stewardship program

- 1.43.1 Enumerate the factors influencing the antimicrobial selection, duration and dose
- 1.43.2 Define appropriate empiric antimicrobial prescribing
- 1.43.3 Highlight mechanisms by which microorganisms develop antimicrobial resistance
- 1.43.4 Understand the impact of pharmacodynamics, pharmacokinetics, bioavailability on development of antimicrobial resistance with examples
- 1.43.5 Understand the principles of antimicrobial selection for a specific infectious condition
- 1.43.6 Enumerate basic steps of prevention of antimicrobial resistance

- **Lecture – 1 Hour**

Assessment: Written, Viva voce

PH 1.44 - Describe the first-line anti-tubercular drugs, their mechanisms of action, side effects and doses

- 1.44.1 Discuss the pathophysiology of tuberculosis.
- 1.44.2 Enumerate various anti-tubercular drugs.
- 1.44.3 Describe the mechanism of action and resistance to anti-tubercular drugs.
- 1.44.4 Describe the adverse effects and drug interactions commonly associated with anti-TB drugs.
- 1.44.5 Understand the rationale for combination drug therapy in the treatment of tuberculosis
- 1.44.6 Describe and discuss the salient features, diagnostic criteria and guidelines for the treatment of tuberculosis under NTEP

- **Lecture – 1 Hour**

Assessment: Written, Viva voce

PH 1.45 - Describe the drugs used in MDR and XDR Tuberculosis

- 1.45.1 Define MDR and XDR TB
- 1.45.2 List drugs, mechanism of action, indications, contraindications and adverse effects of drugs used in MDR and XDR Tuberculosis.
- 1.45.3 Explain the regimen for MDR and XDR tuberculosis

- **Lecture – 1 Hour**

Assessment: Written, Viva voce

PH 1.46 - Describe the mechanisms of action, types, doses, side effects, indications and contraindications of antileprotic drugs

- 1.46.1 Describe the principles of anti-leprosy therapy.
- 1.46.2 Describe the mechanism of action, ADE, DI of antileprotic drugs
- 1.46.3 Discuss the management of leprosy and treatment of Lepra reactions

• **Lecture/ SGD – 4/2 Hours**

Assessment: Written, Viva voce

PH 1.47 - Describe the mechanisms of action, types, doses, side effects, indications and contraindications of the drugs used in malaria, KALA-AZAR, amebiasis and intestinal helminthiasis

- 1.47.1 Describe the stages of the malaria parasite in the human body.
- 1.47.2 Classify antimalarial drugs into those that are effective against only the blood stages of the parasite, those that are effective against both the blood and liver stages and those that are effective against only the liver stages of the parasite.
- 1.47.3 Explain the use of antimalarial drugs in the clinical context, particularly with regard to their mechanism of action, therapeutic uses, and toxicities.
- 1.47.4 Describe the principles and guidelines for the chemoprophylaxis and treatment of malaria.
- 1.47.5 Define KALA-AZAR
- 1.47.6 Discuss the pathophysiology of KALA-AZAR
- 1.47.7 Enumerate drugs used in KALA-AZAR
- 1.47.8 Describe the mechanism of action of drugs used in KALA-AZAR
- 1.47.9 Describe the therapeutic uses of drugs used in KALA-AZAR
- 1.47.10 Describe the precautions and contraindications of drugs used in KALA-AZAR
- 1.47.11 Describe the adverse effects of drugs used in KALA-AZAR
- 1.47.12 Describe the drug interactions of drugs used in KALA-AZAR
- 1.47.13 Describe the management of KALA-AZAR
- 1.47.14 Define amoebiasis
- 1.47.15 Discuss the pathophysiology of amoebiasis
- 1.47.16 Enumerate drugs used for amoebiasis
- 1.47.17 Describe the mechanism of action of drugs used for amoebiasis
- 1.47.18 Describe the therapeutic uses of drugs used for amoebiasis
- 1.47.19 Describe the precautions and contraindications of drugs used for amoebiasis
- 1.47.20 Describe the adverse effects of drugs used for amoebiasis
- 1.47.21 Describe the drug interactions of drugs used for amoebiasis
- 1.47.22 Describe the management of amoebiasis
- 1.47.23 Describe the common helminth infections, the clinical symptoms, and the mainstays of therapy.
- 1.47.24 Describe the therapeutic uses of anthelmintic drugs.
- 1.47.25 Explain the mechanisms of actions of anthelmintic drugs.
- 1.47.26 Describe the toxicities and contraindications of anthelmintic drugs

• **Lecture/ SGD – 3/2 Hours**

Assessment: Written, Viva voce

PH 1.48 - Describe the mechanisms of action, types, doses, side effects, indications and contraindications of the drugs used in UTI/ STD and viral diseases including HIV & Antifungal drugs

- 1.48.1 Define UTI
- 1.48.2 Discuss the pathophysiology of UTI
- 1.48.3 Enumerate drugs used for UTI
- 1.48.4 Describe the mechanism of action of drugs used for UTI
- 1.48.5 Describe the therapeutic uses of drugs used for UTI
- 1.48.6 Describe the precautions and contraindications of drugs used for UTI
- 1.48.7 Describe the adverse effects of drugs used for UTI
- 1.48.8 Describe the drug interactions of drugs used for UTI
- 1.48.9 Describe the management of UTI
- 1.48.10 Define STD
- 1.48.11 Enumerate common STDs
- 1.48.12 Enumerate drugs used in STDs
- 1.48.13 Describe the mechanism of action of drugs used in STD
- 1.48.14 Describe the precautions and contraindications of drugs used in STD

- 1.48.15 Describe the adverse effects of drugs used in STD
- 1.48.16 Describe the drug interactions of drugs used in STD
- 1.48.17 Describe the management of STD
- 1.48.18 Describe the mechanisms of action and resistance of antifungal agents.
- 1.48.19 Describe the therapeutic uses of antifungal agents in the context of treatment for fungal diseases
- 1.48.20 Develop knowledge of the common and unique toxicities of antifungal agents.
- 1.48.21 Explain the drug-drug interactions that can occur with the use of azole antifungal agents
- 1.48.22 Explain the treatment of herpes virus infections and the use of anti-herpes drugs
- 1.48.23 Discuss the treatment strategies for chronic hepatitis B and C infections
- 1.48.24 Explain the mechanisms of action and resistance, and the therapeutic use of the anti-influenza agents
- 1.48.25 Discuss the principles of HIV chemotherapy as per National guidelines including HAART regimen
- 1.48.26 Describe the mechanisms of action and resistance, the untoward effects and the therapeutic uses of the drugs used to treat HIV infections

Anticancer drugs

- Lecture – 2 Hours

Assessment: Written, Viva voce

PH 1.49 Describe the mechanism of action, classes, side effects, indications and contraindications of anticancer drug

- 1.49.1 Discuss the general principles in the chemotherapy of Cancer
- 1.49.2 Classify anticancer drugs
- 1.49.3 Describe the mechanism of action of Anticancer drugs
- 1.49.4 Describe the mechanisms of toxicity of cytotoxic antineoplastic agents on normal cells and strategies for reducing toxic effects
- 1.49.5 Enumerate the classes of agents are typically used in treating specific cancers

Immunomodulators

- Lecture – 1 Hour

Assessment: Written, Viva voce

PH 1.50 Describe mechanisms of action, types, doses, side effects, indications and contraindications of immunomodulators and management of organ transplant rejection

- 1.50.1 Differentiate between Immuno-suppressants and immuno-stimulants
- 1.50.2 Define immunosuppressants & Classify immuno-suppressants
- 1.50.3 Describe the mechanisms of action of Calcineurin inhibitors
- 1.50.4 Enlist m-Tor inhibitors and antiproliferative agents used as immunosuppressants
- 1.50.5 Enlist Biological agents used as immunosuppressants
- 1.50.6 Enumerate the adverse effects of immunosuppressants
- 1.50.7 Enlist clinical uses of immunosuppressants

Occupational and Environmental Pesticides, Food Adulterants, Pollutants and Insect Repellents

- SDL – 1 Hour

Assessment: Written, Viva voce

PH- 1.51 Describe occupational and environmental pesticides, food adulterants, pollutants and insect repellents

- 1.51.1 Define the various toxicology terms
- 1.51.2 Define occupational pesticides and enlist them

- 1.51.3 Explain environmental pesticide and its management
- 1.51.4 Enlist food adulterants
- 1.51.5 Enlist insect repellents

Pharmacotherapy of Poisoning

- Lecture – 1 Hour

Assessment: Written, Viva voce

PH 1.52- Describe the management of common poisoning, insecticides, common sting and bites

- 1.52.1 Explain the general management of common poisoning
- 1.52.2 Enlist the specific antidotes used in the treatment of common poisons
- 1.52.3 Explain the method of enhancing the elimination of toxin using examples
- 1.52.4 Explain the management of Bee sting bite, Scorpion bite and Snakebite

Chelating agents

- SGD – 1 Hour

Assessment: Written, Viva voce

PH 1.53 - Describe heavy metal poisoning and chelating agents

- 1.53.1 Define Chelating agents and enlist Chelating agents used in Heavy metal poisoning
- 1.53.2 Describe the mechanism of action of Chelating agents
- 1.53.3 Name the Chelating agents used in the management of Iron, Lead, Copper, and Arsenic intoxication
- 1.53.4 Enlist the clinical uses of penicillamine

Vaccines and Antisera

- SGD – 1 Hour

Assessment: Written, Viva voce

PH 1.54 - Describe vaccines and their uses

- 1.54.1 Define Vaccines and classify vaccines
- 1.54.2 Enlist the bacterial vaccines
- 1.54.3 Enlist the viral vaccines
- 1.54.4 Enlist Toxoids and Mixed Toxoids
- 1.54.5 Enlist antisera and immunoglobulins
- 1.54.6 Discuss the routine immunization schedule for infants and children as per IAP guidelines

National Health Programme

- SGD – 2 Hours

Assessment: Written, Viva voce

PH 1.55 - Describe and discuss the following National Health Programme including Immunization, Tuberculosis, Leprosy, Malaria, HIV, Filariasis, Kala Azar, Diarrhoeal diseases, Anaemia & nutritional disorders, Blindness, Non-communicable diseases, cancer and Iodine deficiency

- 1.55.1 Explain the universal immunization programme in India
- 1.55.2 Explain Revised National Tuberculosis Elimination Programme
- 1.55.3 Explain National Leprosy Eradication Programme
- 1.55.4 Enlist National Vector Borne Disease Control Programmes
- 1.55.5 Explain the National AIDS Control Programme
- 1.55.6 Describe National programme for prevention and control of cancer, diabetes, cardiovascular diseases and stroke
- 1.55.7 Describe National Programme for Control of Blindness & Visual Impairment

- 1.55.8 Describe National Programme For Prevention and Control Of cancer
- 1.55.9 Discuss the Diarrhoeal Disease Control Programme
- 1.55.10 Describe iodine deficiency disorders control programme

Geriatric and Pediatric pharmacology

- **Lecture – 1 Hour**

Assessment: Written, Viva voce

PH 1.56 - Describe basic aspects of Geriatric and Pediatric pharmacology

- 1.56.1 Describe physiological changes in Children and Elderly patients that influence the pharmacokinetic and Pharmacodynamic parameters of medications.
- 1.56.2 Discuss the common drugs to which children/elderly are likely to respond differently
- 1.56.3 Explain the principles that underlie the prescribing in children/elderly

Pharmacotherapy of Skin disorder

- **SDL – 1 hr**

Assessment: Written, Viva voce

PH 1.57- Describe drugs used in skin disorders

- 1.57.1 Discuss how drugs are absorbed through the skin.
- 1.57.2 Define demulcents, emollients, adsorbents& protectants, astringents, irritants and counter irritants and keratolytic, Melanising agents with examples, their uses and adverse reactions.
- 1.57.3 Describe the mechanism of action, therapeutic uses, and toxicities of topical and systemic drugs used to treat common dermatological disorders like seborrheic dermatitis, Vitiligo, Psoriasis and Acne vulgaris.
- 1.57.4 Discuss the science behind the use of sunscreen agents.
- 1.57.5 List the topical glucocorticoids, explain the rationale for using glucocorticoids in skin disorders and their adverse effects.

Ocular Pharmacology

- **SGD – 1 Hour**

Assessment: Written, Viva voce

PH 1.58 - Describe drugs used in Ocular disorders

- 1.58.1 Understand the principles of using drugs to treat ophthalmic disorders.
- 1.58.2 Describe the ocular toxicities of systemic drugs.
- 1.58.3 Explain the mechanisms of action, clinical uses, and toxicities of ophthalmic drugs.
- 1.58.4 Describe how ophthalmic drugs administered topically can cause systemic side-effects.
- 1.58.5 Understand the pathophysiology of glaucoma and the role of pharmacotherapy in its management.

Essential medicines, Fixed dose combinations, Over the counter drugs, herbal medicines

- **SGD– 2 Hours**

Assessment: Written, Viva voce

PH 1.59- Describe and discuss the following: Essential medicines, Fixed dose combinations, Over the counter drugs, herbal medicines

- 1.59.1 Define Essential medicines concept.
- 1.59.2 Discuss the criteria to prepare a list of essential medicines for your community PHC.
- 1.59.3 Define fixed-dose combination, advantages and disadvantages of FDC.

- 1.59.4 Describe the pharmacokinetics and pharmacodynamics parameters to be considered to combine two drugs in an FDC.
- 1.59.5 Discuss Rational and irrational prescribing drugs with examples.
- 1.59.6 Define over the counter medicines and prescription medicines.
- 1.59.7 Enumerate the similarities and differences between OTC medicines and prescription medicines.
- 1.59.8 Summarize how to responsibly use OTC medicines and prevent misuse.
- 1.59.9 List 10 Herbal medicines used in allopathic practice.
- 1.59.10 Enumerate advantages and disadvantages of Herbal medicines

Pharmacogenomics and Pharmacoeconomics

- SGD - 1 Hour

Assessment: Written, Viva voce

PH 1.60- Describe and discuss Pharmacogenomics and Pharmacoeconomics

- 1.60.1 Define Pharmacogenomics and Pharmacogenetics and Pharmacoeconomics with examples
- 1.60.2 Describe different types of pharmacoeconomic models with examples
- 1.60.3 Discuss the role of Pharmacogenomics and Pharmacoeconomics in modern therapeutics.

Dietary Supplements and Nutraceuticals

- SDL – 1 Hours

Assessment: Written, Viva voce

PH 1.61 - Describe and discuss dietary supplements and nutraceuticals

- 1.61.1 Describe the role of common vitamins and minerals in normal physiology and diseases.
- 1.61.2 Identify the potentially toxic effects of vitamins and minerals.
- 1.61.3 List the fat-soluble and water-soluble vitamins, and identify examples of how solubility affects the absorption, transport, storage and excretion of each type.
- 1.61.4 Describe how B vitamins assist with energy metabolism
- 1.61.5 Justify the statement “It is better to get vitamins from food than from supplements.”
- 1.61.6 Enumerate anti-oxidant vitamins, list the food source and their functions
- 1.61.7 Analyze from the below list, valid reasons that some individuals require vitamin supplements
 - a. women in childbearing age
 - b. Pregnant and lactating women
 - c. Vitamins of AIDS or other wasting illness
 - d. Addicted to drugs or alcohol
 - e. Strict vegetarians
 - f. Recovering from surgery, burns and injury.

Antiseptics and Disinfectants

- SGD – 2 Hours

Assessment: Written, Viva voce

PH 1.62 Describe and discuss antiseptics and disinfectants

- 1.62.1 Describe antiseptics and their use in wound care with examples
- 1.62.2 Describe disinfectants and their use in infection control with examples
- 1.62.3 Summarize the adverse effects of antiseptics and disinfectants
- 1.62.4 Describe Ecto-parasiticides with examples, use and adverse effects
- 1.62.5 Discuss hand hygiene using soap as per WHO guidelines
- 1.62.6 Information on hand sanitisers

Drug Regulation

- SGD – 1 hr

Assessment: Written, Viva voce

PH 1.63 Describe Drug Regulations, acts and other legal aspects

- 1.63.1 Explain why drugs need to be regulated
- 1.63.2 Identify the major regulatory authorities in India
- 1.63.3 Describe the approval process for New Drugs in simple terms.
- 1.63.4 Discuss the major legislation pertaining to drugs

Drug development and GCP

- SGD – 1hrs

Assessment: Written, Viva voce

PH 1.64 - Describe an overview of drug development, Phases of clinical trials and Good Clinical Practice

- 1.64.1 Enlist the stages in new drug development
- 1.64.2 Explain the approaches to drug discovery /invention
- 1.64.3 Discuss about the preclinical studies
- 1.64.4 Describe the phases of clinical trials
- 1.64.5 Describe the Principles Good Clinical Practice

Drug development and GCP

- SGD – 1 hr

Assessment: Written, Viva voce

PH 1.64 - Describe overview of drug development, Phases of clinical trials and Good Clinical Practice

- 1.64.6 Enlist the stages in new drug development
- 1.64.7 Explain the approaches to drug discovery /invention
- 1.64.8 Discuss about the preclinical studies
- 1.64.9 Describe the phases of clinical trials
- 1.64.10 Describe the Principles Good Clinical Practice
- 1.64.11 Understanding the Ethical issues involved in a clinical trial
- 1.64.12 Safety requirements of research subjects- Informed Consent document, Insurance, Compensation**
- 1.64.13 Understand the principles of ethics as applied to research in special population.

PANDEMIC MODULE 2.5

Therapeutic strategies including new drug development

- Theory – 1 hours

Assessment: Written, Viva voce

PH 2.5 - Describe stages of new drug development and clinical trial during a pandemic.

- Enlist the stages in new drug development during a pandemic.
- Describe drug repurposing with its importance and benefits.
- What is off-label drug use? Risks, benefits and implications examples
- Describe the clinical trial conduct during a pandemic.

- SGD – 2 hours

Assessment: Written, Viva voce

- New drug development – Challenges and solutions
- Urgency in procedures
- **Need for monitoring** – Pharmacovigilance activities of drugs approved for emergency use/clinical trials during Pandemic

DRAFT

PRACTICAL

Specific Learning Objectives in Pharmacology

(Skills and communication: Competency no-2.1 to 5.7)

- **Practical DOAP – 14 Hours**

Assessment: Skill Assessment

PH 2.1 Demonstrate understanding of the use of various dosage forms (oral/ local/ parenteral; solid/liquid)

- 2.1.1 Identify various dosage forms – solid, liquid, topical dosage forms
- 2.1.2 Describe the various types of solid dosage form in the given samples with merits and demerits of each
- 2.1.3 Describe the various types of liquid dosage form in the given samples with merits and demerits of each
- 2.1.4 Describe the various types of topical dosage form in the given samples with merits and demerits of each
- 2.1.5 Describe all the components of a commercial label of the given dosage form and its importance

- **Practical DOAP – 4 Hours**

Assessment: Skill Assessment

PH 2.2 Prepare oral rehydration solution from ORS packet and explain its use

- 2.2.1 Define and enumerate the causes of dehydration
- 2.2.2 Describe the clinical assessment of dehydration
- 2.2.3 Enumerate the different types of ORS along with their composition with actions of each ingredient
- 2.2.4 Choose the appropriate type of ORS for a given condition/patient
- 2.2.5 Calculate the quantity of ORS required to correct/prevent dehydration
- 2.2.6 Demonstrate preparation of ORS from a sachet
- 2.2.7 Enumerate non-diarrheal uses of ORS

- **Practical DOAP – 4 Hours**

Assessment: Skill Assessment

PH 2.3 Demonstrate the appropriate setting up of an intravenous drip in a simulated environment

- 2.3.1 Open the infusion set following aseptic technique
- 2.3.2 Appropriately position the patient and select a vein.
- 2.3.3 Prepare the overlying skin with aseptic care.
- 2.3.4 Demonstrate correct IV injection technique and strap the cannula in place.
- 2.3.5 Identify any visible impurities if present in the IV fluids.
- 2.3.6 Adjust the flow rate according to the requirement
- 2.3.7 Routinely check patient's ID, drug name, date of expiry etc. before injecting.
- 2.3.8 Monitor a patient on an IV drip and identify any reactions to it.

- **Practical DOAP – 4 Hours**

Assessment: Skill Assessment

PH 2.4 Demonstrate the correct method of calculation of drug dosage in patients including those used in special situations (integration with General medicine, Paediatrics)

- 2.4.1 Calculate appropriate doses for individual patients based on age, body weight, and surface area
- 2.4.2 Demonstrate the correct method of calculation of drug dosage in paediatric patients
- 2.4.3 Demonstrate the iv drip rate calculation & infusion time
- 2.4.4 Demonstrate the correct method of calculation of drug dosage in a patient suffering from renal disease
- 2.4.5 Demonstrate the correct method of calculation of drug dosage in a patient suffering from hepatic disease

- **Skill station – 6 Hours**

Assessment: Skill Assessment and Certification

PH 3.1 Write a rational, correct and legible generic prescription for a given condition and communicate the same to the patient (integration with General medicine)

- 3.1.1 Establish therapeutic goal/s, based on a diagnosis following standard treatment guidelines (STG)
- 3.1.2 Choose the appropriate drug/s for the given clinical condition
- 3.1.3 Choose the appropriate dose, route, frequency and duration of therapy for the chosen drug/s
- 3.1.4 Write a legible prescription as per MCI format
- 3.1.5 Provide appropriate information to the patient regarding the prescription
- 3.1.6 Review/alter prescription in the light of further investigation
- 3.1.7 Explain the legality (legal implications) of prescriptions.

Examples of 5 Exercises

1. Iron deficiency anaemia due to hookworm infestation
2. Acute attack of Migraine
3. Newly diagnosed obese type 2 DM with Hypertension
4. UTI in pregnancy
5. Typhoid fever in a child

• **Skill Lab – 6 Hours**

Assessment: Skill Assessment and Certification

PH 3.2 Perform and interpret a critical appraisal (audit) of a given prescription – 3 no.s

- 3.2.1 Demonstrate the understanding of the importance of completeness of prescription
- 3.2.2 Demonstrate the understanding of clinical diagnosis for which drugs are prescribed
- 3.2.3 Demonstrate the understanding of MCI format of prescription
- 3.2.4 Identify and comment on any discrepancies in the completeness and legibility of the prescription
- 3.2.5 Identify and comment on any discrepancies in the selection of drug, drug form, dose, frequency, duration of the treatment, instructions according to STG
- 3.2.6 Re-Write the prescription correcting all the discrepancies identified

• **Skill Lab – 6 Hours**

Assessment: Skill Assessment and Certification

PH 3.3 Perform a critical evaluation of the drug promotional Literature - Brainstorming followed by demonstration – 3 no.s (integration with General medicine)

- 3.3.1 Discuss the various types of sources of drug information
- 3.3.2 Demonstrate understanding of the importance of critical evaluation of drug promotional literature
- 3.3.3 Critically evaluate the given drug promotional literature based on WHO criteria
 - a. Appropriateness of illustration
 - b. Relevance of references cited
 - c. Content of scientific information

• **Skill station – 4 Hours**

Assessment: Skill Assessment – Log book

PH 3.4 To recognize and report an adverse drug reaction

- 3.4.1 Recognise an adverse drug reaction (ADR) in the given case
- 3.4.2 Perform causality assessment of the identified ADR using WHO & Naranjo's Scale
- 3.4.3 Fill the ADR reporting form (CDSCO form)
- 3.4.4 Explain the management of the ADR
- 3.4.5 Explain the methods to prevent the occurrence of the ADR
- 3.4.6 Report the ADR to the pharmacovigilance centre
- 3.4.7 Describe the Importance of reporting ADRs
- 3.4.8 Describe the various levels of reporting ADRs national and international centres

Example of 3 cases:

1. Warfarin induced Bleeding
2. Aspirin (NSAID) induced Peptic Ulcer
3. Carbamazepine induced Steven Johnson Syndrome

• **Skill Station – 6 Hours**

Assessment: Skill Assessment and Certification

PH 3.5 To prepare and explain a list of P- drugs for a given case/ condition – 3 no.s (integration with General medicine)

- 3.5.1 Define the diagnosis

- 3.5.2 Specify the therapeutic objective
- 3.5.3 Make an inventory of effective groups of drugs
- 3.5.4 Choose an effective group of drug according to efficacy, safety and suitability criteria
- 3.5.5 Choose the P-Drug for the given clinical condition

Example of 3 Exercises

1. Angina Pectoris
2. Amoebic Dysentery
3. Anxiety

• **Skill Station – 2 Hours**

Assessment: Skill Assessment – Log book

PH 3.6 Demonstrate how to optimize interaction with a pharmaceutical representative to get authentic information on drugs

- 3.6.1 Enumerate the key elements in the WHO guidelines on Ethical criteria for medicinal drug promotion.
- 3.6.2 Direct the discussion with the pharmaceutical representative so as to get the information he needs about the drug effectively.
- 3.6.3 Collect a copy of the datasheet of the product under discussion.
- 3.6.4 Compare the verbal statements with those in the official text during presentation effectively.
- 3.6.5 Perform a prior literature search and check the quality of research methodology of the drug under discussion, including cost comparison.
- 3.6.6 Decide effectively whether to include the drug in personal formulary with regard to efficacy, safety and cost-effectiveness of medicines

• **Skill Station – 4 Hours**

Assessment: Skill Assessment – Log book

PH 3.7 Prepare a list of essential medicine for a health care facility

- 3.7.1 Understand the concept of Essential Medicines List for the nation/state/ health care facility
- 3.7.2 Identify the factors that determine the choice of drugs in an Essential Medicines List.
- 3.7.3 Prepare a list of essential medicines for a healthcare facility, with justification in a given scenario

• **Skill Lab – 4 Hours**

Assessment: Skill Assessment

PH 3.8 Communicate effectively with a patient on the proper use of prescribed medication

1. **Insulins**
2. **Proton pump inhibitors**
3. **Statins**
4. **Ferrous sulphate tablets**
5. **Co-Amoxiclav or Cotrimoxazole**

- 3.8.1 Communicate about the effects of the prescribed drug with regards to the following
 - a. Why the drug is needed
 - b. Which symptoms will disappear, and which will not
 - c. When the effect is expected to start
 - d. When the effect is expected to start
- 3.8.2 Communicate about the adverse effects of the prescribed drug with regards to the following
 - a. Which side effects may occur
 - b. How to recognize them
 - c. How long they will continue
 - d. How serious they are
 - e. What action to take
- 3.8.3 Communicate about the instructions of drug use as following:
 - a. How the drug should be taken
 - b. When it should be taken
 - c. How long the treatment should continue
 - d. How the drug should be stored
 - e. What to do with left-over drugs
- 3.8.4 Communicate about the warnings of the prescribed drug with regards to the following
 - a. When the drug should not be taken
 - b. What is the maximum dose
 - c. Why the full treatment course should be taken

- 3.8.5 Communicate about the future consultations with regards to the following:
 - a. When to come back (or not)
 - b. In what circumstances to come earlier
 - c. What information the doctor will need at the next appointment
- 3.8.6 Conclude the consultation by asking the following questions:
 - a. Ask the patient whether everything is understood
 - b. Ask the patient to repeat the most important information
 - c. Ask whether the patient has any more questions

• **DOAP sessions – 10 Hours**

Assessment: Skill Assessment

PH 4.1 Administer drugs through various routes in a simulated environment using mannequins

USE CHECKLIST FOR ASSESSMENT (refer WHO prescribing book)

Enteral

Oral route

- 4.1.1 Identify the different dosage forms administered through the Oral route and instructions given to the patient for administering it.
- 4.1.2 Present the merits and demerits of the Oral route of drug administration.
- 4.1.3 Demonstrate the administration of the drugs through oral route.
- 4.1.4 Identify the different equipment required for Nasogastric tube (NGT) insertion
- 4.1.5 Demonstrate the Nasogastric tube insertion and present the purpose.
- 4.1.6 Demonstrate the positioning of the patient during NGT insertion.
- 4.1.7 Demonstrate the preparation of the feeds for NG feeding.

Sublingual/ Buccal

- 4.1.8 Demonstrate the administration of the drugs through Sublingual and Buccal route.
- 4.1.9 Present the instructions for administering the same and how to terminate the action of the drug.
- 4.1.10 Present the different examples with dosage forms for the same.

Transrectal

- 4.1.11 Identify the devices used to administer dosage forms through the transrectal route.
- 4.1.12 Present the instructions to the patient before administering dosage forms through the transcutaneous route.
- 4.1.13 Demonstrate the administration of suppositories by rectal route.
- 4.1.14 Demonstrate the administration of enema (Evacuant/ Retention) by rectal route.

Transvaginal

- 4.1.15 Identify the devices used to administer dosage forms through the transvaginal route.
- 4.1.16 Present the instructions to the patient before administering dosage forms through the transvaginal route.
- 4.1.17 Demonstrate the administration of pessary, creams and foams by vaginal route.
- 4.1.18 Demonstrate the administration of douche by vaginal route.
- 4.1.19 Identify different types of Intrauterine contraception
- 4.1.20 Present the instructions/counselling to the patients on intrauterine contraception.
- 4.1.21 Demonstrate the placement of intrauterine contraception using the stimulation setting

Parenteral

Intra Muscular injection

- 4.1.22 Identify the devices required for IM injection
- 4.1.23 Demonstrate the prerequisite preparations for injection along with aseptic precautions.
- 4.1.24 Present instructions to the patient about the injection procedure.
- 4.1.25 Identify the sites of IM injection on mannequin and present merits and demerits of each site.
- 4.1.26 Demonstrate the proper technique for IM injection.

Intravenous injection

- 4.1.27 Identify the devices required for IV injection
- 4.1.28 Demonstrate the prerequisite preparations for injection along with aseptic precautions
- 4.1.29 Present instructions to the patient about the injection procedure.
- 4.1.30 Identify the sites of IV injection on mannequin
- 4.1.31 Demonstrate the proper technique for IV injection.

Subcutaneous injection

- 4.1.32 Identify the devices required for SC injection.
- 4.1.33 Demonstrate the prerequisite preparations for injection along with aseptic precautions.
- 4.1.34 Present instructions to the patient about the injection procedure.
- 4.1.35 Identify the sites of SC injection on mannequin.
- 4.1.36 Demonstrate the proper technique for SC injection.

Intradermal injection

- 4.1.37 Identify the devices required for Intradermal injection.
- 4.1.38 Demonstrate the prerequisite preparations for injection along with aseptic precautions.
- 4.1.39 Present instructions to the patient about the injection procedure.
- 4.1.40 Demonstrate the proper technique for Intradermal injection.

Intracardiac injection

- 4.1.41 Demonstrate a proper technique for Intracardiac injection.
- 4.1.42 Demonstrate the prerequisite preparations for injection along with aseptic precautions.

Local/ Topical application

Transcutaneous – Iontophoresis, Inunction, Jet Injection, Transdermal delivery system

- 4.1.43 Identify the devices used to administer dosage forms through the transcutaneous route.
- 4.1.44 Present the instructions to the patient before administering dosage forms through the transcutaneous route.
- 4.1.45 Demonstrate the administration of dosage forms by Iontophoresis method.
- 4.1.46 Demonstrate the administration of dosage forms by Inunction method.
- 4.1.47 Demonstrate the administration of dosage forms by Jet Injection method.
- 4.1.48 Demonstrate the administration of Transdermal patches.

Transmucosal/ Inhalational

- 4.1.49 Document the inhalational devices used to administer inhalational dosage forms.
- 4.1.50 Present the merits and demerits of inhalational devices over one another
- 4.1.51 Present the instructions to the patient before using inhalational devices.
- 4.1.52 Demonstrate the administration of inhalational dosage forms.
- 4.1.53 Identify the different types of airway masks and intubation tubes. Present a method for selection of intubation tubes.
- 4.1.54 Demonstrate the administration of anaesthetic/ therapeutic gases through airway masks and intubation tubes

Transnasal

- 4.1.55 Identify dosage forms administered transnasally.
- 4.1.56 Identify the devices used for administering dosage forms transnasally.
- 4.1.57 Present the merits and demerits of Transnasal route of drug administration.
- 4.1.58 Present the instructions to the patient before administering dosage forms by the transnasal route.

Ophthalmic/ Ear route

- 4.1.59 Identify dosage forms administered by the ophthalmic/ ear route.
- 4.1.60 Present the instructions to the patient before administering dosage forms by ophthalmic/ ear route.

• **Skill Lab – 6 Hours**

Assessment: Skill Assessment

PH 4.2 Demonstrate the effects of drugs on blood pressure (vasopressor and vasodepressor with appropriate blockers) using computer-aided learning

- 4.2.1 Choose the appropriate animal experiment to study the effects of drugs on blood pressure
- 4.2.2 Explain the differences in actions of different vasopressor (adrenaline, noradrenaline)
- 4.2.3 Explain the differences in actions of different vasodepressor (ACh, alpha-blockers, histamine)
- 4.2.4 Analyse and interpret the graph obtained accurately on the application of various drugs
- 4.2.5 Enumerate the therapeutic uses of vasopressors and vasodepressor

• **SGD – 2 Hours**

Assessment: Skill Assessment

PH 5.1 Communicate with the patient with empathy and ethics on all aspects of drug use (integration with General medicine)

- 5.1.1 Describe what information should be given to patients to allow them to make informed decisions
- 5.1.2 Communicate treatment plan and instructions to the patient, at a suitable level of information
- 5.1.3 Engage in shared decision making where appropriate

• **SGD – 4 Hours**

Assessment: Skill Assessment

PH 5.2 Communicate with the patient regarding the optimal use of

1. Drug therapy
2. Devices
3. Storages

Drug Therapy

5.2.1 Communicate about the effects of the prescribed drug with regards to the following:

- i. Why the drug is needed
- ii. Which symptoms will disappear, and which will not?
- iii. When the effect is expected to start
- iv. What will happen if the drug is taken incorrectly or not at all

5.2.2 Communicate about the adverse effects of the prescribed drug with regards to the following:

- i. Which side effects may occur?
- ii. How to recognize them
- iii. How long they will continue
- iv. How serious they are
- v. What action to take

5.2.3 Communicate about the instructions of drug use as following:

- i. How the drug should be taken
- ii. When it should be taken
- iii. How long the treatment should continue
- iv. How the drug should be stored
- v. What to do with left-over drugs

5.2.4 Communicate about the warnings of the prescribed drug with regards to the following:

- i. When the drug should not be taken
- ii. What is the maximum dose?
- iii. Why should the full treatment course be taken?

5.2.5 Communicate about the future consultations with regards to the following:

- i. When to come back (or not)
- ii. In what circumstances to come earlier
- iii. What information the doctor will need at the next appointment

5.2.6 Conclude the consultation by asking the following questions:

- i. Ask the patient whether everything is understood
- ii. Ask the patient to repeat the most important information

Devices

- 5.2.7 The student should be able to communicate to patients on**
- i. Stepwise points or instructions on the use of device
 - ii. Communicate list of do's and don'ts on the device
 - iii. Demonstrate the proper use of device and ask the patient to show the same.
 - iv. Methods on handling, cleaning and storage of device
 - v. Dangers of use of device on other persons, without the prescription of doctor
 - vi. Importance of keeping the device away from the reach of the children
 - vii. Contact number of manufacturers to be communicated on troubleshooting

Storage of Medicines

- 5.2.8 The student should be able to communicate to patients on**
- i. Ideal storage condition of a pharmaceutical product as per product label
 - ii. Ideal storage condition of a pharmaceutical product as per product label
 - iii. Effect of storage condition on potency and efficacy of the drug
 - iv. ill-effects of improper storage condition on human consumption
 - v. Factors to be taken into consideration for drug storage like sanitation, temperature, light, moisture, ventilation and segregation.
 - vi. Importance of storage of medicines away from the reach of the children
 - vii. Disposal of expired drugs

• **SGD – 4 Hours**

Assessment: Skill Assessment/ Short note

PH 5.3 Motivate patients with chronic diseases to adhere to the prescribed management by the health care provider

- 5.3.1 Explain the term medication adherence
- 5.3.2 Explain the consequences of non-adherence in chronic diseases
- 5.3.3 Explain the methods to measure medication adherence
- 5.3.4 Elicit the barriers affecting medication adherence
- 5.3.5 Explains the measures to be taken to motivate the patient to adhere to medications in chronic diseases

• **SGD – 2 Hours**

Assessment: Shortnote/ Viva Voce

PH 5.4 Explain to the patient the relationship between the cost of treatment and patient compliance

- 5.4.1 Assess the cost of the treatment
- 5.4.2 Enumerate various factors influencing patient compliance (patient-related, disease condition related, therapy-related and health system-related factors).
- 5.4.3 Explain the consequences of medication non-compliance in terms of cost to the patient
- 5.4.4 Communicate clearly to the patient about the relationship between the cost of treatment and compliance

• **SGD – 4 Hours**

Assessment: Short Note, Viva voce

PH 5.5 Demonstrate an understanding of the caution in prescribing drugs likely to produce dependence and recommend the line of management (integrate with Psychiatry)

- 5.5.1 Describe the term drug dependence
- 5.5.2 Enumerate the drugs that produce dependence
- 5.5.3 Describe the Legality involved in prescribing drugs likely to produce dependence (Drugs and Cosmetics Act, 1940; Pharmacy Act, 1948; Narcotic Drugs and Psychotropic substances Act, 1985)
- 5.5.4 Describe the clinical including psychosocial assessment of the patient before prescribing
- 5.5.5 Describe the importance of documentation of the prescribing process
- 5.5.6 Describe the importance of periodic review of prescriptions
- 5.5.7 7. Describe the basic treatment regimens for various addictions and withdrawal states along with psycho-social rehabilitation

• **SGD – 4 hrs (Practical)**

Assessment: Short notice, Viva voce

PH 5.6- Demonstrate the ability to educate public & patients about various aspects of drug use including drug dependence and OTC drugs (integrate with Psychiatry)

- 5.6.1 The importance of complying with the doctor's instructions
- 5.6.2 The demerits of self-prescription
- 5.6.3 The importance of identifying and reporting ADRs to concerned authorities
- 5.6.4 Caution be taken while using drugs causing dependence
- 5.6.5 Safe use of OTC

• **SGD – 2 Hours**

Assessment: Short notice, Viva voce

PH 5.7 Demonstrate an understanding of the legal and ethical aspects of prescribing drugs (integrate with Forensic Medicine)

Legal aspects

- 5.7.1 Explain who is entitled to prescribe medicines and the legal requirements involved
- 5.7.2 Describe the legal requirements associated with prescribing controlled drugs
- 5.7.3 Describe the legal implications of irrational prescription that could endanger the life of patients

Ethical aspects

- 5.7.4 Describe the importance of rational prescription
- 5.7.5 Explain the responsibilities of prescribing in a resource-limited setting
- 5.7.6 Describe what information should be given to patients to allow them to make informed decisions
- 5.7.7 Explain why it is important to recognize the limits of competence and to ask for help when needed
- 5.7.8 Explain the responsibility of all prescribers to update knowledge
- 5.7.9 Describe the importance of following clinical guidelines, protocols and formularies are appropriate

PANDEMIC MODULE 2.5

Therapeutic strategies including new drug development

• **SGD – 2 Hours**

Assessment: Short notice, Viva voce

PH 5.8 Demonstrate the use of drugs during a pandemic. (Integrate with General Medicine)

- Prepare a plan for evaluation of off-label use of a drug – repurposing
- Emergency use authorization – Compliance with regulatory authorities
- CDSCO/DCGI and US FDA
- Pharmacovigilance during a pandemic
- Ethical aspects of clinical trials in pandemic
- Visit to a pharmaceutical firm/ pharmacy lab to show various stages of drug development or an ADR monitoring exercise in clinical wards

DISTRIBUTION OF ATTITUDE ETHICS AND COMMUNICATION SKILLS
(AETCOM) MODULE

SI NO	MO DU LE	TOPIC	DEPARTMENT					No. of hours	Formative assessment	Summative assessment
			PA	MI	PH	CM	FM			
1	2.1	Foundation of communication				✓		5	✓	-
2	2.2	Foundation of bioethics					✓	2	-	✓
3	2.3	Health care as a right				✓		2	-	✓
4	2.4	Working in a health care team	✓					6	✓	-
5	2.5	Bioethics- case studies on patient autonomy and decision making (patient rights and shared responsibility in health care)			✓			6	✓	✓
6	2.6	Bioethics-Case studies on patient autonomy and decision making (refusal of care including do not resuscitate and withdrawal of life Support)			✓			5	✓	✓
7	2.7	Bioethics- Case studies on patient autonomy and decision making (consent for surgical procedures)		✓				5	✓	✓
8	2.8	What does it mean to be a family member of a sick patient					✓	6	✓	✓

**PA-Pathology; MI- Microbiology; PH- Pharmacology; CM- Community medicine; FM- Forensic medicine.

CERTIFIABLE COMPETENCIES

Competencies in the knowledge domain

Sl no	Topic	Competency
1	General Pharmacology Toxicology Clinical Pharmacology and rational drug use	PH 1.1 to PH 1.12
2	Autonomic Nervous System	PH 1.13 to PH 1.14
3	Autacoids	PH1.16
4	Drugs in anaesthetic practise:	PH 1.15, PH1.17 to PH 1.18
5	Central Nervous System	PH 1.19 to PH 1.23
6	Diuretics	PH 1.24
7	Drugs affecting blood and blood formation	PH 1.25, PH 1.35
8	Cardiovascular System	PH 1.26 to PH 1.31
9	Respiratory System:	PH 1.32 to PH 1.33
10	Gastrointestinal System	PH 1.34
11	Endocrine System	PH 1.36 to PH 1.41
12	Chemotherapy	PH 1.42 to PH 1.49
13	Miscellaneous	PH 1.50 to PH 1.64

Competencies in Skills:

There are **21** competencies in this domain. These include clinical pharmacy (04), Clinical Pharmacology (8), Experimental Pharmacology (2) and Communication (7) as given below.

Topic	Competency	Description
Clinical Pharmacy	PH 2.1	Demonstrate an understanding of the use of various dosage forms (oral/local/parenteral; solid/liquid)
	PH 2.2	Prepare oral rehydration solution from ORS packet and explain its use
	PH 2.3	Demonstrate the appropriate setting up of an intravenous drip in a simulated environment.
	PH 2.4	Demonstrate the correct method of calculation of drug dosage in patients including those used in special situations
Clinical Pharmacology	PH 3.1-C	Write a rational, correct and legible generic prescription for a given condition and communicate the same to the patient
	PH 3.2-C	Perform and interpret a critical appraisal (audit) of a given prescription
	PH 3.3-C	Perform a critical evaluation of the drug promotional literature
	PH 3.4- L	To recognise and report an adverse drug reaction
	PH 3.5-C	To prepare and explain a list of P-drugs for a given case/condition
	PH 3.6-L	Demonstrate how to optimize interaction with a pharmaceutical representative to get authentic information on drugs
	PH 3.7-L	Prepare a list of essential medicines for a healthcare facility
	PH 3.8	Communicate effectively with a patient on the proper use of prescribed medication
Experimental Pharmacology	PH 4.1	Administer drugs through various routes in a simulated environment using mannequins
	PH4.2	Demonstrate the effects of drugs on blood pressure (vasopressor and vaso-depressors with appropriate blockers) using CAL
Communication	PH5.1	Communicate with the patient with empathy and ethics on all aspects of drug use
	PH5.2	Communicate with the patient regarding optimal use of a) drug therapy, b) devices and c) storage of medicines
	PH5.3	Motivate patients with chronic diseases to adhere to the prescribed management by the health care provider
	PH5.4	Explain to the patient the relationship between the cost of treatment and patient compliance
	H5.5	Demonstrate an understanding of the caution in prescribing drugs likely to produce dependence and recommend the line of management
	PH5.6	Demonstrate ability to educate public & patients about various aspects of drug use including drug dependence and OTC drugs
	PH5.7	Demonstrate an understanding of the legal and ethical aspects of prescribing drugs

C- Needs certification: 4 no.

L Needs Maintenance of a logbook: 3 no.

CERTIFIABLE SKILLS

Certifiable skill - 1

Skill: PH 3.1 Write a rational, correct and legible generic prescription for a given condition and communicate the same to the patient. The student has to perform this activity five times to be certified

Certifiable skill - 2

Skill: PH 3.2 Perform and interpret a critical appraisal (audit) of a given prescription. The student has to perform this activity three times to be certified

Certifiable skill - 3

Skill: PH 3.3 Perform a critical evaluation of drug promotional literature. The student has to perform this activity three times to be certified

Certifiable skill - 4

Skill: PH 3.5 To prepare and explain a list of P-drugs for a given case/condition. The student has to perform this activity three times to be certified

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EXAMINATION SCHEDULE

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
							Foundation Course	I MBBS			
I MBBS								Exam I MBBS	II MBBS		
II MBBS								Exam II MBBS	III MBBS		
III MBBS Part I								Exam III MBBS Part I	Electives & Skills		
III MBBS Part II											
Exam III MBBS Part II		Internship									
Internship											

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Competencies to be covered in each block

BLOCK I		BLOCK II		BLOCK III	
Competency	Topics	Competency	Topics	Competency	Topics
PH 1.1- 1.12, 1.52, 1.59, 1.60, 1.64	General Pharmacology Clinical Pharmacology And Toxicology	PH 1.26 - 1.31	Cardiovascular System	PH 1.36 – 1.41	Endocrine
PH 1.13-1.14	Autonomic Nervous System	PH 1.24	Diuretics	PH 1.42 - 1.48	Chemotherapy
PH 1.18-1.23	Central Nervous System	PH 1.32 - 1.33	Respiratory System	PH 1.49	Anti-Cancer Drugs
PH 1.15, 1.17	Peripheral Nervous System	PH 1.34	Gastrointestinal Tract	PH 1.50	Immunomodulators
PH 1.16	Autacoids	PH 1.57, 1.58	Drugs Used In Skin Diseases & Ocular Diseases		
PH 1.25 & 1.35	Blood And Blood Products & Anaemia	PH 1.51,1.53, 1.54,1.55, 1.62, 1.63	Miscellaneous (Vaccines Etc...)		

TOPICS FOR HORIZONTAL INTEGRATION

	Pathology	Microbiology	Pharmacology	Forensic Medicine	Community Medicine	Concerned Clinical subjects
BLOCK 1	Immunology Anaemia Wound healing Shock	Immunology Anaemia Shock Surgical practice Infective endocarditis & Rheumatic heart disease Immunisation	Immunology Anaemia & anticoagulants Essential medicines Shock Toxicology Drugs of abuse (FM) ANTIBIOTIC STEWARDSHIP PROG (Micro+ Gen med+ Paed)	Wound healing Toxicology	Essential medicines	Shock Surgical practice Toxicology Infective endocarditis & Rheumatic heart disease Immunisation
BLOCK 2	Infective endocarditis & Rheumatic heart disease (Nesting) Myocardial infarction Atherosclerosis Tuberculosis Leprosy AIDS Malaria	Tuberculosis Leprosy AIDS Malaria Enteric fever Viral hepatitis Acid peptic disease Bone & Joint infection Meningitis Encephalitis STI	IHD (Path + Gen med) CHF (Path) Br Asthma COPD (Path+Pul med) PUD- (Physio + Gen med +Path) IBD & IBS (Path) Tuberculosis Leprosy (Micro + Dermat) AIDS Malaria		Tuberculosis Leprosy AIDS Malaria	Myocardial infarction Atherosclerosis Tuberculosis Leprosy AIDS Malaria Enteric fever Viral hepatitis Acid peptic disease Bone & Joint infection Meningitis Encephalitis STI

BLOCK 3	Diabetes mellitus	Zoonotic disease	Endocrines Thyroid, DM, Osteoporosis (Path)		Diabetes mellitus	Diabetes mellitus
	Hepatitis (Sharing / Nesting)	Hospital-acquired infection	Malaria, Kala-azar, Ameobiasis, Helminthiasis (Gen Med+Micro)		Zoonotic disease	Zoonotic disease
		National health programs of communicable diseases	HIV, UTI, STD (Micro) NHP (CM)		Hospital-acquired infection	Hospital-acquired infection
					National health programs of communicable diseases	Endocrines

NOTE - National days of importance for AIDS, Leprosy, Tuberculosis, Malaria, Mental health, Breastfeeding promotion, World health day, etc. can be used to conduct full-day integration sessions for students

Beyond these topics, Institutions are free to integrate topics with concerned departments, wherever feasible within the MCI stipulations.

Minimum two of the suggested topics should be covered in each block.

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TOPICS FOR VERTICAL INTEGRATION

	COMPETENCY	
Number	The student should be able to	Vertical Integration
PH 1.15	Describe mechanism/s of action, types, doses, side effects, indications and contraindications of skeletal muscle relaxants	Anesthesiology, Physiology
PH 1.16	Describe mechanism/s of action, types, doses, side effects, indications and contraindications of the drugs which act by modulating autacoids, including anti-histaminic, 5-HT modulating drugs, NSAIDs, drugs for gout, anti-rheumatic drugs, drugs for migraine	General Medicine
PH 1.17	Describe the mechanism/s of action, types, doses, side effects, indications and contraindications of local anaesthetics	Anesthesiology
PH1.18	Describe the mechanism/s of action, types, doses, side effects, indications and contraindications of general anaesthetics, and pre-anaesthetic medications	Anesthesiology
PH1.19	Describe the mechanism/s of action, types, doses, side effects, indications and contraindications of the drugs which act on CNS, (including anxiolytics, sedatives & hypnotics, anti-psychotic, anti-depressant drugs, anti-maniacs, opioid agonists and antagonists, drugs used for neurodegenerative disorders, anti-epileptics drugs)	Psychiatry, Physiology
	Describe the effects of acute and chronic ethanol intake	Psychiatry

PH1.20		
PH1.21	Describe the symptoms and management of methanol and ethanol poisonings	General Medicine
PH1.22	Describe drugs of abuse (dependence, addiction, stimulants, depressants, psychedelics, drugs used for criminal offences)	Psychiatry
PH1.23	Describe the process and mechanism of drug deaddiction	Psychiatry
PH1.25	Describe the mechanism/s of action, types, doses, side effects, indications and contraindications of the drugs acting on blood, like anticoagulants, antiplatelets, fibrinolytics, plasma expanders	Physiology, General Medicine
PH1.26	Describe mechanisms of action, types, doses, side effects, indications and contraindications of the drugs modulating the renin-angiotensin and aldosterone system	Physiology, General Medicine
PH1.27	Describe the mechanisms of action, types, doses, side effects, indications and contraindications of antihypertensive drugs and drugs used in shock	General Medicine
PH1.28	Describe the mechanisms of action, types, doses, side effects, indications and contraindications of the drugs used in	General Medicine
	ischemic heart disease (stable, unstable angina and myocardial infarction), peripheral vascular disease	

PH1.29	Describe the mechanisms of action, types, doses, side effects, indications and contraindications of the drugs used in congestive heart failure	General Medicine
PH1.30	Describe the mechanisms of action, types, doses, side effects, indications and contraindications of the antiarrhythmics	General Medicine
PH1.31	Describe the mechanisms of action, types, doses, side effects, indications and contraindications of the drugs used in the management of dyslipidemias	General Medicine
PH1.32	Describe the mechanism/s of action, types, doses, side effects, indications and contraindications of drugs used in bronchial asthma and COPD	Respiratory Medicine
PH1.33	Describe the mechanism of action, types, doses, side effects, indications and contraindications of the drugs used in cough (antitussives, expectorants/ mucolytics)	Respiratory Medicine
PH1.34	Describe the mechanism/s of action, types, doses, side effects, indications and contraindications of the drugs used as below:	General Medicine
	1. Acid-peptic disease and GERD	
	2. Antiemetics and prokinetics	
	3. Antidiarrhoeals	
	4. Laxatives	
	5. Inflammatory Bowel Disease	
	6. Irritable Bowel Disorders, biliary and pancreatic diseases	

PH1.35	Describe the mechanism/s of action, types, doses, side effects, indications and contraindications of drugs used in haematological disorders like:	General Medicine, Physiology
	1. Drugs used in anaemias	
	2. Colony Stimulating factors	
PH1.36	Describe the mechanism of action, types, doses, side effects, indications and contraindications of drugs used in endocrine disorders (diabetes mellitus, thyroid disorders and osteoporosis)	General Medicine
PH1.39	Describe the mechanism of action, types, doses, side effects, indications and contraindications the drugs used for contraception	Obstetrics & Gynaecology
PH1.40	Describe the mechanism of action, types, doses, side effects, indications and contraindications of 1. Drugs used in the treatment of infertility, and 2. Drugs used in erectile dysfunction	Obstetrics & Gynaecology
PH1.41	Describe the mechanisms of action, types, doses, side effects, indications and contraindications of uterine relaxants and stimulants	Obstetrics & Gynaecology
PH1.43	Describe and discuss the rational use of antimicrobials including antibiotic stewardship program	General Medicine, Pediatrics
PH1.44	Describe the first-line antitubercular drugs, their mechanisms of action, side effects and doses.	Respiratory Medicine
PH1.45	Describe the drugs used in MDR and XDR Tuberculosis	Respiratory Medicine

PH1.46	Describe the mechanisms of action, types, doses, side effects, indications and contraindications of antileprotic drugs	Dermatology, Venereology & Leprosy
PH1.47	Describe the mechanisms of action, types, doses, side effects, indications and contraindications of the drugs used in malaria, KALA-AZAR, amebiasis and intestinal helminthiasis	General Medicine
PH1.52	Describe the management of common poisoning, insecticides, common sting and bites	General Medicine
PH1.56	Describe basic aspects of Geriatric and Pediatric pharmacology	Paediatrics
PH1.57	Describe drugs used in skin disorders	Dermatology, Venereology & Leprosy
PH1.58	Describe drugs used in Ocular disorders	Ophthalmology
PH2.4	Demonstrate the correct method of calculation of drug dosage in patients including those used in special situations	Paediatrics, General Medicine
PH3.1	Write a rational, correct and legible generic prescription for a given condition and communicate the same to the patient	General Medicine
PH3.3	Perform a critical evaluation of the drug promotional literature	General Medicine
PH3.5	To prepare and explain a list of P-drugs for a given case/condition	General Medicine
PH5.1	Communicate with the patient with empathy and ethics on all aspects of drug use	General Medicine
PH5.4	Explain to the patient the relationship between the cost of treatment and patient compliance	General Medicine

PH5.5	Demonstrate an understanding of the caution in prescribing drugs likely to produce dependence and recommend the line of management	Psychiatry
PH5.6	Demonstrate ability to educate public & patients about various aspects of drug use including drug dependence and OTC drugs	Psychiatry

Column C: K- Knowledge, S – Skill, A - Attitude/professionalism, C- Communication.

Column D: K – Knows, KH - Knows How, SH - Shows how, P- performs independently,

Column F: DOAP session – Demonstrate, Observe, Assess, Perform.

Column H: If entry is P: indicate how many procedures must be done independently for certification/ graduation

DRAFT

EVALUATION METHODOLOGY

Summative Assessment - An assessment conducted at the end of instruction to check how much the student has learnt.

Formative Assessment - An assessment conducted during the instruction with the primary purpose of providing feedback for improving learning.

Internal Assessment - Range of assessments conducted by the teachers teaching a particular subject with the purpose of knowing what is learnt. Internal assessment can have both formative and summative functions.

Note - Assessment requires specification of measurable and observable entities. This could be in the form of whole tasks that contribute to one or more competencies or assessment of a competency per se. Another approach is to break down the individual competency into learning objectives related to the domains of knowledge, skills, attitudes, communication etc. and then assess them individually.

Scheduling of Internal Assessment - Done once in three months preferably at the end of each block.

Theory IA can include: Written tests should have essay questions, short notes and creative writing experiences.

Practical IA can include: Practical tests, Objective Structured Practical Examination (OSPE), Directly Observed Procedural Skills (DOPS), records maintenance and attitudinal assessment.

Assessment of Log-book- Logbook should record all activities like seminar, symposia, quizzes and other academic activities. It should be assessed regularly and submitted to the department. Up to ten (10) per cent, IA Practical marks should be for Logbook assessment.

Assessment of Practical Record book- Practical book should record all skills and other practical exercises done during the academic programme. It should be assessed regularly and submitted to the department. Up to ten (10) per cent, IA Practical marks should be for Practical record book assessment.

Assessment for AETCOM will include: - Written tests comprising of short notes and creative writing experiences only in internal assessment.

INTERNAL ASSESSMENT

1. There will be 3 internal assessment examinations in Pharmacology. The structure of the internal assessment examinations should be preferably similar to the structure of University examinations.
2. It is mandatory for the students to appear for all the internal assessment examinations.
3. First internal assessment examination will be held after 3 months, second internal assessment examination will be held after six months and third internal assessment examination will be held after 9 months of Phase II curriculum.
4. Pattern of first and second Internal Assessment are left to the discretion of the individual institute. However, third internal assessment has to be conducted in the same pattern of the University exam
5. Additional internal assessment examination for absent students can be considered due to genuine reason after approval by the head of the department. It should be taken before the submission of internal assessment marks to the University.
6. Internal assessment marks allotment for theory and practical for the first and second internal assessment are left to the discretion of the respective institutes. Marks allotted in the third (final) Internal Assessment should be preferably for 100 marks each for Theory and Practical.
7. 20% of the internal assessment marks should be from Formative Assessment in both Theory and Practical
8. Feedback in Internal Assessment - Feedback should be provided to students throughout the course so that they are aware of their performance and remedial action can be initiated well in time. The feedbacks need to be structured and the faculty and students must be sensitized to giving and receiving feedback.
9. The results of IA should be displayed on the notice board within two weeks of the test and an opportunity provided to the students to discuss the results and get feedback on making their performance better.
10. It is also recommended that students should sign with date whenever they are shown IA records in token of having seen and discussed the marks.
11. Internal assessment marks will not be added to University examination marks and will reflect as a separate head of passing at the summative examination.
12. Internal assessment should be based on competencies and skills.
13. Criteria for appearing in University examination: Learners must secure at least 50% marks of the total marks (combined in theory and practical; not less than 40 % marks in theory and practical separately) assigned for internal assessment in order to be eligible for appearing at the final University examination.
14. Average marks obtained in all three internal assessments should be calculated to 40 marks.
15. A candidate who has not secured requisite aggregate in the internal assessment may be subjected to remedial assessment by the institution. If he/ she successfully complete the same, he/she is eligible to appear for University Examination. Remedial assessment shall be completed before submitting the internal assessment marks online to the University.

SUMMATIVE ASSESSMENT/ UNIVERSITY EXAM

THEORY

GENERAL INSTRUCTIONS

1. The topics for the two papers are distributed
2. Questions in each paper should be as per the distribution
3. Please refer to the SLO while setting the question paper
4. Repetition of questions from the same SLO should be avoided
5. Please adhere to the marks allotted to the different topics & sections
6. Questions to be covered from the different sections of Pharmacology

THEORY EXAMINATION-2 PAPERS OF 100 MARKS EACH

Distribution of marks:

Sl no.	Type of questions	Marks per question	Number of questions	Total marks
1	Long Essay (LE)	10	2	20
2	Short Essay (SE)	5	10	50
3	Short Answer (SA)	3	10	30

Long essay

The question should pose a clinical/practical problem to the students and require them to apply knowledge and integrate it with disciplines. Avoid giving one-liners as questions. The question stem should be structured and marking distribution should be provided. Use action verbs from higher domains as given in this document. Please avoid simple recall-based questions. What is asked in the examination generally sets the agenda of what and how the students learn.

Short essay: These provide an opportunity to sample a wider content, albeit in a short time. The questions should be task-oriented rather than Write a short note on xxx

Short answer: Questions based on applied aspect

SUMMATIVE ASSESSMENT/ UNIVERSITY EXAM

PRACTICALS

Total Marks – 100 (Practical: 80 + Viva voce: 20)

Sl. No.	Competency	Topics	Teaching hours	For university exams	Max. marks in exams
1	PH 2.1	Dosage forms	14 hours	TABLE VIVA	10 marks
2	PH 2.2	ORS	4 hours	Correction only	10 marks
3	PH 2.3	I.V Drip	4 hours	DEMO only	
4	PH 2.4	Drug Dose Calculation	4 hours	Correction only	10marks
5	PH 3.1	Prescription Writing	6 hours	Correction only	
6	PH 3.2	Prescription Audit / CCR	6 hours	LOG BOOK	10 marks
7	PH 3.3	Drug Promotional Literature(DPL)	6 hours	TABLE VIVA with 2.2	Alternate with ORS for 10 marks
8	PH 3.4	ADR	4 hours	TABLE VIVA	10 marks
9	PH 3.5	P Drugs	6hours	LOG BOOK	
10	PH 3.6	Interaction with Pharma Representative	2 hours	Role play, LOG BOOK	
11	PH 3.7	Essential Medicines	4 hours	LOG BOOK	
12	PH 3.8	Drug Counseling	4 hours	TABLE VIVA	10marks
13	PH 4.1	Routes in Mannequins	10 hours	DEMO only	
14	PH 4.2	Computer-Aided Learning CAL	6 hours	Correction / TABLE VIVA	10 marks
15	PH 5.1	Empathy, ethics	SGD 2 hours	TABLE VIVA with 3.8	10 marks
16	PH 5.2	Drug therapy, storage	SGD 4 hours	TABLE VIVA with 3.8	10 marks
17	PH 5.3	Adherence	SGD 4 hours	Short note-theory	
18	PH 5.4	Cost & compliance	SGD 2 hours	Short note-theory	
19	PH 5.5	Dependence	SGD 4 hours	Short note-theory	
20	PH 5.6	OTC	SGD 4 hours	TABLE VIVA Along with 3.4	10 marks
21	PH 5.7	Legal, ethical aspects	SGD 2 hours	Short note-theory	
		Total hours	Practical 80 hours + SGD 22 hours		

University exams (total 80 marks) Each exercise 10 marks

Examiner	1st	2nd	3rd	4th
Correction only	Drug dose calculation 2.4/ OTC 5.6 10 marks	ORS/ DPL 2.2/3.3 10 marks	Prescription 3.1 10 marks	Spotters 10 marks
Table Viva	Dosage form 2.1 10 marks	CAL Graph 4.2 10 marks	ADR 3.4 10 marks	Drug counselling 3.8 / Drug therapy & storage 5.2 / Empathy & ethics 5.1 10 marks

PROPOSED MARKS ALLOCATION FOR PRACTICAL INTERNAL ASSESSMENT

Sl No	Assessment	Marks allotted		
		First IA	Second IA	Third (Final) IA
1	Spotters	10 Marks	10 Marks	10 Marks
2	Exercises - Writing	10 Marks <ul style="list-style-type: none"> • ORS 2.2 / Drug promotional literature 3.3 (5 marks) • Drug dose calculation 2.4/OTC 5.6 (5 marks) 	Prescription writing 3.1	10x3 = 30 Marks <ul style="list-style-type: none"> • Drug dose calculation 2.4/ OTC 5.6 (10 marks) • ORS 2.2/ Drug promotional literature 3.3 (10 marks) • Prescription writing 3.1 (10 marks)
3	OSPE- Table viva	15 Marks <p>Dosage form 2.1 (10 marks) Graph-CAL 4.2 (5marks)</p>	15 Marks <p>ADR 3.4 (10 marks) Drug therapy/Empathy/ Counselling 3.8, 5.1, 5.2 (5Marks)</p>	10x4= 40 Marks <ul style="list-style-type: none"> • Dosage form 2.1 (10 marks) • CAL Graph 4.2 (10marks) • ADR 3.4 (10 marks) • Drug counselling 3.8 / Drug therapy & storage 5.2 / Empathy & ethics 5.1 (10marks)
4	Record Assessment	05 Marks	05 Marks	20 Marks
Total		40	40	100

Note: Certifiable competencies/AETCOM should be completed in Formative/Internal assessment

BLUEPRINT FOR THEORY PAPER – PHARMACOLOGY

Weightage matrix determines the weightage given to a particular topic. The weightage was calculated based on Perceived impact/importance of a topic - impact on health (I) and frequency (F) of occurrence of a particular disease or health problem.

Overall weight for a topic/system is the product of Impact and Frequency (I x F)

t = Total weights

Weightage for each topic: $W = I \times F / t$

Number of marks allocated in exams $N = W \times T$

Where T is the total marks in university examination.

Sl no.	PAPER I- Topics	Competencies	Impact	Frequency	Weightage	Marks	Nature of Questions
1	General Pharmacology- Sources, Routes, PK, PD, ADR+ Clinical pharmacology- TDM, Factors	PH 1.1 TO PH 1.12.	2	2	0.18	18	LE, SE, SA
2	Autonomic nervous system-Adrenergic, cholinergics and their agonists & antagonists	PH 1.13 TO PH 1.14	2	2	0.18	18	LE, SE, SA
3	Central nervous system- GA, including substances of abuse & Opioids	PH 1.18 TO PH 1.23	2	3	0.27	27	LE, SE, SA
4	Peripheral nervous system (Local anaesthetics, skeletal muscle relaxants)	PH 1.15, PH 1.17					SE, SA
5	Autacoids (Prostaglandins, histamine and antihistamines, Treatment of migraine) & NSAIDS & Drugs used in the treatment of gout and rheumatoid arthritis	PH 1.16	1	2	0.09	9	SE, SA
6	Respiratory system	PH 1.32, PH 1.33	1	2	0.09	9	SE, SA
7	Gastrointestinal system	PH 1.34	1	2	0.09	9	SE, SA

8	Occupational and environmental pesticides, food adulterants, Pollutants & insect repellents, Common poisoning, insecticides, stings & bites, Chelating agents , EDL, FDC, OTC, Herbal medicines, Pharmacogenomics, Pharmacoeconomics, Drug therapy in special population, Geriatric & Pediatric pharmacology, Drug regulations, Phases of clinical trial, GCP, Drug development Pharmacovigilance	PH 1.51, PH 1.52, PH 1.53 , PH 1.59, PH 1.60, PH 1.56, PH 1.63, PH 1.64	2	1	0.09	9	SE, SA
	Total					99	

$$\sum I \times F = 22 = t$$

Justification:

- **General pharmacology** deals with the principles of drug action. It explains the pharmacological basis for the use of a specific drug in a disease condition. The student should be assessed with regards to the various concepts in general pharmacology and its clinical application. Hence 20 marks is allocated to this topic.
- **Autonomic nervous system:** There are a number of drugs acting through this system with clinical application in diseases affecting different organ systems. Hence 20 marks is allocated to this system.
- **Central nervous system:** 9.2% of 55.4% Disability Adjusted Life Years (DALY) for non-communicable diseases was from neurological, mental and substance abuse related disorders as per a study in 2016¹. Hence 25 marks is allocated to CNS and peripheral nervous system.
- **Autacoids, drugs for rheumatoid arthritis and gout:** Around 4% of the patients had arthritis/joint pain as diagnosed by primary health care (PHC) physicians in India². Hence 10 marks have been allocated to this topic.
- **Gastrointestinal system:** Gastrointestinal symptoms were the second most common cause of a visit to a health-care practitioner 25% in Poseidon study².
- **Respiratory system:** Symptoms related to respiratory system were the main cause of a visit to a health-care practitioner (50.6%) in Poseidon study². Hence 10 marks allocated to assess this system.
- **Miscellaneous topics** have been allocated 5 marks

BLUEPRINT FOR THEORY PAPER – II

Sl no.	PAPER II- Topics	Competencies	Impact	Frequency	Weightage	Marks	Nature of questions
1	Endocrines including Hormonal contraceptives+ Drugs acting on uterus	PH 1.36 To PH 1.41	2	3	0.24	24	LE, SE, SA
2	Drugs acting on blood-Anticoagulants, Antiplatelets, Fibrinolytics, Plasma expanders, Anemia, CSF	PH 1.25, PH 1.35	3	3	0.36	36	SE, SA
3	Diuretics and antidiuretics	PH 1.24					SE, SA
4	Cardiovascular system + treatment of shock Dyslipidemia	PH1.42 To PH 1.48, PH 1.50					LE, SE, SA
5	Chemotherapy	PH 1.49	3	2	0.24	24	LE,SE, SA
6	Anti cancer agents& Immunomodulators	PH 1.26 To PH 1.31	2	1	0.08	8	SE, SA
7	Drugs to treat skin disorders, Drugs to treat ocular diseases,	PH 1.57, PH 1.58,	1	1	0.04	4	SE, SA
8	Vitamins, Vaccines, NHP, Nutraceuticals, Antiseptics and disinfectants,	PH 1.54, PH 1.55, PH 1.61, PH 1.62	1	1	0.04	4	SE, SA
	Total					100	

Justification:

- **Endocrines:** Diabetes and hypothyroidism are common endocrine conditions that a PHC physician will encounter. Approximately 9% of the patients who came to PHC were found to be diabetic ². Hence 25 marks is allocated to endocrinology.
- **Cardiovascular system including blood and diuretics:** Incidence of non-communicable diseases are on the rise in India. Cardiovascular diseases contributed to 14% of the DALYs ¹ and hypertension, ischemic heart disease, cardiac failure, obesity and cerebrovascular accidents together contributed to around 20% of the patients seen by a PHC physician ². The student needs to be assessed in all these topics and hence 30 marks have been allocated.

- **Chemotherapy:** Antibiotics form the mainstay of treatment for infectious diseases. Infections like tuberculosis (TB) and malaria are endemic in India, assessing its treatment become important. With antibiotic resistance emerging as a major health care problem, knowledge about the indications, adverse drug reactions and rational use of antibiotics is imperative. Hence 30 marks have been allocated to this topic.
- **Immunomodulators, anti-cancer agents, vaccines, vitamins etc.:** The student should be aware of these drugs and have basic knowledge about these topics. Hence 15 marks have been allocated to these topics.

References:

1. Indian Council of Medical Research, Public Health Foundation of India, and Institute for Health Metrics and Evaluation. India: Health of the Nation's States — The India State-Level Disease Burden Initiative. New Delhi, India: ICMR, PHFI, and IHME; 2017.
2. Sundeep Salvi, Komalkirti Apte, Sapna Madas, Monica Barne, Sushmeeta Chhowala, Tavpritesh Sethi, Kunal Aggarwal, Anurag Agrawal, Jaideep Gogtay. Symptoms and medical conditions in 204 912 patients visiting primary health-care practitioners in India: a 1-day point prevalence study (the POSEIDON study) *Lancet Glob Health* 2015;3: e776–84

PRACTICAL EXAMINATION- BLUEPRINT- Final University exams

Exercise 1: Drug dose calculation or OTC- Marks: 10, Duration: 15 minutes

Student will be given a problem statement and asked to calculate the appropriate dose of drug/s. OR

Student will be given a set of questions to evaluate the understanding of OTC Drugs

Evaluation is by the correction of the problem and OTC questions.

Exercise 2: Oral rehydration solution or critical evaluation of drug promotional literature Marks: 10, Duration: 30 minutes

ORS: A clinical scenario will be given to the student and asked to answer a set of questions related to scenario OR

DPL: Hard copy of one drug promotional literature will be given to the student and asked to evaluate according to the WHO criteria

Evaluation based on checklist.

Exercise 3: Prescription writing, Marks: 10, Duration: 15 minutes

A clinical case scenario is given to the student and asked to write an appropriate prescription for the given clinical scenario.

Evaluation will be based on the checklist.

Exercise 4: Spotters, Marks: 10, Duration: 15 minutes

Questions based on all practical exercises, one mark each, one minute for each question, total of 10 questions will be given

Evaluation based on correction.

Exercise 5: Dosage form, Marks: 10, Duration: 30 minutes (Competency 2.1)

A clinical scenario is given to the student. The student will be asked to answer a set of questions related to scenario.

Evaluation based on checklist.

Exercise 6: Graph interpretation based on computer-assisted learning, Marks: 10, Duration: 15 minutes

A graph will be given to the student.

The student will be asked to interpret and draw inference from the graph

Evaluation based on checklist.

Exercise 7: Adverse drug reactions, Marks: 10, Duration: 30 minutes

A clinical scenario will be given to the student. The student will be asked to answer a set of questions related to ADR scenario.

Evaluation based on checklist.

Exercise 8: Drug counselling and communication, & Drug therapy & storage Empathy & ethics - Marks: 10, Duration: 30 minutes

A clinical scenario will be given to the student. The student will be asked to answer a set of questions related to scenario.

Evaluation based on checklist

PRACTICAL BLUE PRINT-University exams (Total 80 marks) Each exercise 10 marks

Examiner	1st	2nd	3rd	4th
For Correction	Drug dose calculation 2.4/ OTC 5.6 10 marks	ORS 2.2/ DPL 3.3 10 marks	Prescription 3.1 10 marks	Spotters 10 marks
For OSCE/Table Viva	Dosage form 2.1 10 marks	CAL Graph 4.2 10 marks	ADR 3.4 10 marks	Drug counselling 3.8 / Drug therapy & storage 5.2 / Empathy & ethics 5.1 10 marks

DRAFT

MODEL QUESTION PAPERS

Rajiv Gandhi University of Health sciences
MBBS Phase II Degree Examination
Pharmacology- Model Paper I
QP Code-

Answer ALL questions. Draw diagrams wherever necessary

Time: 3 Hours

Maximum Marks: 100

Long Essay(2 X10 Marks =20 Marks)

1. A 30 year old lady was brought to the Neurology OPD with a history of three episodes of fits in the last 10 days. She gave a history of head injury six months back following a car accident. Neurological examination revealed no abnormality. Awake EEG of the patient and the MRI scan of the brain were normal. Based on the typical description of the fit, the neurologist made a diagnosis of Generalized Tonic-Clonic Seizures (GTCS) and antiepileptic medications were started.
 - 1.1 Which are the antiepileptic drugs appropriate for this patient? [1 Marks]
 - 1.2 Explain the mechanism of action of any one of them [4 Marks]
 - 1.3 Discuss its adverse effects? [2 Marks]
 - 1.4 What are the advantages of newer antiepileptic drugs compared to the conventional drugs in this patient? [3 Marks]
2. 2.1 Enlist different types of receptors with examples of drugs acting through them [2+2 Marks]
- 2.2 Describe the factors modifying drug action and their clinical significance [3+3 Marks]

Short Essays [10X5 Marks=50 Marks]

3. What is bioavailability? Explain the clinical significance. [3+2 marks]
4. Compare and contrast Nitrous oxide and halothane [2.5+2.5 marks]
5. Discuss the treatment of organophosphorus (OP) poisoning with rationale [2+3]
6. Describe the therapeutic uses and adverse effects of beta blockers[2.5+2.5 marks]
7. A 30-year-old man presented with progressive worsening of shortness of breath. He was exposed to dust while cleaning his office room and gave past history of severe asthma and multiple hospitalizations. His peak flow rates are decreased by nearly 50% from baseline and was diagnosed with *acute severe asthma*.
 - 7.1 Discuss the pharmacological management of this patient [3 Marks]
 - 7.2 Which are the drugs used in combination therapy and give the rationale[2 marks]
8. Discuss the pharmacological management of a patient with *Helicobacter pylori* infection [5 Marks]
9. Rationale for the use of succinylcholine during intubation and discuss its adverse effects [2+3 Marks]
10. Describe the uses and adverse effects of Aspirin [3+2 Marks]
11. Why is allopurinol used in chronic gout? What are its adverse effects [3+ 2 Marks]
12. Discuss the uses and adverse effects of metoclopramide [3+2 Marks]

Short Answers: [10X3 Marks=30Marks]

13. What is the rationale for prescribing terazosin in Benign Prostatic Hypertrophy?
14. Explain the role of prostaglandin analogues in the management of glaucoma
15. Why is glycopyrrolate used as a pre-anaesthetic medication?
16. Explain the clinical significance of redistribution with a suitable example
17. Write the advantages and disadvantages of sublingual route of administration of drugs
18. Rationale for combining Levodopa with Carbidopa in the treatment of parkinsonism
19. Why is morphine given in acute left ventricular failure?
20. Explain the role of inhaled corticosteroids [ICS] in Bronchial asthma
21. Why is deferoxamine used in iron poisoning?
22. What is the rationale for the use of Nicotine replacement therapy in smoking cessation?

Rajiv Gandhi University of Health sciences
MBBS Phase II Degree Examination
Pharmacology - Model Paper II
QP Code-

Answer ALL questions. Draw diagrams wherever necessary

Time: 3 Hours

Maximum Marks: 100

Long Essay (10 Marks X 2=20 marks)

1. A 14-year-old boy presented with polyuria, polydipsia and weight loss of about 6 kg in last 3 months. His biochemical evaluation showed FBS 280mg/dl; PPBS 370mg/dl; HbA1c 10.4%. After assessment, his diagnosis was Type 1 Diabetes mellitus
 - 1.1 Discuss the pharmacological management of this patient [5 marks]
 - 1.2 What are the expected adverse effects of the medications? [3 marks]
 - 1.3 Explain the precautions to be taken to prevent the adverse effects? [2 marks]
2.
 - 2.1 Enumerate the first-line drugs used in the treatment of tuberculosis [2 Marks]
 - 2.2 Discuss the mechanism of action and adverse effects of any one of them [2.5+ 2.5 Marks]
 - 2.3 Explain the regimen for the treatment of Multi-Drug Resistant (MDR) tuberculosis [3 marks]

Short Essays [5 Marks X10=50 Marks]

3. Describe the uses and adverse effects of Corticosteroids [2.5+2.5 marks]
4. Explain the mechanism of action and adverse effects of aminoglycosides [2.5 +2.5 marks]
5. Discuss the mechanism of action, adverse effects and uses of Clomiphene Citrate [2+ 1+ 2 marks]
6. Explain the therapeutic uses and adverse effects of Zidovudine [3+2 marks]
7. Describe the mechanism of action and therapeutic use of Bisphosphonates [3+2 marks]
8. Describe the uses and adverse effects of Heparin [2+3]
9. Explain the mechanism of action and therapeutic uses of Angiotensin-Converting Enzyme Inhibitors [2.5+2.5 marks]
10. What is the role of calcium channel blockers in treatment hypertension? Discuss their adverse effects [3+2 marks]
11. A patient is being discharged from hospital after treatment of an otherwise uneventful acute myocardial infarction (MI). He is a known hypertensive and was found to have elevated LDL during this admission. His blood sugars are normal.
 - 11.1 Discuss the drug treatment for secondary prevention of MI in this patient [2 marks]
 - 11.2 Discuss the mechanism of action and adverse effects of statins [2+1 marks]
12. Explain the uses and adverse effects of Vinca alkaloids

Short Answers: [3 Marks X10=30 Marks]

13. Enlist plasma expanders and explain their adverse effects [2+1]
14. Why is prolonged use of chloroquine NOT preferred in patients with visual problems?
15. Why is tetracycline NOT preferred in children?
16. What is the rationale for the use of Coal tar in Psoriasis?
17. Explain the uses of clindamycin
18. Why are diuretics NOT preferred in pregnancy-induced hypertension?
19. Why is penicillin combined with Cilastatin?
20. Why is Nimodipine prescribed in subarachnoid haemorrhage?
21. Explain the rationale for combining a beta-blocker and long-acting nitrate is in classical angina?
22. Explain the role of folinic acid in minimizing methotrexate toxicity.

Checklists for Practical exercises

Competencies for Skill & Communication (No. 2.1 to 5.7)

PH 2.1	Demonstrate an understanding of the use of various dosage forms	Marks
1	Chooses the appropriate dosage form for the given clinical scenario	1
2	Describes the reason for choosing the particular dosage form	2
3	Provides the appropriate instructions to be followed for administering the chosen dosage form	4
4	Describes the merits and demerits of the given dosage form	1
5	Explains the components of the commercial label	2
	Total	10

PH 2.2	Prepare oral rehydration solution from ORS packet and explain its use	Marks
1	Describes the causes and clinical assessment of dehydration	1
2	Enumerate the different types of ORS along with their composition with actions of each ingredient	2
3	Choose the appropriate type of ORS for a given condition/patient	1
4	Calculate the quantity of ORS required to correct/prevent dehydration	1
5	Demonstrate preparation of ORS from a sachet	4
6	Enumerate non-diarrheal uses of ORS	1
	Total	10

PH 3.1	Checklist for Prescription writing	Marks
1	Particulars of Prescriber: Name, qualification, registration number, address, contact details	0.5
2	Date	0.5
3	Particulars of the patient: Name, Address, age, gender, height, weight, LMP if applicable	1
4	Clinical details: Chief complaints, history, examination/lab diagnosis, Diagnosis	1
5	Generic name with a capital	1
6	Drug form	1
7	Dose	1
8	Frequency	1
9	Duration	1
10	Label: instructions, warnings	1
11	Signature of prescriber	1
	TOTAL	10 MARKS

PH 3.3	Perform a critical evaluation of the drug promotional Literature	Marks
1	Discuss the various types of sources of drug information	2
2	Demonstrate understanding of the importance of critical evaluation of drug promotional literature	2
3	Critically evaluate the given drug promotional literature based on WHO criteria	
	▫ Appropriateness of illustration	2
	▫ Relevance of references cited	2

	Content of scientific information	2
	TOTAL	10

PH 3.4	To recognize and report an adverse drug reaction	Marks
1	Describes the drug therapy of the given case and explains the rationality of prescription	1
2	Recognise an adverse drug reaction (ADR) in the given case	1
3	Perform causality assessment of the identified ADR using WHO & Naranjo's Scale	2
4	Fill the ADR reporting form (CDSCO form)	2
5	Explain the management of the ADR	1
6	Explain the methods to prevent the occurrence of the ADR	1
7	Report the ADR to the pharmacovigilance centre	1
8	Describe the Importance of reporting ADRs and pharmacovigilance	1
	Total	10

PH 4.2	Graph interpretation from CAL	Marks
1	Describes the Graph (Observation)	2
2	Interprets the graph (Pharmacological actions, receptors, any phenomenon etc.)	4
3	Describes the inference drawn from the graph	2
4	Implication of the graph	2
	Total	10

PH 3.8, 5.1, 5.2, 5.6	Communicate with the patient on all aspects of drug use	Marks
1	Describes and comment appropriately on the drug therapy	2
2	Demonstrates effective clinical communication skills	4
3	Describes the ethical/ legal considerations around the case appropriately	2
4	Demonstrates empathy effectively	2
	Total	10

Linker cases:

Case 1: Drugs used for criminal offences (Pharmacology + Forensic medicine)

Case 2: Bronchial asthma (Pharmacology+ Respiratory medicine)

Case 3: Antibiotic stewardship programme (Pharmacology+ Microbiology+ General medicine+ Paediatrics)

Case 4: Renin-angiotensin system (Pharmacology+ Physiology)

Case 5: Oral contraceptive pills (Pharmacology+ OBG)

Case 6: Anaemia (Pharmacology+ Physiology+ Pathology+ General medicine+ Paediatrics)

Case 7: National programmes of TB, Malaria etc. (Pharmacology+PSM)

BOOKS

Recommended Books: (Latest editions are recommended)

- **Basic references**

1. KD Tripathi, Essentials of Medical Pharmacology, 8th Edition.
2. Padmaja Udaykumar, Medical Pharmacology, 6th (CBME) Edition
3. HL Sharma and KK Sharma, Principles of Pharmacology, 3rd Edition.
4. RS Satoskar, Nirmala N Rege, Raakhi K Tripathi, S D Bhandarkar. Pharmacology and Pharmacotherapeutics, 25th Edition.

Reference Books: (Latest editions -recommended)

- **Advanced references (may also include journals/ web/ other electronic sources).**

1. Goodman & Gilman's -The Pharmacological Basis of Therapeutics, ed. Laurence L Brunton, Bruce A. Chabner, Bjorn Knollman. 13th Edition.
2. Lippincott Illustrated Reviews: Pharmacology ed. Karen Whalen
3. Bertram G. Katzung and Anthony J. Trevor, Basic and Clinical Pharmacology, 14th Edition
4. David E Golan, Ehrin J Armstrong, April W Armstrong, Principles of Pharmacology – The Pathophysiologic Basis of Drug Therapy, 4th Edition.
5. Indian Journal of Pharmacology
6. Indian journal of physiology and pharmacology