MBBS SYLLABUS

AND

CURRICULUM

PREFACE

The MBBS students coming out of this prestigious Medical University should be competent in diagnosis and management of common health problems of the individual and the community at primary, secondary, tertiary levels using the clinical skills based on history, physical examination and relevant investigations.

The Graduate Medical Curriculum has been prepared to fulfill the vision of this University and it is oriented towards training students in an unique environment preparing them to undertake the duties and responsibilities of a physician of first contact who is capable of looking after the preventive, promotive, curative and rehabilitative aspects of medicine. The students pursuing Graduate Medical curriculum will have the necessary competencies (knowledge, skills & attitudes) to assume the role of a quality health care provider to the people of India and across the world.

The curriculum is framed involving many experts in relevant medical fields incorporating especially the **specific learning objectives, Teaching methodology, "must know, desirable to know and nice to know"** as put `forth by Medical Council of India and more importantly it includes the vital **Medical Ethics** to practice in patient care, service and research. It also includes the **integrated teaching** using a problem based learning, evidence based approaches starting with clinical or community cases and exploring the relevance of various preclinical disciplines in both understanding and sharp focus on resolving health care problems. Every attempt has been made to de - emphasize compartmentalisation of disciplines so as to achieve both horizontal and vertical integration in different phases with a mission that our Medical Graduates will outshine and match the International standards.

The Introduction of teaching elements, OSCE / OSPE have also been incorporated which are proven to be an important, innovative, reliable and objective modality of assessment for clinical / practical skills in the changing scenario of Medical Sciences.

Record Book / Log Book becomes a reflective record of student's learning and achievements and faculty contribution towards learning. Every student will be motivated to document what he/she has learnt in the respective department / specialty in the log book and make it as a permanent record. The **revised Record Book/Log Book** should be followed by all the affiliated Medical colleges of this University to bring uniformity in teaching and training of students.

Internship is a phase of training wherein the graduate is expected to conduct actual practice under the supervision of a trained doctor. The learning methods and modalities have to be done during the MBBS course itself with larger number of hands on session and **practice on simulators**.

The Introduction of a restructured curriculum and training program with emphasis on early clinical exposure, integration of basic and clinical sciences, clinical competence and skills and new teaching – learning methodologies will lead to a new generation of medical graduates of global standards.

I want to thank the Academic Officer and the team of Academic, Experimental Medicine & Examination wing and the team of experts from their relevant Medical Specialties of various Medical Colleges in the State for their enthusiastic and energetic efforts to bring this revised syllabus & curriculum.

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VICE-CHANCELLOR.

Comments/feedback are welcome if any and mail it to registrar@tnmgrmu.ac.in

Second MBBS

PHARMACOLOGY

1. Curriculum

The curriculum has been designed as per MCI recommendations. MCI has allocated approximately 300 hours for teaching pharmacology over a period of three semesters. The theory classes would comprise of 180 hours and the practical classes would comprise of 120 hours.

Goal

The goal of teaching the second year undergraduate students in Pharmacology is to impart a holistic approach to Pharmacology and inculcate a rational and scientific basis of therapeutics ,with regard to the basic domains of knowledge along with skill development , attitude and communication . It aims at building up of various competency levels at an undergraduate level with

* Focus on imparting a better insight into the clinical oriented training of the subject which would definitely benefit the student to be more confident and skilled to face the demands expected of him / her.

*And to include all clinically relevant aspects of the subject in the pharmacology assessment with appropriate testing and to include CAL exercise for must know aspects wherever applicable.

Specific learning objectives:

Knowledge:

At the end of the course the students shall be able to enumerate , describe ,analyse and acquire knowledge based on the following pharmacological aspects relevant to clinical practice.

1. The general principles of actions and effects of various drugs and their kinetics.

2. Dose related effects of drugs.

3. Indications, contraindications, interactions and adverse effects of must know drugs
   for must know disorders , [therapeutically used drugs in day to day practice].

4. The concept of essential drugs, the essential drug list of our country, concept of P
   drugs .

5. The importance of rational drug therapy.
6. To prescribe rationally based on the efficacy, safety and cost effectiveness for a
   particular disease depending on both individual and community needs.

7. To prescribe drugs in special situations such as pregnancy, lactation, pediatric
   population and old age.

8. To prescribe for mass therapy under National health programs.

9. The drugs of addiction and the management of addiction.

10. Antidotes and drugs used in common poisoning.

11. The various environmental and occupational pollutants, their effects on human health and their management.

12. The different types of biomedical waste, their potential risks and the management of health hazards caused by them.

13. The ethics and modalities in the development of new drugs and the ethics in clinical practice and animal ethics including evidence based medicine and practice oriented research .

14. Simple facts on legal aspects of drug use

Skills:

At the end of the course the student shall be able to demonstrate , show / show how competencies related to the following topics

1. Rational therapeutics : includes art of prescription writing, common prescribing errors and interpretation of drug labels
2. Demonstrate the ability in drug administration and drug loading skills in drug administration
3. Interpretation of clinically relevant problem based learning exercises based on prescription audit, pharmacoeconomics ,dose calculations ,drug interactions.
4. Demonstrate the ability to communicate in simulated models/ patients
5. Demonstrate attitudinal skills through simulated models / patients

6. Demonstrate the ability to interpret simple aspects on adverse drug reaction monitoring
7. Demonstrate the ability to interpret simple aspects of antibiotic policies
8. Interpretation of toxicological aspects in pharmacology

A. **Integration:** A knowledge of clinical presentation and therapy of common diseases will be imparted to the students by both horizontal and vertical integrated teaching methods , seminars and group discussions .

Example : Cardiovascular pharmacology related topics like acute myocardial infarction ,congestive cardiac failure . integrating departments Anatomy, Physiology, Pathology, Pharmacology, Medicine.

Teaching hours in pharmacology : phase 2 ,5th to 7th semester

s.no	Teaching methods	Detailed time distribution	Number of hours
1.	Interactive lectures		110
2.	Problem based learning	Must know aspects	20
3.	Small group discussions		14
4.	Integrated lectures		8
5.	Tutorials	At the end of each system	14
6.	Others [seminars,quiz,role play]		14
	Total		**180**
	Practicals [small group teaching]		

1.	Charts	Prescription writing Prescription audit Clinical problem solving exercise Dose calculation Pharmacoeconomics Clinical pharmacology Toxicology	15 10 10 5 5 10 10
2.	Spotters		5
3.	OSPE		20
4.	Computer assisted learning		20
	Practical exam		5
	Viva		5
	Total practical hours		**120**
	Grand Total		**300**

Teaching methodology

Theory :

1. Interactive Lectures
2. Problem Based Learning
3. Small group discussions
4. Integrated lectures
5. Tutorials.
6. Others [Seminars ,Mini quiz,Role play]

Practical teaching learning methods :

1. Small group teaching of charts
2. OSPE [includes mannequin models]
3. Computer Assisted Learning

Theory syllabus

General Guidelines :

- The important undergraduate based theory lectures can be scheduled to be taught based on different clinical postings and prescribing pattern of common drugs. The students can be instructed to collect prescription data on the common ailments to enable an interactive session for a forth coming lecture. The students of a particular clinical posting should be intimated at least 10 – 15 days earlier/ prior to the planned lecture. The other students should come with the Prepared theory background .

  [Examples of important must know ailments : Hypertension, Diabetes Mellitus, Myocardial Infarction, Congestive Cardiac Failure ,Shock, Bronchial Asthma, Anemia, Peptic Ulcer ,Hypothyroidism , Hyperthyroidism , Epilepsy, Parkinsonism, Major Depression, Schizophrenia, Rheumatoid Arthritis, Glaucoma, Urinary Tract Infections, Tuberculosis, Typhoid, HIV, Amoebiasis, etc]
- Specific learning objectives and detailed time distribution for each teaching learning method should be framed for each system by the department in common, for uniform implementation and the theory classes should be based on that.
- The students can be divided into small groups and assigned into different subtopics of the subject to be dealt for the day . They should be given adequate preparatory time and each group can discuss their views on the

particular topic which can be summarized by the teacher/students in the end. This can be done for must know topics.

Theory Syllabus : Pharmacology for undergraduate curriculum

Topic	Must Know	Desirable To Know	Nice To Know

General Pharmacology	1.Terminologies 2. Definitions 3.Routes of drug administration 4.Pharmacokinetics Passage of drug across biological membranes, Absorption and bioavailability, Distribution redistribution and plasma protein binding, Biotransformation reactions , Enzyme inhibition and induction, First pass metabolism, Routes of excretion , Plasma half life 5. Pharmacodynamics – mechanism of drug action , Receptors, Combined effect of drugs, Factors modifying drug action 6.Adverse Drug effects and pharmacovigilance 7.Concepts of therapeutic index and margin of safety 8.Ethics – biomedical ethics on rational prescribing,biomedical ethics on medical research	1.Drug nomenclature 2.Sources of drugs 3.Pharmacokinetics -microsomal enzyme classes, First order and zero order kinetics Loading and maintenance doses, Prolongation of drug action Transducer mechanisms, Regulation of Receptors, Dose Response Relationship, Rational Use Of Medicines Drug Interactions, Pharmacogenomics, Pharmacogenetics	1.Pharmacopia 2.Essential Medicines Concept 3.Kinetics Of Elimination – Clearance ,Repeated Drug Administrations , Plateau Principle , Target Level Strategy, Monitoring Plasma Concentrations Evidence Based Medicine , New Drug Development Drug Regulations& Drug Acts Bioassays

Autonomic Nervous System 1.Neurohumoral Transmission 2.Cholinergic System And Drugs 3.Adrenergic System And Drugs	 Cholinergic Transmission, Receptors, Cholinergic Drugs – Pharmacology, Anticholinesterases, Anticholinergic Drugs – Pharmacology Adrenergic Transmission , Receptors, Adrenergic Drugs – Pharmacology, Antiadrenergic Drugs, Drugs For Glaucoma	 Neurohumoral Transmission – Steps , Cotransmission Drugs Acting On Autonomic Ganglia, Ganglion Blocking Agents	 Drug Dosage
Autacoids and related Drugs 1.Histamine And Antihistamines	 H1 Antagonists - Pharmacology	 Histamine Actions And Role	 Histamine Synthesis And Degradation
2. 5HT And Its Antagonists And Drug Therapy Of Migraine	Pathophysiological Roles Of 5 HT, 5HT Receptors, 5HT Antagonists, Ergot Alkaloids, Drug Therapy Of Migraine	Synthesis And Destruction, Actions Of 5HT	5HT Receptors – Distribution And Individual Roles Of Different Receptors
3.Prostaglandins, Leukotrienes And PAF	Biosynthesis And Degradation Of PGs And LTs, Uses Of PGs And LTs, PAF	Actions And Pathophysiological Roles Of PGs And LTs	Prostanoid Receptors And LTReceptors
4.NSAIDS	Classification, Mechanism Of Action, Actions, Uses, Adverse Effects Of NSAID Selective Cox – 2 Inhibitors	Pharmacology Of Individual NSAIDS	Choice Of NSAID And Analgesic Combinations

5.Antirheumatoid And Anti Gout Drugs	Classification And Pharmacology Of Drugs Used For Rheumatology And Gout	Individual Pharmacological Variations	
Respiratory System Drugs For Cough And Bronchial Asthma	Mucolytics, Drugs Used For Bronchial Asthma, Mechanism Of Drugs Used For Bronchial Asthma And Their Pharmacology, Status Asthmaticus	Individual Drugs, Pharmacological Variations	Choice Of Treatment In Bronchial Asthma, Drugs Used For Cough
Hormones 1.Anterior Pituitary Hormones	Somatostatin And Its Analogues, Gonadotropins, Gnrh Agonists	Growth Hormone, Prolactin, GNRH, TSH, ACTH	Pathophysiological Role Of Each Hormone
2.Thyroid Hormones	Actions, Uses Of Thyroid Hormones, Thyroid Inhibitors	Synthesis, Metabolism And Regulation Of Secretion Of Thyroid Hormones	Individual Drug Variations Among Antithyroid Drugs
3.Insulin, Oral Hypoglycemic Drugs And Glucagon	Insulin Actions, Mechanism, Types And Uses, Diabetic Ketoacidosis, Newer Insulin Delivery Devices, Oral antidiabetic agents – Classification And Pharmacology Of Individual Drugs	Insulin Resistance, Difference In Pharmacology Of Individual Drugs, Glucagon, Status Of Oral Antidiabetic In DM	
4.Corticosteroids	Actions, Mechanism, Uses, Adverse Effects, Contraindications Of Glucocorticoids	Mineralocorticoid Actions, Gene Mediated Cellular Actions Of Glucocorticoids	Biosynthesis, Individual Differences Among Steroids
5.Androgens	Actions, Mechanism, Adverse Effects Andd Uses Of Androgens, Anabolic Steroids, Antiandrogens	Drugs For Erectile Dysfunction	Regulation Of Secretion
6.Estrogen, Progestin And Contraceptive	Actions, Uses And Mechanism Of Estrogen And Progestinsantiestrogens And Serms, Aromatase Inhibitors, Antiprogestins, Contraceptive Pills– Types, Adverse Effects And Contraindications Biosynthesis And Regulation, Male Contraception, Contraceptives		Individual Drug Differences
7.Oxytocin And Drugs Acting On Uterus	Oxytocin, Ergot Alkaloids Pharmacology, Tocolytics	Uterine Stimulants	Individual Drug Differences Among Tocolytics

8.Drugs Affecting Calcium Balance	Calcitonin, Vitamin D, Bisphosphonates	Calcium – Physiological Role And Uses, Parathyroid Hormone	
Peripheral Nervous System 1.Skeletal Muscle Relaxants	Classification, Mechanism And Pharmacology Of Different Groups Of Peripheral And Centrally Acting Skeletal Muscle Relaxants	Differences Between Competitive And Depolarising Block	Notes On Individual Drugs
2.Local Anaesthetics	Classification, Mechanism Of Action, Uses And Techniques Of Local Anaesthetics	Adverse Effects, Individual Compounds	Chemistry,Kinetics And Comparative Properties Of Local Anaesthetics
Central Nervous System 1.General Anaesthetics	Stages Of Anaesthesia, Classification, Pharmacology Of General Anaesthetics, Pre Anaesthetic Medication	Mechanism Of General Anaesthesia, Kinetics Of Inhalational Drugs	Techniques Of Inhalational Anaesthetics, Individual Drug Variations
2.Alcohols	Acute Alcohol Intoxication, Chronic Alcoholism, Aldehyde Dehydrogenase Inhibitor, Methyl Alcohol Poisoning	Pharmacological Actions, Mechanism, Kinetics And Interactions Of Alcohol	Food Value And Alcoholic Beverages
3.Sedative Hypnotics	Classification, Pharmacology Of Barbiturates And Benzodiazepines, Z Compounds,Melatonin, Benzodiazepine Antagonist	Drugs Affecting GABA Receptor Gated Chloride Channel, Individual Drug Variations	Sleep Stages , Kinetics Of Drugs
4.Antiepileptic Drugs	Classification, Pharmacology Of Different Drugs, Status Epilepticus	Treatment Of Epilepsies ,Types Of Epilepsies	Kinetics Of Drugs
5.Antiparkinsonian Drugs	Classification , Pharmacology Of Individual Drugs	Pathophysiology Of Parkinsonism	Kinetics Of Drugs And Individual Drug Variations
6.Antipsychotics And Antimanic Drugs	Classification And Actions Of Antipsychotics, Atypical Antipsychotics, Adverse Effects And Uses Of Antipsychotics, Antimanic Drugs	Hallucinogens, Cannabinoids	Types Of Psychosis, Distinctive Features Of Neuroleptics
7.Antidepressant And Antianxiety Drugs	Classification Of Antidepressants, Pharmacology Of Each Group Of Drugs, Classification And Pharmacology Of Antianxiety Drugs	Differences Among Individual Drugs Treatment Of Anxiety	Comparison And Individual Properties Of Drugs
8.Opioid Analgesics	Classification, Pharmacology Of Morphine, Agonist Antagonists Of Opioid	Endogenous Opioid Peptides, Individual Drug Properties	

9.Cns Stimulants	Classification, Cognition Enhancers	Analeptics, Psychostimulants	Individual Drug Properties
Cardiovascular System 1.Renin Angiotensin System	ACE Inhibitors Pharmacology, ARBs Pharmacology	RAS, Actions, Pathophysiological Roles Of Angiotensin, Direct Renin Inhibitor	Plasma Kinins
2.Cardiac Glycosides	Pharmacology Of Digitalis, Drugs Used For CCF And Their Mechanisms	Properties Of Individual Drugs	Chemistry Of Cardiac Glycosides And Kinetics
3.Antiarrythmic Drugs	Classification, Pharmacology Of Each Group	Individual Drug Properties	Types Of Arrythmia, Choice And Use Of Antiarrythmic Drugs
4.Antianginal Drugs	Classification, Pharmacology Of Individual Groups, Treatment Of Myocardial Infarction	Individual Drug Properties Drugs For Peripheral Vascular Diseases	Types Of Angina
5.Antihypertensive Drugs 6.Shock	Classification, Pharmacology Of Individual Groups, Hypertensive Emergencies, Hypertensive In Pregnancy	Status Of Each Group As Antihypertensive, Treatment Of Hypertension Treatment Of Shock	Combination Therapy, Parenteral Therapy
Drugs Acting On Kidney 1.Diuretics	Classification, Pharmacology Of Individual Groups	Individual Drug Differences	
2.Antidiuretics	Vasopressin Analogues	ADH Pharmacology	Vasopressin Antagonists, Thiazides As Antidiuretics
Blood 1.Haematinics And Erythropoietin	Iron Preparations , Adverse Effects, Uses Of Iron, Iron Poisoning, Erythropoietin	Deficiency Manifestations, Uses Of Vit B12 , Folic Acid	Kinetics Of Iron, Kinetics Of Maturation Factors
2.Drugs Affecting Coagulation	Vit K , Classification Of Anticoagulants, Pharmacology Of Heparin , Oral Anticoagulants ,Fibrinolytics, Antiplatelet Drugs	Coagulants, Direct Thrombin Inhibitors, Direct Factor Xa Inhibitors, Antifibrinolytics	Kinetics And Properties Of Individual Drugs
3.Hypolipidemic Drugs	Classification, Pharmacology Of Individual Groups	Characteristics Of Individual Drugs, Plasma Expanders, Total Parenteral Nutrition	Lipid Transport And Lipoproteinemias

Gastrointestinal Tract 1.Drugs For Peptic Ulcer	Classification, Pharmacology Of Individual Groups, Anti H.Pylori Drugs	Characteristics Of Individual Drugs	Regulation Of Gastric Acid Secretion
2.Antiemetics And Prokinetics	Classification, Pharmacology Of Individual Groups, Prokinetic Drugs, 5HT 3 Antagonists, Nk1 Receptor Antagonists	Emetics, Other Antiemetics	Digestants, Gall Stone Dissolving Drugs
3.Antidiarrheal Drugs And Drugs For Constipation	Laxatives Classification, Lactulose, Stool Softeners, Drugs For Inflammatory Bowel Diseases	Treatment Of Diarrhea, ORS, Other Laxatives	Choice And Use Of Purgatives, Non Specific Anti Diarrheal Drugs, Antimotility Drugs
Antimicrobial Drugs 1.General Considerations	Drug Resistance, Super Infections,	Classification, Mechanism Of Action, Combined Use Of Antimicrobial	Problems With Use Of AMA, Choice Of Antimicrobial Agent
2.Sulfonamides and flouroquinolones	Classification, pharmacology of individual groups	Characteristics of individual drugs	
3.Beta Lactam Antibiotics	Classification, pharmacology of individual groups	Characteristics of individual drugs	
4.Aminoglycosides	Classification, Pharmacology Of Individual Groups	Characteristics Of Individual Drugs	
5.Macrolide, Lincosamide, Glycopeptide	Classification, Pharmacology Of Individual Groups	Characteristics Of Individual Drugs	Urinary Antiseptics
6.Antituberculous Drugs	Classification, Pharmacology Of Individual Groups, Short Course Chemotherapy	Characteristics Of Individual Drugs	
7.Antileprotic Drugs	Classification, Pharmacology Of Individual Groups	Characteristics Of Individual Drugs	
8.Antifungal Drugs	Classification, Pharmacology Of Individual Groups	Characteristics Of Individual Drugs	
9.Antiviral Drugs	Classification, Pharmacology Of Individual Groups	Characteristics Of Individual Drugs	HIV Treatment Principles And Guidelines
10.Antimalarial Drugs	Classification, Pharmacology Of Individual Groups	Characteristics Of Individual Drugs	
11.Antiamoebic And Other Protozoal Drugs	Classification, Pharmacology Of Individual Groups	Characteristics Of Individual Drugs, Other Antiprotozoal Drugs	
12.Antihelminthic Drugs	Classification, Pharmacology Of Individual Groups	Characteristics Of Individual Drugs	
Anticancer Drugs	Classification, Pharmacology Of Individual Groups	Characteristics Of Individual Drugs, General Principles Of Chemotherapy Of Cancer, Toxicity Amelioration	

Miscellaneous	1.Immunosuppressant Drugs 2.Treatment Of Scabies, Drugs For Psoriasis, Drugs For Acne Vulgaris 3.Chelating Agents, 4.Vaccines 5.Drug Interactions 6.Vitamins , Antioxidants	Enzymes In Therapy, Drugs Acting On Skin, Paediatric And Geriatric Pharmacology, Therapeutic Gases	Antiseptics And Disinfectants, Environmental Toxicants

Bio medical ethics: The pharmacology lecture classes should have an introductory class on biomedical code and values of ethics.

PRACTICAL SYLLABUS:

It was resolved to adopt compulsorily the Medical Council of India's Minimum standard requirements regulations 1999 amended upto July 2015 as per the terms of Notification published on 23.10.2008 in the Gazette, Government of India which is as follows:

"for teaching Physiology and Pharmacology in UG curriculum the required knowledge and skill should be imparted by using computer assisted module. Only an animal hold area, as per CPCSEA Guidelines is required."

PRACTICAL SCHEDULE

S.no	Contents	Mode of teaching	Student activity	10 point score
	Pharmacology – an ever changing science			
	Learning objectives			
A.	**General pharmacology**			
1.	Drug information resources	CAL	visit to library	1
2.	Sources of new drugs & common dosage forms / Spotter	CAL / Lecture	Exercise on identity /spotter	6
3.	Animal experiments in pharmacology	CAL /Lecture	Visit to animal house	3
4.	Clinical drug development and biomedical ethics	CAL / chart	OSPE / Exercise	3
5.	Therapeutic drug monitoring	CAL /Lecture	Exercise	3
6.	Instruments in pharmacology	CAL / Lab visit	Exercise	1
7.	Weights ,measures and pharmaceutical calculations	Lecture	Exercise	6
B.	**Clinical pharmacology**			
1.	Principles of prescription writing	Lecture	Exercise	6
2.	Interpretation of drug orders and labels	Lecture	Exercise	6
3.	Prescription writing exercise	Charts	Exercise	6
4.	Dose calculation & Standard doses of commonly prescribed drugs	Charts	Exercise	6
5.	Prescription audit	Charts	Exercise	6

6.	Pharmacoeconomics	Charts	Exercise	6
7.	Clinical problem solving exercise	Charts	Exercise	6
9.	Qualitative and quantitative pharmacology exercise	Charts	Exercise	6
	Toxicology	Chart	Exercise	6
10.	Adverse drug reaction assessment exercise	Students ADR assessment form	To collect at least 1 or 2 reports / discussion in small groups	1
11.	Antibiotic policy making exercise	Students Antibiotic policy form	To collect at least 1 or 2 reports / discussion in small groups	1
12.	P drug concept & exercise on common ailments	Lecture	Exercise on 5 must know disease	1
C.	**Pharmacological skill development exercises & experiments / Objective structured practical examination : Examples**			
1.	Test dose preparation of penicillin	OSPE 1	Prep	6
2.	Preparation of prefilled Adrenalin injection for emergency handling	OSPE 2	Prep	6
3.	Administration of eye drops	OSPE 3	Demonstrate skill with mannequin	6
4.	Identification of different syringes	OSPE 4	Exercise on identity	6
5.	Preparation of an IV line	OSPE 5	Demonstrate skill	6
6.	Insulin :Mixing of long acting and short acting insulin	OSPE 6	Demonstrate skill	6

7.	Preparation of emergency tray in Anaphylaxis	OSPE 7	Demonstrate skill	6
9.	Preparation of emergency tray in Acute myocardial infarction	OSPE 8	Demonstrate skill	6
	Picking out the drugs used in must know disorders and their rationale	OSPE 9	Exercise	6
10.	Interpretation of drug labels	OSPE 10	Exercise	6
11.	Identification of common prescribing errors	OSPE 11	Exercise on identity	6
12	Identification of banned drugs	OSPE 12	Exercise on identity	6
13	Identification of Preanaesthetic medications	OSPE 13	Exercise on identity	6
14	Identifying the drug producing the toxicity/specific adverse drug reaction	OSPE 14	Exercise on identity	6
15	Clinical drug development model blocks arrangement	OSPE 15	Arrange assorted block models	6
16	Aspiration from a vial	OSPE 16	Demonstrate skill	6
17	Aspiration from an ampoule	OSPE 17	Demonstrate skill	6
18	Reconstitution of dry powder form of drug	OSPE 18	Demonstrate skill	6
19	Intramuscular drug administration	CAL / mannequin	Demonstrate skill with mannequin	6
20	Intravenous drug administration	CAL / mannequin	Demonstrate skill with mannequin	6
21	Subcutaneous drug administration	CAL / mannequin	Demonstrate skill with mannequin	6

22	Metered dose inhaler	CAL	Demonstrate skill with inhaler	6
23	Nebulizer	CAL / mannequin	Demonstrate skill with mannequin	6
D.	**Toxicology & Small animal experiments / techniques for undergraduates**			
1.	Identification of picture [Plant Poisons & symptoms]	CAL / Chart	Exercise/spotter	6
2.	Effect of drugs on rabbit eye : Miotic	CAL	Exercise	3
3.	Effect of drugs on rabbit eye : Mydriatic	CAL	Exercise	3
4.	Effect of analgesics on albino mice : physical method	CAL	Exercise	3
5.	Effect of GA on rat	CAL	Exercise	3

Note : 10 Point Score [6: 3: 1], 6 : Must Know , 3 : Desirable To Know , 1 : Nice To Know

Requirements for practical classes :

- Updated charts on must know drugs for must know disorders as per syllabus
- **10 computers for 125 students**
  Mannequins: IM model deltoid , IM model gluteal . IV model forearm, subcutaneous model / intradermal model. [at least 2 of each for training on rotation]
- Inhalers and Nebulizer for demonstration
- Other necessary material as per OSPE model [e.g.: drug tray, drugs , syringes , drug development block models , beakers ,test tubes , test tube holders ,vials, ampoules etc.]

CAL station:

- Each module: 15 -20 minutes
- Computers needed: 10 for 125 students
- No. of instructors: 10 [at least 8]
- E.g. 250 students can be divided into 3 batches: A, B, C [84 +83+ 83 posted on rotational basis to pharmacology ,microbiology, pathology during practical hours]
- CAL can be conducted for one batch of around 84 students at a time
- Each batch will further be divided into smaller groups of 8 – 12 students

REFERENCE BOOKS : Latest Editions

1. Basics and Clinical Pharmacology : Bertram G. Katzung
2. Essentials Of Medical Pharmacology : K.D.Tripathi
3. Pharmacology And Pharmacotherapeutics : Satoskar
4. Clinical Pharmacology : Bennet And Brown
5. Goodman & Gilmans Pharmacological Basis Of Therapeutics

THEORY EXAMINATION

Theory examination :

Theory Question Paper Pattern

	No. of Questions	**Marks**
1. Essay	1 x 10 marks	10
2. Brief answers	6 x 4 marks	24
3 Short answers	6 x 1 marks	6

	Total	40

Practical examination including OSPE: 25 Marks

Practical 1 : 15 Marks

Practical 2 : 5 Marks

OSPE: 5 Marks

Total 25 marks

Viva : 15

Internal assessment : 30 marks (Theory 15, Practical 10 &Record 5)

Practical 1 :

1.Spotters - - 2 marks

2.Prescription writing - - 3 marks

3.Prescription audit - - 3 marks

4.Clinical problem solving exercises - - 3 marks

(Therapy oriented problems of

drug adverse reactions and

interaction of commonly used drugs)

5.Dosage calculation - - 2 marks

6. Pharmacoeconomic problems - - 2 marks

Practical 2:

1.Toxicology	- -	2.5 marks
2.Clinical pharmacology	- -	2.5 marks
OSPE	- -	5x1 = 5 marks

Viva topics : Total 15 marks

I . General Pharmacology 4 marks

Autonomic Nervous system

Central Nervous system

Ocular Pharmacology

II . Autacoids 4 marks

Drugs acting on Kidney

Cardiovascular system including Blood

Respiratory system

Therapeutic gases

Gastrointestinal system

III. Chemotherapy 4 marks

Dermatological Pharmacology
Immunomodulators

IV. Endocrines 3 marks

Enzymes in therapy

Vitamins

Toxicology

Internal assessment

- Each chapter will be followed by a theory written test and viva voce. Average of all the test marks should be considered for the final internal assessment. If the student is absent himself for any test, a repeat test can be given according to the departmental decision.
- At the same time practical exams should be conducted at periodic intervals on the topics covered as per syllabus. The internal assessment marks will be an average of theory, viva voce and practical exams including the completed record work .
- Internal assessment based on the above should be forwarded to the university at quarterly intervals along with attendance for theory and practical's .

Internal assessment test: unit wise

Unit	Topics	Month
1.	General pharmacology	2nd week of December
2.	Autonomic nervous system and peripheral nervous system	1st week of February
3.	Central nervous system	1st week of April
4.	Cardiovascular system ,Blood and Diuretics	1st week of June
5.	RS,GIT ,Autacoids	4th week of July
6.	Endocrine	3rd week of September
7.	Chemotherapy 1	3rd week of October
8.	Chemotherapy 2	3rd week of November

Maintenance of records and log books

- A documentation of the must know knowledge gained by the student in the subject is mandatory. Every student should submit a record notebook at the end of his course for certificate of completion during his examination with assessment at periodic intervals .

- A log book with regard to day to day progress should be submitted every month to the concerned staff / mentor for verification. [Attitude assessment eg .visit to library, participation in quiz, seminars ,CMEs etc]

Research activities:

Research must be implemented during the course of the undergraduate study**.** A basic knowledge about preclinical studies and clinical trials along with the basics of protocol writing, biostatistics should be introduced through workshops/ seminars/guest lectures/ assignment/ mini projects [eg. Drug utilization studies], to all the undergraduate students. The students can be motivated on the importance of attending CME s, Conferences ,Symposias etc.

Note: Samples of antibiotic policy form, adverse drug reaction monitoring form, feedback form are provided for uniform implementation. The record note book should be indexed uniformly in all the medical colleges ensuring all relevant and important topics are implemented in the curriculum for all the medical under graduates students without fail as per practical schedule.

ASSIGNMENT ON ANTIBIOTIC POLICY [sample form]

Students Reporting Form , Department of Pharmacology & Microbiology

Name of the patient : Department / ward:

Age & sex : OP No / IP No. :

Address :

Provisional diagnosis :

Empirical antibiotic therapy given: 1.

with dose and duration 2.

Culture & Sensitivity recommended : yes / no

If yes, result of report:

Any change in the treatment after C&S report:

Rationale behind the choice of treatment, dose & duration before and after culture and sensitivity:

Classification, mechanism of action, uses, most common and serious adverse effects of the prescribed antibiotic:

ASSIGNMENT ON ADVERSE DRUG REACTION MONITORING [sample form]

Department of pharmacology, students reporting form

Patient name:

Age/Sex :

OP/IP No:

Ward / Unit:

Group of the drug considered:

Adverse event noted:

Analysis of the report:

1. Known ADRs reported (**Expected**) :

2. Other ADRs reported (**Unexpected**) :

3. Relationship of the ADR with administered drugs:

Certain ☐	Probable ☐	Possible ☐
Unlikely ☐	Unclassified ☐	Unclassifiable ☐

4. Comments:

Followed by small group discussion.

MICROBIOLOGY

A	**Goal and objectives**			
Sl.No	**Content**	**Must Know**	**Desirable to Know**	**Nice to Know**

II. M.B.B.S. MICROBIOLOGY PRESCRIBED TEACHING HOURS - 250 Hrs.

GOAL :

The broad goal of the teaching of undergraduate students in Microbiology is to provide an understanding of the natural history of infectious diseases in order to deal with the etiology, pathogenesis, laboratory diagnosis, treatment, control and prevention of infections in the community, immune system in health and disease.

OBJECTIVES:

A) Knowledge

At the end of the course, the student will be able to acquire knowledge in the following:

1) Morphology, classification of bacteria and the virulence mechanisms.
2) The principles and practice of sterilization and disinfection in health care settings
3) The various mechanisms of transfer of genes between bacteria and the genetic mechanisms of antimicrobial resistance.
4) Normal flora of the human body and describe the host parasite relationship
5) List the pathogenic microorganisms (bacteria, viruses, parasites, fungi and describe the Pathogenesis of the disease produced by them with emphasis on diseases of clinical and public health importance
6) Epidemiology and transmission of zoonoses, arthropod borne diseases and opportunistic infections

A	**Goal and objectives**			
Sl.No	**Content**	**Must Know**	**Desirable to Know**	**Nice to Know**

7) Basic immunology- Innate immunity, Structure and functions of cells and organs

of immune system, antigen & antibody reactions, complement, antigen

presentation and cell mediated immunity.

Clinical immunological aspects - like hypersensitivity reactions, autoimmune

disorders, immunodeficiency diseases, immunity in infections, principles of

vaccination tumor and transplantation immunology.

8) Principles of laboratory diagnosis of infectious diseases; estimation of diagnostic accuracy of lab tests -sensitivity, specificity and predictive values
9) Antimicrobial agents for treatment of infections and antimicrobial stewardship.
10) Water and Food borne diseases; epidemiology and demonstration of water analysis
11) Health care associated infections and principles of infection control including standard work precautions & biomedical waste management.
12) Principles of infectious diseases surveillance: Investigation of outbreaks including collection of samples and control measures.

B) SKILLS: The following are the skills expected to be acquired by the students at the end of course:

1) Operate the light compound microscope.

2) Common laboratory techniques (as given below) for the direct demonstration of microorganisms from clinical materials and interpret their findings.

(a) Saline and iodine wet mount preparations (stool) for the demonstration of trophozoites, Ova or cysts

(b) Collection of blood by finger prick, preparation of smear and Giemsa/JSB staining and examination for malarial parasites and microfilariae.

(c) Preparation of a smear and performance of Gram stain and interpretation –

A	**Goal and objectives**			
Sl.No	**Content**	**Must Know**	**Desirable to Know**	**Nice to Know**

body fluids, urine, sputum and pus specimens,

(d) Preparation of a smear and performance of Ziehl – Neelsen stain with biosafety

precautions for the demonstration of acid fast bacilli from sputum and

reading with bacterial index.

3) Identification of the common microorganisms isolated from clinical specimens by colony appearance and biochemical tests genus/species level. Interpretation of the results of antimicrobial testing for the diagnosis of common infectious diseases.
4) Identification of some common fungi based on colony morphology and Lactophenol cotton blue microscopy ; KOH wet mount preparation
5) Reading and interpretation of serological tests -Widal, rapid plasma Reagin, , HIV/HBV ELISA /Rapid tests, latex agglutination tests-rheumatoid factor and ASO.
6) Blood collection through venipuncture with aseptic precautions while performing
   Blood culture
7) Collection of clinical samples :pus through syringe (aspirate) or swab ;clean catch midstream urine sample ;sputum with minimal contamination by saliva
8) Hand hygiene and standard work precautions.

A	**Goal and objectives**			
Sl.No	**Content**	**Must Know**	**Desirable to Know**	**Nice to Know**

B	**Integrated seminars/lectures**

C) INTEGRATION:

The following are some of the topics for integrated lecture/seminar

Sl.No	Name of the topic	Integration	
		Horizontal	Vertical
1.	Tuberculosis	Microbiology, Pathology, Social and preventive medicine, Pharmacology	Anatomy, General medicine, Pulmonology, Pediatrics,
2	malaria	Microbiology, Pathology, Social and preventive medicine, Pharmacology	General medicine, Pediatrics
3.	HIV/AIDS	Microbiology, Social preventive medicine	Dermatology & STD, General medicine, pediatrics,
4	Dengue	Microbiology, Social and preventive medicine, Pharmacology	General medicine, pediatrics,
5	Sexually transmitted infections	Microbiology, Social preventive medicine	Dermatology & STD, General medicine,
6	Respiratory tract infections	Microbiology, Pathology, Pharmacology	Anatomy, Physiology, General medicine, pediatrics, Pulmonology
7	CNS infections	Microbiology, Pathology, Pharmacology	Anatomy, General medicine, Pediatrics, Neurology
8	Gastrointestinal tract infections- acute diarrheal disease & Food poisoning	Microbiology, Social preventive medicine	General medicine, Pediatrics,
9	Urinary tract infections	Microbiology	Anatomy, Physiology, General medicine, Pediatrics, Urology, Nephrology, Obstetrics and

B	**Integrated seminars/lectures**

			gynecology
10	Wound infections & surgical site infections	Microbiology	Surgery, Obstetrics and gynecology, Orthopedics, Plastic Surgery
11	Antimicrobial use & stewardship	Microbiology	General medicine, Pediatrics, Surgery, Obstetrics & gynecology
12	Sterilization & Disinfection	Microbiology	Anesthesiology, surgery, CSSD,
13	Healthcare associated Infections & infection control	Microbiology, Social preventive medicine	General medicine, Pediatrics, Surgery, Obstetrics and gynecology

C 1	**GENERAL BACTERIOLOGY**			
Sl.No	**Content**	**Must Know**	**Desirable to Know**	**Nice to Know**
1	Introduction & History	**Role of Microbiology** in infectious diseases **History** of vaccination, sterilization, antiseptic surgery, virology and immunology Scientists: Louis Pasteur, Robert Koch, Antony von Leeuwenhoek, Alexander Fleming, lie Metchnikoff, Joseph Lister, Paul Ehrlich, Ernst Ruska	Edward Jenner, Ronald Ross, Armaeur Hansen, Frank Burnet Karl Landsteiner History of vaccination, sterilization, tuberculosis	Kary Mullis and PCR Enders at all,
2	Microscopy	**Types of microscope: Simple, Compound**- Bright - field & Dark Field, Fluorescent Microscope, Dissecting (Stereo) microscope		Interference microscope, Confocal Scanning Laser Microscope,
3	Staining Methods	Gram, AFB (Ziehl Neelsen), Giemsa, JSB, Negative staining (India ink), KOH wet mount , Alberts Staining, Lacto-phenol cotton blue, Iodine mount,	AFB (M. leprae), Modified AFB for Nocardia & cryptosporidium, AFB -fluorochrome, Ponder, Trichrome, Neissers,	Flagellar Stain Fontana Silver Impregnation, Calcofluor
4	Morphology of Bacteria Classification of bacteria	**Structure and Functions**: Cell wall, Capsule, Flagella, Fimbriae, Spores Phylogenetic Classification, Intra species Classification, Bacterial Nomenclature	Slime layer, Cytoplasmic Membrane Numerical Taxonomy	Nucleus, Ribosomes Desmosomes, Molecular classification
5	Nutrition and growth of Bacteria	Nutrition, respiration (anaerobic &aerobic) and growth of bacteria, growth curve, factors influencing growth; Fermentation-Glucose, formic acid, butane diol	Bacterial Counts, Biofilms	Bacteriocins, Continuous Culture
6	Culture Media & Cultivation methods	**Solid**: Nutrient, Blood, chocolate, MacConkey, Mueller Hinton, CLED, XLD, TCBS, LJ, Sabourauds, Dextrose, Cary Blair, Amie's, Stuart, Thayer Martin,**Liquid**: peptone water, nutrient broth, brain	Liquid media for M. TB, Potassium Tellurite agar, BACTEC &MGIT- AFB culture using liquid	Chromogenic media

C 1	**GENERAL BACTERIOLOGY**			
Sl.No	**Content**	**Must Know**	**Desirable to Know**	**Nice to Know**
		heart infusion, Tryptone soya broth, Alkaline peptone, Selenite **Culture method**s Aerobic, AFB culture (solid),Anaerobic : Robertson cooked meat and Thioglycollate , Air evacuation system, Gaspack	media	
7	Identification of bacteria	**Cultural Characteristics**: Colony morphology, fermentation of lactose, Hemolysis, CAMP test, **Biochemical Reactions**: Indole , Citrate utilization, urease, triple sugar iron agar, VP-MR, slide and tube coagulase, catalase, oxidase, bacitracin and optochin sensitivity, bile solubility, X-V Factor test	All sugars fermentation and Lysine ornithine arginine metabolism Sero grouping Rapid ID Methods (Automated)	Animal Pathogenicity, Sero Typing of Bacterial Strains Molecular Methods
8	Sterilization & Disinfection	Definition Bacterial death pattern, thermal death time and point, Decidual reduction time. **Methods of Sterilization**, Moist Heat Sterilization-Autoclave in detail Disinfection-High, Intermediate and Low level Chemical disinfectants-phenol, chlorine, Iodine. glutaraldehyde, formaldehyde Sterilization monitoring & Sterilization Controls	ETO, Plasma Sterilization, Central Sterile Supply Department (CSSD) High level disinfectants-Per acetic acid, Hydrogen peroxide Disinfection of critical and semi critical instruments Disinfection of endoscopes	Testing of Disinfectants
9	Bacterial Genetics	Methods of Gene Transfer, Plasmids, transposons, Mutations, Genetic basis of mechanisms of drug resistance Genetic Engineering-cloning &recombinant DNA technology.	DNA Methods-Plasmid finger printing, RFLP, Pulse field Gel Electrophoresis, DNA hybridization, Ribotyping, Polymerase chain reaction (PCR)	Gene sequencing Gene Microarray

C 1	**GENERAL BACTERIOLOGY**			
Sl.No	**Content**	**Must Know**	**Desirable to Know**	**Nice to Know**
10	Antimicrobials & Chemotherapy	**Definitions**: antimicrobial, antibiotic, MIC, synergism, antagonism **Classification**: chemical, mechanism of action & antimicrobial spectrum Antimicrobial susceptibility Testing-Disc diffusion Mechanisms of drug resistance-β lactamase production, Methicillin Resistance in S. aureus; vancomycin resistant enterococci, combination of antimicrobials ,Antimicrobial stewardship	MIC determination Multidrug resistance in Tuberculosis	Molecular method of detection of antimicrobial resistance
11	Normal flora	Introduction - various sites, types role of normal flora in prevention of infections & in drug resistance,	Antimicrobials on normal flora	
13	Microbial pathogenicity	Commensal, pathogenic and opportunistic organisms. Virulence determinants: capsule, fimbriae, exotoxins, enzymes, intracellular parasitism, antigenic variation & extrinsic factors Types of infection: primary, secondary, general, local, natural, nosocomial, iatrogenic, zoonotic.	Mechanisms of action of Exotoxins	

C 2	**IMMUNOLOGY**			
Sl.No	**Content**	**Must Know**	**Desirable to Know**	**Nice to Know**
1	Immunity	Definition of immunity, types of immunity, innate immunity, acquired immunity Components of innate immunity active and passive immunity and local immunity. Opsonization and phagocytosis Natural killer cells	Pathogen associated molecular patterns, Pathogen Recognition Receptors (PRR), Toll like receptors,	Cytokines involved in innate immunity Interferons
2	Antigen	Definition: Antigen, Hapten, immunogen types, antigen determinants, properties of antigen.	Various routes of administration of antigens Methods of preparation of antigens	Recombinant DNA derived protein and Synthetic peptides as antigens for diagnostic tests and vaccination
3	Antibody	Definition, structure of immunoglobulins, immunoglobulin isotypes, immunoglobulin classes, idiotypic antibodies physical and biological properties of immunoglobulins., Functions of antibodies in immune response Detection of IgM and IgG class antibodies in the diagnosis of infectious diseases	Hypo gamma globulinaemia Immuno genetics and antibody diversity Immunoglobulin therapy Monoclonal antibody Hybridoma technology	Ig Class switching Quantitation of immunoglobulins Humanized monoclonal antibody therapy
4	Antigen & Antibody Reaction	Forces binding Antigen and antibody Epitope and paratopes Affinity and Avidity, Immune complex	Western Blot Radial Immuno diffusion, Immuno -electrophoresis	Immune Electron Microscopy Chemi-luminescence
5	Complement system	Complement Pathways Functions of complement Regulation of complement pathway	Complement Deficiency Diseases	Quantitation of Complements

C 2	**IMMUNOLOGY**			
Sl.No	**Content**	**Must Know**	**Desirable to Know**	**Nice to Know**
6	Structure and Functions of the Immune system	Primary & Secondary Lymphoid OrgansB Lymphocytes-Activation and antibody productionT Lymhocytes-CD4+(Helper) and CD8+cytotoxic cellsNK cells, Monocytes & MacrophagesAntigen Presenting Cell & Major Histo compatibility Complex (MHC)-antigen Processing	MALT (Mucosal Associated Lymphoid Tissues), Dendritic Cells, Mast CellsHLA Typing and Applications	------
7	Hypersensitivity Reaction	Definition & Types of Hypersensitivity – I, II, III, IV Immediate Vs Delayed, IgE and IgE receptors,	Desensitization in anaphylaxis type V reaction	Detection of immune complexes
8	Auto Immunity	Mechanisms of tolerance Role of Thymus in tolerance Mechanisms of activation autoreactive T cells Classification & Pathogenesis of Auto immune diseases	Rheumatic Fever Rheumatoid arthritis Systemic Lupus erythematosus, Type-1 diabetes mellitus	Hashimato's thyroiditis Grave's disease Thrombocytopenic purpura, Management of Autoimmune disorders
9	Transplantation Immunology	Types of Grafts, Mechanism of transplant rejection, Acute, hyper acute rejection, Graft Versus Host reaction, Prevention of graft rejection	MHC matching (HLA Typing) Immunosuppression by corticosteroids, cytotoxic drugs and cyclosporine	Kidney & liver transplants Bone marrow transplant
10	Tumour Immunology	Tumour rejection antigens Immune response to tumours	Humanized monoclonal antibody therapy in cancers Immunotoxins	Flow cytometry in the diagnosis of malignancies Vaccines against tumors
11	Immuno Deficiency Disorder	Humoral, Cellular & Combined Immuno Deficiency Defect of Phagocytosis		

C 2	**IMMUNOLOGY**			
Sl.No	**Content**	**Must Know**	**Desirable to Know**	**Nice to Know**
12	Immunohematology	Blood Group antigens, Blood grouping, Cross matching, Coomb's test Rh &ABO incompatibilityRh D immunization		
13	Immuno prophylaxis	National Immunization Schedule (EPI), Vaccines – Killed and subunit & Live attenuated Toxoid and Recombinant DNA derived Vaccines Polio,Diptheria,Pertussis,Tetanus,,Measles,mumps,rubella,Hepatitis B, Japanese Encephalitis ,Rabies, Pneumococcal Immunoglobulin therapy,	Live attenuated varicella Hepatitis A, Haemophilus influenza, Influenza A Cytokine therapy Adverse Events following Immunization	New Vaccine strategies Newer Vaccines: Dengue

C 2	**IMMUNOLOGY**			
Sl.No	**Content**	**Must Know**	**Desirable to Know**	**Nice to Know**
	I.GRAM POSITIVE COCCI			
	1.Staphylococci	Morphology, Cultural and isolation, Pathogenicity, Diseases caused, Virulence factors, Laboratory diagnosis Prevention and control, Methicillin resistant Staphylococcus aureus, Pyogenic infections, Surgical site infection, TSST, Treatment	Biochemical reactions, antigens. MRSA	Typing methods Exotoxins
	2.Streptococci	Morphology, Cultural classification Characteristics, Lancefield grouping, Culture and Identification, Group A & B beta hemolytic streptococci Pathogenicity, Virulence factors. Diseases : Pharyngitis, erysipelas, impetigo, necrotizing fasciitis , Puerperal sepsis Post Streptococcal Sequelae- Rheumatic fever, Acute glomerulo nephritis pathogenesis, clinical features, Laboratory diagnosis & treatment treatment and prevention.	Biochemical reactions, antigens. Subacute bacterial endocarditis	Vancomycin resistant Enterococci Anaerobic streptococci streptococcus viridans
	3.Pneumococci	Morphology, Cultural Characteristics, Pathogenicity, Diseases caused, Virulence factors, Laboratory diagnosis, Quellung reaction	Animal Pathogenicity tests. Immune response, Antigen detection in urine	
	II.GRAM NEGATIVE COCCI			
	1.Neisseria gonorrhoeae	Morphology, Classification of Gram negative cocci Pathogenicity, Epidemiology, Laboratory diagnosis, clinical manifestations, complications , Infertility in male & female, Treatment Prophylaxis,	Culture & Biochemical reactions Immune response. Treatment	Non Gonococcal urethritis

C 2	**IMMUNOLOGY**			
Sl.No	**Content**	**Must Know**	**Desirable to Know**	**Nice to Know**
	2.Neisseria meningitidis	Serotyping based on capsule. Virulence factors, Septicemia, meningitis, lab diagnosis of pyogenic meningitis due to N. meningitidis, Treatment	Chemoprophylaxis Meningococcal vaccines	
	III.GRAM POSITIVE BACILLI1.			
	1.Cornye bacterium diphtheriae	Morphology, Cultural characteristics, pathogenicity due to Toxins, Laboratory diagnosis, Treatment, Prophylaxis, Epidemiology, Diphtheria Vaccine	Classification, Culture and Isolation	Typing
	2.Bacillus anthracis	Type of Infection, Morphology, cultural characteristics, virulence factors, pathogenesis, clinical manifestations, laboratory diagnosis, treatment and prevention	Epidemiology Biochemical reactions	Anthrax bacilli as potential agent for Bioterrorism
	3. Bacillus cereus	Morphology, cultural characteristics, biochemical reactions, Pathogenesis of food poisoning	Laboratory Diagnosis	……. …….
	IV.ANAEROBIC BACTERIA			
	1.Clostridium tetani	Morphology, Culture, Resistance, Pathogenicity, Prophylaxis, laboratory diagnosis and Treatment,	Biochemical reactions	Classification of the clostridia
	2.Clostridium perfringens	Morphology, Pathogenesis of Gas gangrene, Prophylaxis, Nagler's reaction	C. histiolyticum, C. noviyi Biochemical reactions.	…… …… ……
	3.Clostridium botulinum	Morphology, Culture, Resistance, Pathogenicity, Prophylaxis Treatment, laboratory diagnosis, types	…… ……. ……	….. …… ……
	4.Clostridium	Antimicrobials &Pseudomembranous colitis	….. …… ……	….. …… ……

C 2	**IMMUNOLOGY**			
Sl.No	**Content**	**Must Know**	**Desirable to Know**	**Nice to Know**
	difficile			
	5.Non-sporing anaerobes	Classification, diseases caused, laboratory diagnosis, Common anaerobic infections, treatment	Normal anaerobic flora of the human body	
	V. ENTERO-BACTERIACEAE	….. …… …….	Classification of the Enterobacteriaceae, Biochemical reactions,	….. …… …….
	1.Escherichia coli	Morphology, cultural characteristics, Virulence factors, Diarrhoeagenic E coli, Pathogenesis of UTI, neonatal meningitis and clinical manifestations, Laboratory diagnosis and treatment	Antigenic structure Extended spectrum Beta Lactamase producing E. coli (ESBL)	….. …… ……
	2.Klebsiella	Classification Klebsiella pneumoniae: pathogenesis of UTI and	K. oxytoca and K. rhino-scleromatis	….. …..
	3.Proteus	Morphology, Special characteristics, diseases caused	……. ……..	…… …… …….
	4.Shigella	Morphology, Classification, Exotoxins, Pathogenesis of shigellosis, Hemolytic Uremic syndrome, Laboratory diagnosis, Treatment and control	Biochemical reactions Drug resistance in Shigella	……. ……. ……..
	5.Salmonella	Morphology, Pathogenicity, Epidemiology, Clinical manifestations of Enteric fever and intestinal Salmonellosis, complications, laboratory diagnosis, Treatment & Prophylaxis ,Drug resistance	Classification, antigenic structure and variations, Serotyping methods Laboratory Diagnosis of carriers,	……. ……. ……..
	6.Intestinal Salmonellae	Sources of infection, Pathogenesis, Lab diagnosis	Salmonella septicemia	……. ……. ……..

C 2	**IMMUNOLOGY**			
Sl.No	**Content**	**Must Know**	**Desirable to Know**	**Nice to Know**
	VI. VIBRIO			
	1.Vibrio cholerae 2. Halophilic vibrios	Morphology, Cultural characteristics, transport media used, resistance, Epidemiology, Pathogenesis, Clinical features, Laboratory diagnosis, Prophylaxis, Treatment : Oral rehydration therapy	Biological typing Serotyping, V. cholerae O139	Vibrio mimicus
	3.Aeromonas and plesiomonas	…… …… ……	Clinical features, Laboratory diagnosis, Prophylaxis, Treatment	…… ……..
	VII.PSEUDOMONAS			
	1.Pseudomonas aeruginosa	Morphology, cultural characteristics, Resistance to Antimicrobials, Pathogenicity, clinical manifestations, Laboratory diagnosis, Treatment: antipseudomonal drugs	Nosocomial infections: Ventilator Associated Pneumonia, Wound infections	…… ……
	2.Stenotrophomonas maltophila 3. Burkholderia cepacia 4. Burkholderia mallei and Glanders 5. Burkholderia pseudo mallei and melioidosis	…… …… ……	Epizootology, zoonotic infections, clinical manifestations. Treatment and control	…… ……

C 2	**IMMUNOLOGY**			
Sl.No	**Content**	**Must Know**	**Desirable to Know**	**Nice to Know**
	VIII.OTHER GRAM NEGATIVE BACTERIA			
	1.Yersinia pestis	Morphology, Cultural characteristics, Antigens, toxins and virulence factors Epidemiology & Epizootology, Rodents, Rat fleas, Pathogenesis of Plague, Clinical manifestations, Laboratory Diagnosis, Treatment.	Prophylaxis, Plague surveillance and control	Yersinia enterocolitica
	2.Pasteurella multocida	……. ……. ……	Pathogenesis, clinical presentations, laboratory diagnosis treatment.	……. ……. ……
	3.Francisella tularensis	…. ……. ……	Tularemia in man: pathogenesis, clinical features, treatment and prophylaxis	……. ……. ……
	IX.HEMOPHILUS			
	1H. influenzae.	Morphology, cultural characteristics, resistance, pathogenesis, clinical presentations, laboratory diagnosis treatment, Vaccines	Biochemical reactions Antigenic properties	……. ……. ……
	2.H. aegypticus & H. para-influenzae, H. aphrophilus, HACEK	…. ……. ……	Pathogenesis, clinical presentations, laboratory diagnosis treatment. HACEK induced endocarditis	……. ……. ……
	3.H. ducreyi	Sexually transmitted infections, clinical features, treatment	…. ……. ……	……. ……. ……

C 2	**IMMUNOLOGY**			
Sl.No	**Content**	**Must Know**	**Desirable to Know**	**Nice to Know**
	X. BORDETELLA	Morphology, cultural characteristics, virulence factors, pathogenesis, clinical presentations, laboratory diagnosis treatment, prophylaxis	Biochemical reactions Pertussis vaccines	Other Bordetella species viz. B. parapertussis and B. bronchiseptica
	1.B. pertussis			
	XI. **BRUCELLA**	Morphology, cultural characteristics, pathogenesis, clinical presentations, laboratory diagnosis treatment, Prevention and control	Epidemiology, Antigenic structure	…… ……. …….
	XII. MYCOBACTERIUM M. tuberculosis	Epidemiology, Morphology, virulence determinants & pathogenicity Resistance, cultural characteristics, clinical presentations, Pathogenesis of Pulmonary and Extra pulmonary tuberculosis, HIV/TB coinfection laboratory diagnosis: AFB microscopy and Multi drug anti tuberculous treatment, prophylaxis RNTCP -- DOTS, Multidrug Resistance (MDRT)	Drug susceptibility testing methods: solid media and liquid media Molecular methods of diagnosis of MDRT Standards of TB care	Latent TB Management of TB contacts Extremely Drug Resistant Tuberculosis New anti TB drugs
	2.M. leprae and Leprosy	Epidemiology, Morphology, classification pathogenesis, clinical features, Laboratory Diagnosis: AFB microscopy	Cultivation of M. leprae in mouse footpad	Multi drug therapy,
	3.Non-Tuberculous Mycobacteria	Classification, Diseases caused by NTM		Biochemical reactions
	XIII.SPIROCHETES			

C 2	**IMMUNOLOGY**			
Sl.No	**Content**	**Must Know**	**Desirable to Know**	**Nice to Know**
	1.Treponema pallidum & Syphilis	Epidemiology, Morphology, Cultural characteristics, pathogenicity, Stages and Clinical features: Primary, Secondary, Tertiary, Congenital Laboratory diagnosis: Dark field microscopy, Serological Tests-rapid Plasma Rapid Reagin, Specific Treponema antibody tests Treatment and Prevention and control	Non venereal treponematoses, Yaws, Pinta and Endemic syphilis	Nonpathogenic treponemes
	2.Borrelia recurrentis Relapsing fever	Morphology, pathogenicity, laboratory diagnosis, treatment	Cultural characteristics Antigenic properties Vincent's angina	…….. ……
	4.Borrelia burgdorferi	Lyme's disease, Vector involved, Clinical features, Laboratory diagnosis		
	5.Leptospira	Epidemiology, Epizootology, Morphology, Classification, Isolation, pathogenesis of leptospirosis and complications, clinical features, lab diagnosis: Genus specific and serovar specific tests, treatment, Prevention and control	Silver impregnation staining Microscopic Agglutination Test PCR in the diagnosis of leptospirosis Antigenic structure	Leptospirosis in animals
	XIV Ricketssiae			
	Rickettsia ricketsii R. prowazekii R. typhi Orientia tsutsugamuzhi	Epidemiology, morphology, cultural characteristics, pathogenesis, Laboratory diagnosis: Weil Felix Test, IgM ELISA, Clinical features and treatment. Indian tick typhus, epidemic typhus, Murine Typhus, Scrub Typhus, Q fever	Emerging Rickettsial infections in India Rocky mountain spotted fever	…….. …….

C 2	**IMMUNOLOGY**			
Sl.No	**Content**	**Must Know**	**Desirable to Know**	**Nice to Know**
	Coxiella burnetii			
	XV Mycoplasma & Chlamydia			
	1.Mycoplasma pneumoniae & hominis	Morphology, pathogenesis, L forms, clinical features: Atypical pneumonia, Non gonococcal urethritis and cervicitis, laboratory diagnosis, Cell culture contamination by mycoplasma, treatment.	Epidemiology Cultural characteristics, Biochemical properties, Antigenic properties	Classification, Ureaplasma urealyticum,
	2.Chlamydia trachomatis C. pneumoniae, C. psittaci & TWAR agents	Morphology, pathogenesis, Reticulate bodies, clinical features: Trachoma, Inclusion conjunctivitis, Non gonococcal urethritis and cervicitis, Lymphogranuloma venereum, Atypical pneumonia, laboratory diagnosis; Gram stain, Detection of Antigen, real time PCR & treatment.	Cell culture	…….. …….
	1.Anaerobic actinomycetes & Actinomycosis	Morphology, Clinical features, Laboratory diagnosis, treatment	Actinomycetes causing COPD, farmer's lung	…….. …….
	2.Nocardia	Morphology, Staining characteristics, Clinical features: Opportunistic infections, Lab diagnosis and Treatment	Culture of Nocardia Nocardiosis in HIV/AIDS	…….. …….
	XVI. MISCELLANEOUS BACTERIA			

C 2	**IMMUNOLOGY**			
Sl.No	**Content**	**Must Know**	**Desirable to Know**	**Nice to Know**
	1.Listeria monocytogenes	Listeriosis – clinical features: Food poisoning, Neonatal meningitis due to Listeria, Listeria opportunistic infections in HIV/AIDS, lab diagnosis, treatment,	…….. …….	…….. …….
	Klebsiella granulomatis	Granuloma inguinale- clinical features, lab diagnosis and treatment	…….. …….	…….. …….
	Streptobacillus moniliformis and spirillum minus	Rat bite fever: clinical features, lab diagnosis and management	…….. …….	…….. …….
	Campylobacter	Epidemiology, Morphology, cultural characteristics, Classification, pathogenesis, and lab diagnosis and treatment.	Gullain baare syndrome and campylobacteriosis	…….. …….
	Helicobacter pylori	Disease caused, pathogenicity, laboratory diagnosis and treatment	…….. …….	…….. …….
	Legionella pneumophila	Morphology, cultural characteristics, Pathogenesis, Clinical features: Atypical pneumonia, Hospital Acquired Infections and treatment	…… ……..	……. ……..

C 4	**PARASITOLOGY**			
Sl.No	**Content**	**Must Know**	**Desirable To Know**	**Nice to Know**

	Parasitology			
Sl No	**Content**	**Must Know**	**Desirable To Know**	**Nice to Know**
1.	**GENERAL PARASITOLOGY - INTRODUCTION**	**Definitions**- types of hosts, parasites, types of host parasite relationships, sources of infections, portals of entry, modes of transmission of parasitic diseases, **Life cycles** of parasites, pathogenicity, immunity to parasitic infections, **Laboratory diagnosis** of parasitic infections- principles Specimen collection,- Stool and Blood Stool Direct saline & iodine mount, Concentration Techniques in Stool exam Blood thick and thin smear ; Rapid Antigen Detection Serological Tests-IgM and IgG detection	Polycarbonate filters to concentrate microfilariae	Ectoparasites Recent Advances in the Lab diagnosis of Parasites Parasitic opportunistic infections
2. 2.	**PROTOZOA**	Classification & General characteristics of Protozoa		
3.	**INTESTINAL AMOEBAE**	**Entamoeba histolytica** Habitat, morphology, life cycle, pathogenicity, clinical manifestations, intestinal & extra intestinal- amoebiasis, laboratory diagnosis of intestinal & extra intestinal amoebiasis, Treatment and Prevention	Entamoeba dispar, Entamoeba coli, Entamoeba hartmanni, Iodamoeba butschlii, Endolimax nana	Histo pathology of amoebic lesions

C 4	**PARASITOLOGY**			
Sl.No	**Content**	**Must Know**	**Desirable To Know**	**Nice to Know**
4. 4	**FREE - LIVING AMOEBAE**	**Free living amoeba:** Naegleria fowleri, Acanthamoeba species, Morphology, life cycle, pathogenicity, clinical manifestations, lab diagnosis, Treatment and Prevention		Newer free living amoebae Sappinia diploid
5.	**INTESTINAL, ORAL & GENITAL FLAGELLATES**	**Intestinal Flagellates Giardia** lamblia Habitat, Morphology, life cycle, pathogenicity, clinical manifestations, lab diagnosis, prevention & treatment	Immune response recent advance in laboratory diagnosis of Giardiasis other intestinal flagellates	Trichomonas tenax Trichomonas hominis
6. 5		**Genital flagellates**Trichomonas vaginalis: Habitat, Morphology, life cycle, pathogenicity, clinical manifestations, lab diagnosis, prevention & treatment		
7. 6	**BLOOD PARASITES**	**Trypanosoma** African trypanosomiasis. brucei gambiense &T. brucei rhodesiense South American trypanosomiasis: T. cruzi Habitat, Morphology, life cycle, pathogenicity, clinical manifestations, lab diagnosis, prevention & treatment	Antigenic variation in Trypanosomiasis	Newer Parasites & Opportunistic Parasitic Infections
9. 7		**Leishmania**		

C 4	**PARASITOLOGY**			
Sl.No	**Content**	**Must Know**	**Desirable To Know**	**Nice to Know**
10. 8		**Old world Leishmaniasis**: Leishmania donovani L. tropica - Epidemiology, Habitat, Morphology, cultivation, life cycle, pathogenicity, clinical manifestations: Kala azar, Post kala azar Leishmaniasis, lab diagnosis – specific and nonspecific tests, prevention & treatment	Virulence factors Immunology HIV and Leishmania Co-infection Rapid diagnostic tests Control measures	Xeno diagnosis Other species: L. major L. peruviana ; L. chagasi
11.		**New world leishmaniasis** L. brazilensis complex & L. Mexicana complex Habitat, Morphology, life cycle, pathogenicity, clinical manifestations, lab diagnosis, prevention & treatment		
12.		**PLASMODIUM SPECIES** P. falciparum, P. vivax : Epidemiology, Life cycle, Morphology, Pathogenesis, Clinical features , complications, Laboratory diagnosis of Malaria : Thick and Thin blood smear-Blood collection, Giemsa staining/JSB staining, Identification of P. vivax and P. falciparum Rapid Detection Tests, Treatment of malaria Control measures & National programs In Malaria control	P. ovale & P. malariae	Drug resistance in malarial parasites
		BABESIA: Habitat, Morphology, Life cycle, Pathogenesis, Clinical features, Laboratory		

C 4	**PARASITOLOGY**			
Sl.No	**Content**	**Must Know**	**Desirable To Know**	**Nice to Know**
		diagnosis, treatment		
14.	**COCCIDIAN PARASITES**	**TOXOPLASMA**Morphology, Life cycle, Pathogenesis, modes of transmission, Clinical manifestations- congenital toxoplasmosis, toxoplasmosis in immuno -compromised, Laboratory diagnosis and treatment **Cryptosporidium parvum** Morphology, Life cycle, Pathogenesis, clinical manifestations, Laboratory diagnosis, treatment **Balantidium coli**	Diagnosis of CNS toxoplasmosis in HIV/AIDS	
15. 10	**MICRO-SPORIDIA**		MICROSPORIDIA	
	HELMINTHS			
16. 11	**CESTODES**	Classification of Cestodes systematic & habitat based General characteristics of cestodes **TAENIA SOLIUM & TAENIA SAGINATA** Morphology, Life cycle, Pathogenesis, modes of transmission Clinical manifestations, neurocysticercosis Laboratory diagnosis, Prophylaxis treatment	Epidemiology of neurocysticercosis Spirometra, Hymenolepis diminuta	Taenia multiceps, Echinococcus vogeli

C 4	**PARASITOLOGY**			
Sl.No	**Content**	**Must Know**	**Desirable To Know**	**Nice to Know**
17. 12		**Diphyllobothrium latum** **Hymenolepis nana** **Echinococcus granulosa** Morphology, Life cycle, Pathogenesis, modes of transmission Clinical manifestations- Laboratory diagnosis, prophylaxis treatment		
18. 13	**TREMATODES**	**Schistosomes- blood flukes; Fasciola hepatica (Liver fluke); Paragonimus westermani (Lung fluke)** Epidemiology, Morphology, Lifecycle, Clinical Features, Pathogenesis, Lab diagnosis, Prevention& Treatment.	Schistosomiasis in India	Heterophyes -heterophyes Watsonius watsoni Opisthorchis felineus Metagonimus yoogawi
19. 14		**Opisthorchis (Clonorchis) sinensis**: Morphology, Lifecycle Clinical Features, Pathogenesis, Lab diagnosis Treatment Prevention		
20. 15	**NEMATODES**	**Ascaris lumbricoides**: Habitat, morphology; Life cycle, pathogenicity of adult worms, pathogenicity of migrating larvae clinical manifestations, lab diagnosis, Prevention and Treatment, visceral larva migrans	Free living Species	……. ……

C 4	**PARASITOLOGY**			
Sl.No	**Content**	**Must Know**	**Desirable To Know**	**Nice to Know**
21. 16		**Strongyloides stercoralis** morphology; Life cycle, pathogenicity of adult worms, pathogenicity of migrating larvae clinical manifestations, Hyper infection, lab diagnosis, Prevention and Treatment , larva currens	Strongyloidiasis in HIV AIDS	……. ……
22.		**Ankylostoma duodenale:** habitat, morphology; Life cycle, pathogenicity of adult worms, pathogenicity of migrating larvae clinical manifestations, microcytic hypochromic anemia, lab diagnosis, Prevention and Treatment	Pseudo hook worms Ankylostoma brazilensis	……. ……
23.		**Necator americanus** Differentiating features between Ankylostoma and Necator Cutaneous larva migrans	……. ……	……. ……
24.		**Enterobius vermicularis & Trichuris trichiura** habitat, Morphology, Lifecycle Clinical Features, Complication-appendicitis, Pathogenesis, Lab diagnosis Treatment Prevention	Gnathostoma species	
25.		**Dracanculensis medinensis** habitat, Morphology, Lifecycle Clinical Features, Pathogenesis, Lab diagnosis, Treatment, Prevention	Anisakiasis	

C 4	**PARASITOLOGY**			
Sl.No	**Content**	**Must Know**	**Desirable To Know**	**Nice to Know**
26.	**FILARIAL NEMATODES**	**LYMPHATIC FILARIAL PARASITES:** **Wuchereria bancrofti & Brugia malayi** Epidemiology, Habitat, morphology,Life cycle, pathogenicity, clinical manifestations, laboratory diagnosis- conventional and rapid diagnostic tests, Anti filarial treatment,Mass prophylaxis with DEC	Occult filariasis Loa loa, Oncocerca volvulus Mansonella species infecting human	Ivermectin
27.	**LABORATORY DIAGNOSTIC PARASITOLOGY PROCEDURES**	1.Blood for Malarial parasites and Microfilariae: Thick and thin blood smear 2.Stool saline and iodine wet mounts 3.Stool concentration methods, 4. Microscopic techniques in stool examination for diagnosis of parasitic diseases. 5. Examination of urine in parasitic diagnosis (Schistosomiasis) 6. Examination of sputum (Paragonimiasis) 7. Examination of aspirates(Leishmaniasis) 8. Examination of CSF; Serologic diagnostic methods (Toxoplasmosis)	Quantification of malarial parasites	Culture methods in parasitology Molecular methods in parasitic diagnosis

C 5	**VIROLOGY**			
Sl.No	**Content**	**Must Know**	**Desirable To Know**	**Nice to Know**

S No	**VIRUSES**	**MUST KNOW**	**DESIRABLE TO KNOW**	**NICE TO KNOW**
1	GENERAL PROPERTIES OF VIRUSES	**History of virology;** definition of virus; Structure and Symmetry; Classification; Characterization of viruses; Electron microscopy -Negative staining and cryo electron microscopy; Viral Replication strategies; Susceptibility to physical and chemical gents Resistance. Cultivation of Viruses; Viral Hemagglutination	Viral Multiplication: Cell culture & Viral growth. Shell vial culture Identification of viral cultures using Haemadsorption inhibition, neutralization test, Immunofluorescence and ELISA	Virus Titre estimation using neutralization method (Plaque count)
2	LABORATORY DIAGNOSIS OF VIRAL INFECTIONS	**1.Specimen collection and transportation** i) Blood (serum) for immunoassays volume blood(3-5ml), whole blood and serum, plasma. Timing of specimen is critical ; standard precautions and PPE ; Transportation at 4 ^{0} C ii)**.**Naso pharyngeal swab or aspirate for Antigen detection & nucleic acid **:** Trans-portation in in VTM at 4 ^{0} C using gel pack or wet ice iii)**.**Specimens for Nucleic acid : CSF,	**Nucleic acid test** qualitative and quantitative by real time PCR for diagnosis and prognosis respectively **Diagnostic accuracy of laboratory tests** : (sensitivity, specificity, positive predictive value, negative predictive value) for immunoassays and nucleic acid tests for each viral infection	**1.Virus Isolation** nasopharyngeal swab & CSF); Specimen processing for viral culture ; Incubation time ; .

C 5	**VIROLOGY**			
Sl.No	**Content**	**Must Know**	**Desirable To Know**	**Nice to Know**
		Blood whole ,plasma, serum: Transportation at 4 ^{0} C using gel pack or wet ice <u>without VTM.</u> 2.**Methods**- A) Microscopy (Tzank smear) B) Antigen & Antibody detection using Immuno fluorescence, ELISA, Rapid tests (Dot -blot and immuno chromatography): **IgM , IgG** detection		
3	VIRUS -HOST INTERACTIONS	Receptors used by viruses; Cell & tissue tropism; Mechanisms virus entry into the cell ; Viral replication-Cell injury-Cytopathic effect & Inclusion bodies; persistence of viruses ; viruses and cancer; **<u>Host response</u>**: <u>Innate immunity</u>: Natural killer cells, & Interferons. <u>Adaptive immunity</u>: MHC1 restricted CD 8 + T cell cytotoxicity, central role of CD 4+ T cell (TH_1 &TH_2) helping the CD8+ and B-cells, ; Neutralization of viruses ; ADCC ; Iimmunoprophylaxis (vaccines) ;Primary and secondary immune response	Innate immunity : **Viral PAMPs**: single-stranded (ss)RNA, dsRNA, and DNA; **PRRs**: Toll-like receptors (TLRs) and the cytosolic nucleic acid sensors Immunopathogenetic mechanisms (e.g. HIV/AIDS,RSV)	

C 5	**VIROLOGY**			
Sl.No	**Content**	**Must Know**	**Desirable To Know**	**Nice to Know**
4	BACTERIOPHAGES	Morphology & Life cycle. Significance of Phages Phage typing	Bacteriocins	Bacteriophages in molecular cloning
5	POX VIRUSES	Classification; Variola virus, Vaccinia virus – morphology cultivation host range. Small pox pathogenesis, clinical findings, Small pox eradication programe Cow pox. Milker's nodes Orf , Molluscum Contagiosum. Small pox eradication	History of small pox vaccine	Vaccinia virus as a vector for candidate antigens in the field of vaccinology.
6	PAPOVAVIRUS	Classification. Human papilloma virus(HPV): Morphology, mechanisms of oncogenesis HPV serotypes and lesions produced, pathogenesis of skin lesions, (wart) carcinoma cervix Lab diagnosis : (Papanicolou smear) ,treatment & HPV vaccines .	Molecular diagnosis of HPV infection using real time PCR	HPV vaccines in the prevention of Carcinoma cervix
7	PARVO VIRUS	Human Parvo Virus B 19: Epidemiology, Structure, pathogenesis, clinical manifestations, treatment.	Congenital infection and management	

C 5	**VIROLOGY**			
Sl.No	**Content**	**Must Know**	**Desirable To Know**	**Nice to Know**
8	**HUMAN HERPES VIRUSES** HERPES SIMPLEX VIRUSES VARICELLA ZOSTER VIRUS CYTOMEGALO VIRUS EPSTEIN BARR VIRUS	**Human Herpes viruses**: **HSV**: Epidemiology, Types of HSV, pathogenesis, Latency, Primary, initial, recurrent infections, **Clinical(syndromes)**: HSV1: Orofacial, HSV keratitis, Encephalitis & Disseminated HSV; HSV2 : Genital Herpes, Aseptic meningitis, Congenital and neonatal HSV Laboratory diagnosis**:** Direct microscopy: Tzank smear in orofacial & Genital Herpes, Virus isolation, Antigen detection by immuno- fluorescence, IgM and IgG detection; Real time PCR in HSV encephalitis; Treatment : Acyclovir and Valacyclovir therapy of primary, initial and recurrent infections. HSV encephalitis & chemo-prophylaxis.	HSV in HIV/AIDS Acyclovir: mechanism of action, pharmacodynamics and pharmacokinetics	HSV Latency Associated Transcription
	Varicella Zoster Virus(VZV)	**Varicella Zoster virus**: Epidemiology, Pathogenesis clinical manifestations: Chickenpox, CNS complications, Pneumonia, and Herpes Zoster; laboratory diagnosis of VZV, treatment, Vaccines	Herpes Zoster in HIV/AIDS VZV in pregnancy & Congenital infection	Post Herpetic Neuralgia

C 5	**VIROLOGY**			
Sl.No	**Content**	**Must Know**	**Desirable To Know**	**Nice to Know**
	Cytomegalo virus (CMV)	Epidemiology, Pathogenesis, CMV inclusion bodies, clinical manifestations: CMV in pregnancy, Congenital CMV, CMV infections in HIV/AIDS & complications (CMV encephalitis and retinitis), lab diagnosis, treatment.	CMV infections renal, liver & bone CMV infections in renal, liver, & bone marrow transplant recipients; Ganciclovir & Valganciclovir therapy & Prophylaxis in transplant recipients	New antiviral drugs: Cidofovir
	Epstein Barr Virus (EBV)	Epidemiology, EBV Antigens, Pathogenesis: Infection of the pharyngeal & and B cells, immortalization of B cells; Clinical: Infectious mononucleosis & encephalitis; Lab diagnosis Paul Bunnel and EBV specific ELISA tests and treatment,	EBV associated lymphomas. pharyngeal carcinoma, EBV in HIV/AIDS	…… …….
	HUMAN HERPES VIRUSES-HHV 6 HHV 7 & KSHV (HHV8) Herpes B virus	Epidemiology, pathogenesis, clinical features: HHV6 & 7: Exanthema subitum, infantile fever and seizures, encephalitis KSHV: Kaposi Sarcoma in HIV/AIDS Herpes B virus: Epidemiology, pathogenesis, clinical manifestations & Post exposure prophylaxis with valacyclovir	…….. ……..	…… …….

C 5	**VIROLOGY**			
Sl.No	**Content**	**Must Know**	**Desirable To Know**	**Nice to Know**
9.	PICORNA VIRUSES	Classification of picornaviridae family Enterovirus genus classification and Polio virus antigenic types, P**olio virus**: epidemiology, pathogenesis, clinical manifestations Acute flaccid paralysis, laboratory diagnosis: isolation of polio virus from stool, Polio Vaccines –Oral Polio (live) & Inactivated (advantages & disadvantages) dose, Immunization schedule, Mass pulse Polio vaccination. **Other Enteroviruses**: Coxsackie A and B , ECHO viruses , pathogenesis, clinical manifestations , laboratory diagnosis, treatment Rhino viruses General characteristics, Serotypes, pathogenesis & clinical manifestations	Polio Surveillance and eradication Switch from OPV to IPV Vaccine associated AFP; Acute Encephalitis due to Non polio entero viruses	……. …….
10	ORTHOMYXOVIRUSES	Classification, Structure, Antigenic variation, Influenza A: Epidemiology, pathogenesis, Clinical features-mild to severe influenza and complications such as acute respiratory distress syndrome, Laboratory diagnosis : viral isolation, real time RT PCR in the diagnosis of encephalitis treatment & prevention .	Pandemics due to Influenza A Genetic mechanism of antigenic drift and shift Bird Flu, Influenza A vaccine	Influenza B & C
11	PARAMYXOVIRUSES	Paramyxoviridae: Introduction, Antigenic Structure, classification. **Mumps virus** : Pathogenesis, Clinical manifestations, complications, Lab		

C 5	**VIROLOGY**			
Sl.No	**Content**	**Must Know**	**Desirable To Know**	**Nice to Know**
		Diagnosis , Prevention : live mumps vaccine **Measles (Rubella)** History, epidemiology, Pathogenesis, Clinical manifestations : measles exanthemas, complications: pneumonia, encephalitis, post infectious encephalitis, SSPE, Lab Diagnosis , Prevention , Prophylaxis. **Respiratory Syncytial Virus (**RSV): Epidemiology, Pathogenesis; Risk factors for severe disease; Clinical manifestations: Acute bronchitis, bronchiolitis & complications, Laboratory Diagnosis: Antigen detection by immunofluorescence& real time PCR, Treatment: Ribavirin therapy **Parainfluenza viruses** 1-4: Pathogenesis, clinical manifestations: Stridor due to acute trachea bronchitis (Croup), Treatment		
12	ARBOVIRUSES	**General**: Introduction, Definition, taxonomical classification, Epidemiology, Ecology, Entomology clinical syndromes: Fever with rashes, fever with hemorrhage, fever with arthritis, Encephalitis Lab Diagnosis: Antibody (IgM/&IgG) by ELISA Prevention and entomological control measures. **Dengue** : WHO/NVBDC clinical classification and management, lab	Yellow fever; Sandfly fever Chandipura fever ; Aedes agyptii : Habitat, Trans ovarian transmission ;	Hanta HF, argentine HF, Bolivian HF, Crimean-Congo HF, Lassa fever, Rift valley Fever, Viral isolation in vitro using vero cell and insect cell lines

C 5	**VIROLOGY**			
Sl.No	**Content**	**Must Know**	**Desirable To Know**	**Nice to Know**
		diagnosis : NS1 antigen IgM detection ; Aedes mosquito Control measures ; Source reduction and larvicidal **Japanese encephalitis** : Epidemiology, general ; Clinical : asymptomatic to encephalitis syndrome; lab diagnosis : IgM from CSF and serum ; prevention with the new JE live vaccine **Kyasanur Forest Disease** **Chikungunya**		Dengue vaccines Xeno diagnosis
13	RHABDOVIRUSES	Structure, Symmetry, Susceptibility to physical and chemical agents of disinfection, Antigenic Properties. Natural life cycle in animals, Transmission, Pathogenesis, Pathology: Rabies inclusion (Negri) bodies, Clinical features, Laboratory diagnosis of rabies: ante and post mortem, clinical manifestations, Prophylaxis- Pre exposure and post exposure Prophylaxis. Control of Rabies in domestic dogs and cats	History of Rabies vaccine Cell culture derived rabies vaccines Control of wild rabies	Rabies related viruses
14	CORONAVIRUS	Classification, & SARS Transmission, clinical manifestation, lab diagnosis, treatment, Prophylaxis	MERS CoV	

C 5	**VIROLOGY**			
Sl.No	**Content**	**Must Know**	**Desirable To Know**	**Nice to Know**
16	SLOW VIRUSES	Slow virus disease definition: classification : Prion diseases ,Subacute Sclerosing Pan encephalitis SSPE and Progressive multifocal leukoencephalopathy (PML) **Prion**; susceptibility to physical agents; classification of slow viral diseases, pathogenesis of Prion mediated disease clinical manifestation , diagnosis treatment & prevention Human Prion diseases : Kuru, Creutzfeldt-Jakob disease (CJD) encephalopathy, **SSPE** : Pathogenesis ,clinical features, Lab diagnosis & prognosis	Prion Protein (PrP). Sterilization and disinfection methods that are effective against Prion PML	Gerstmann-Straüssler-Scheinker Syndrome (GSSS)
17	REO VIRUSES	Rota viruses: Epidemiology, structure, Subtypes, pathogenesis clinical manifestations, diagnosis: Antigen detection from stool: ELISA, Latex agglutination-Treatment of diarrhoea & prevention : Rotavirus vaccines		
18	ADENOVIRUSES	Adeno virus Structure, classification, Pathogenicity, Clinical manifestations: Upper and respiratory tract infections, conjunctivitis, and enteritis. Lab diagnosis	Epidemic keratoconjunctivitis Oncogenecity of adeno virus	Adenovirus infection in immuno compromised ; Haemorrhagic cystitis

C 5	**VIROLOGY**			
Sl.No	**Content**	**Must Know**	**Desirable To Know**	**Nice to Know**
20	ONCOGENIC VIRUSES	Classification of Oncogenic Viruses ; Mechanisms of oncogenesis in virus infected cells; Viruses associated With Human cancer;	Human papilloma virus and carcinoma cervix EBV and Burkitt's lymphoma	Antiviral therapy in virus asssociated tumors

C 6	**MYCOLOGY**			
Sl.No	**Content**	**Must Know**	**Desirable To Know**	**Nice to Know**

	II MBBS CURRICULUM MYCOLOGY			
	TOPICS	MUST KNOW	DESIRABLETO KNOW	NICE TO KNOW
	I General Aspects of fungi	General characteristics of Pathogenic fungi. Clinical Classification of fungus infections; Dimorphic fungi; Pathogenicity and virulence; laboratory mycology-specimen collection, direct examination using KOH, Calcofluor- KOH, Gram stain, Culture and isolation from specimens; Serology and NAAT; Antifungal agents- Topical and systemic	Histopathological diagnosis: Haematoxylin-Eosin, PAS, gomori's methenamine Blue, Gridley's fungal stain of mycotic diseases Real time PCR in the diagnosis of fungi	Antifungal susceptibility testing; Azole resistance
	II Superficial Mycoses	Tinea nigra, Piedras-white and black, Pitryasis versicolor Dermatophytes- General characteristics, classification, Pathogenicity Clinical aspects of dermatophytoses :Tinea corporis & cruris, Tinea pedis & manuum, Tinea barbae, Tinea ungium, Tinea capitis. Superficial candidiasis Laboratory diagnosis: Direct KOH & culture and identification of colonies Treatment : Topical Azole derivatives & Systemic Griseofulvin & Azole therapy	WOOD's lamp and its applications. Identification methods of the Dermatophytes: In vitro hair perforation ,urea production and hydrolysis	Treatment of Drug resistant dermatophytes with Terbinafine

C 6	**MYCOLOGY**			
Sl.No	**Content**	**Must Know**	**Desirable To Know**	**Nice to Know**
	III Subcutaneous Mycoses	Types of subcutaneous mycoses : Eumycetoma, Sporotrichosis, Chromoblastosis and entomophthorosis **1.Eumycetoma** :Fungi : Curvularia geniculata & lunata ; Exophiala jeanselmei ; Fusarium falciforme ; Leptosphaeria senegalensis Madurella grisea & mycetomatis; Phaeoacremonium spp_ epidemiology & transmission ,clinical features, Lab diagnosis : direct examination of the granules and culture **2.Sporotrichosis**- Causative agent, clinical features, laboratory diagnosis and treatment **3.Rhinosporidiosis**-Structure and morphology; life cycle of Rhinospoidium seeberi ;epidemiology, clinical features, Lab diagnosis and treatment	Chromoblastomycosis	Entomophthoromycosis - due to Entomophthorale fungi- Electron microscopic structure of R.seeberi NAAT in the diagnosis of Eumycetoma
	IV Systemic and Opportunistic Mycoses	**Systemic mycoses** : Causative agents : *Histoplasma capsulatum, Coccidioides spp , Paracoccidioides brasilensis, Blastomyces dermatidis* epidemiology & transmission, clinical features,Lab diagnosis and Treatment **Opportunistic mycoses** : Causative agent, pathogenesis,clinical features,Lab diagnosis and Treatment : Aspergillosis,Penicillosis,Zygomycosis, Candidiasis, Cryptococcosis and	…….. ……..	

C 6	**MYCOLOGY**			
Sl.No	**Content**	**Must Know**	**Desirable To Know**	**Nice to Know**
		Pneumocystis jirovecii pneumonia		
	V. Miscellaneous Topics	Oculomycosis: Causative Agents (*Aspergillus , Fusarium , Scedosporium, Paecilomyces, Acremonium* species) ; Clinical features -keratitis, conjunctivitis Lab diagnosis and treatment Otomycosis & Mycotic poisoning	…….. ……..	Protothecosis Pythiosis Lobamycosis

C 6	**MYCOLOGY**			
Sl.No	**Content**	**Must Know**	**Desirable To Know**	**Nice to Know**

C 7	**Applied microbiology**			
Sl.No	**Content**	**Must Know**	**Desirable To Know**	**Nice to Know**
1	COLLECTION & TRANSPORT OF SPECIMENS	Specimen : type ,timing of sample collection ,containers, volume and Labelling Requisition forms: Filling the test order forms with identifiers & relevant clinical details, Appropriate instructions (specimen wise Aseptic precautions during blood and body fluid collection laboratory specimen log/register specimen rejection criteria Transport of specimen within the hospital and to the reference laboratory ;transport media Amie's, Stuart, Cary Blair	1.Newer safe blood collection devices such as vacutainers and self-locking needles 2. Specimen transport to overseas following IATA rules. 3.transport media- Amie's for Gonococci and Cary Blair for Vibrio cholerae 4. Sputum collection in Falcon tubes for MDR TB culture/molecular diagnosis 5. Nasopharyngeal swab for Influenza A	1.Viral transport medium 2. Cold chain maintenance of specimen during transport for viral cultures and molecular diagnosis 3.Storage of specimens and cultures long term. 4.New Dried blood spot (DBS) collection system
2	NORMAL MICROBIAL FLORA OF THE HUMAN BODY	1.Normal flora of skin, Oropharynx, Intestinal tract, genital tract 2. Normal flora as Innate immunity component 3. Interference of normal flora with the pathogens during culture	1.Criteria (macroscopic and microscopic) to identify specimens contaminated with normal flora 2. Selective media for minimizing the interference by normal flora 3.Interpretation of cultures positive for pathogens that form part of normal flora	Broad spectrum antimicrobials altering the normal flora

C 7	**Applied microbiology**			
Sl.No	**Content**	**Must Know**	**Desirable To Know**	**Nice to Know**
3	IMMUNOPROPHYLAXIS	1.Active and passive immunization 2. Killed and live vaccines 3. Adjuvants & Routes of administration 4. National immunization schedule 5. Cold Chain maintenance 6. Bacterial, and viral vaccines 7.Rabies post exposure vaccination principles 8.Adverse events following immunization (AEFI)	1.Health care workers immunization; Hepatitis B, Tetanus, Varicella-Zoster,Rabies Influenza A, 2.Japanese encephalitis vaccine in endemic region 3.Vaccine management peripheral level 4.Mass Polio vaccination ;Switch from Trivalent OPV to bivalent OPV	1.Newer vaccines-rotavirus, Pertussis acellular vaccines, inhalation based measles vaccine 2. New strategies of vaccination -DNA vaccines;
4	HEALTHCARE ASSOCIATED INFECTIONS & STANDARD PRECAUTIONS	1.Health care –Associated Infections -definition 2. Categories of HAI -Catheter associated UTI, Surgical site infection, Blood stream infection(BSI); Ventilator associated pneumonia (VAP), 3.Implications of HAI -morbidity, mortality and financial 4.**Prevention of HAI** : **Hand Hygiene** importance , practice and monitoring	1.Specific prevention measures **UTI** : Catheter administration policy, Asepsis during procedure, weaning policy & administration of antimicrobials **SSI** : Contact precautions, Theatre asepsis, Good surgical practices **BSI**: Strict aseptic protocols for central vein cannulation, Change of CVC during infection, **VAP** : Aseptic handling of Ventilator conduits ; Weaning of ventilator etc.	1.Infection control committee 2. Surveillance of HAI 3. Antibiotic Stewardship 4.Antimicrobial prophylaxis 5.Central Sterile supply department 6.Operation room disinfection

C 7	**Applied microbiology**			
Sl.No	**Content**	**Must Know**	**Desirable To Know**	**Nice to Know**
5	BIOMEDICAL WASTE MANAGEMENT	1.**Definition** &Importance of BMWM for Health care workers' safety; Infectious and noninfectious hazards associated with BMW 2. Categories of biomedical waste and disposal mechanisms BMW lifecycle: 1. Generation 2. Segregation,34. Disinfection, 4. transportation to the common storage section 5. Transportation to the common treatment facility, 8.Treatment and Disposal by suitable methods : incineration, autoclaving, deep burial, sharp burial pit, Effluent treatment plant for liquid waste Biomedical waste handling rules .	Bio medical waste treatment- incineration, Deep burial	Common Treatment Facility Functions
6	Clinical microbiology	**1.Direct Microscopy** : Gram's stain, ZN / Fluorescent AFB sputum microscopy and RNTCP grading, Thick and thin Giemsa smear for malaria 2.**Culture &anti-microbial susceptibility** (AST) : Urine, blood, pus ,CSF, Sputum, 3.**Serological tests**; Widal, RPR (VDRL), ASO, Rheumatoid Factor, HIV Rapid 4.**ELISA** : HBsAg, anti HCV, ,IgM Dengue,NS1 Ag 5.Interpretation of culture results correlating with Gram stain findings;	1.ELISA: IgM HAV, IgM HEV, IgM TORCH , IgM JE, IgM Chikungunya, 2.Malaria Rapid Detection Test, CRP	Molecular Tests: **Real time PCR** Influenza A, Cartridge based PCR for TB (CBNAAT), real time PCR (qualitative and Quantitative) for HCV and HIV

C 7	**Applied microbiology**			
Sl.No	**Content**	**Must Know**	**Desirable To Know**	**Nice to Know**
7	URINARY TRACT INFECTIONS	List of potential pathogens causing community acquired UTI, Pathogenesis of Ascending and descending UTI and Catheter associated UTI Instructions to the patients for getting -Clean catch midstream urine samples; Sterile Collection containers ; Collection of urine from urinary catheters (CAUTI) direct Gram Stain examination of non-centrifuged urine for pyuria & bacteriuria Culture of urine, antimicrobial susceptibility testing & interpretation of culture results .	1.Sterile pyuria, 2. Asymptomatic bacteriuria 3. Examination of centrifuged urine for pus cells, leukoesterase & nitrate reductase rapid tests to detect pyuria and bacteriuria respectively 4. Prostatitis 5. Aseptic collection of urine through supra pubic puncture.	1.Specific preventive measures for the prevention of Heath care associated UTI

C 7	**Applied microbiology**			
Sl.No	**Content**	**Must Know**	**Desirable To Know**	**Nice to Know**
8	BLOOD STREAM INFECTIONS	**1.Indications for blood culture**: Typhoid fever, Infective endocarditis (Acute and sub-acute) Meningitis, meningococcemia, pneumonia, acute osteomyelitis, septicemia, Health care associated infections -Blood stream infections & nosocomial pneumonia 2. **List of bacteria causing bacteremia**: S. typhi, S. paratyphi A & B Group D streptococci, Pneumococci, group A and B beta hemolytic streptococci, H. influenzae, S. aureus, Coagulase negative staphylococci, enterococci, enterobacteriaceae etc., 3.**Blood culture method** : time of collection of specimens, site of collection, Culture media (aerobic and anaerobic containing sodium polyanenthol sulphonate) ,volume of blood to be inoculated -infants, children, adults, Strict asepsis during collection & transport of samples to the laboratory. Incubation time (7-10 days), Interpretation of the pathogenicity of the isolate & AST	1.Automated blood culture system and antimicrobial susceptibility system 2. Biphasic medium for blood culture 3. Anaerobic blood culture	Fungal blood culture using Isolator blood collection system

C 7	**Applied microbiology**			
Sl.No	**Content**	**Must Know**	**Desirable To Know**	**Nice to Know**
9	RESPIRATORY TRACT INFECTIONS	Etiology, Clinical features and differentiation of Viral and bacterial respiratory tract infections **Otitis media**: Pathogens involved- Pneumococci, H, influenzae, and M. catarrhalis, specimen collection **Pharyngitis** : Viral : Parainfluenza, RSV , Influenza viruses Bacterial : Beta hemolytic Group A streptococci **Pneumonia (community acquired)** ; List of bacterial pathogens: Pneumococci, Influenzae, and M. catarrhalis; Pul.TB **Nosocomial** : S.aureus, Pseudomonas aeruginosa and Acinetobacter, etc., **Pulmonary Tuberculosis** : AFB microscopy -Ziehl- Neelsen and Auramine (fluorescent stain);biosafety in sample collection, staining, Reading and interpretation . Interpretation of Culture report correlating with Gram smear	**Throat swab Culture** and identification for Group A Beta hemolytic streptococci using blood agar and bacitracin susceptibility testing **Sputum culture** : indications, instructions for collection of sputum with minimal contamination of saliva and biosafety precautions;Wide mouth plastic containers Quality assessment of sputum for culture with Gram stained smear; Culture media ; Identification of Pneumococci by Optochin susceptibility testing and AST **Real time PCR for influenza A** -indications.	AFB culture for M. tb and biochemical identification Nucleic acid amplification tests (Xpert Gene and Line probe assay) in the detection of M.tb organism and MDRT
10	PYREXIA OF UNKNOWN ORIGIN	Definition in adults and children List of pathogens causing PUO Lab diagnosis & antimicrobial treatment		

C 7	**Applied microbiology**			
Sl.No	**Content**	**Must Know**	**Desirable To Know**	**Nice to Know**
11	MENINGITIS	1.Definition of meningitis and encephalitis 2.List of pathogens causing meningitis: Pneumococci, H. influenzae and Meningococci 3.Neonatal meningitis : Group B streptococci, Escherichia coli and Listeria monocytogenes 4.Rapid Gram stained smear examination of centrifuged / non-centrifuged (when the sample volume <1ml) CSF 5.Giemsa stain: for study of inflammatory cells (neutrophils and lymphocytes) 6.Differentiation of viral and bacterial meningitis through CSF findings	Lumbar puncture and collection of CSF Contraindications for collection of CSF Isolation and identification using blood, chocolate (5% CO2) & MacConkey media and biochemical reactions; Optochin sensitivity, factor X, V, XV dependent growth test for H. influenzae	1.Rapid Antigen detection tests using latex agglutination
12	Sexually transmitted Infections	1.STI : Syphilis, Gonorrhea, chancroid , Granuloma inguinale, Herpes simplex genital infection, Lympho-granuloma Venereum, bacterial vaginosis BV, Trichomoniasis, Human papilloma virus infection , HIV,HBV 2..HIV and Coinfection with other STI -implications 3.Microscopy: Direct Gram smear vaginal smear for BV; Saline wet mount of vaginal exudate for Trichomonas vaginalis ; Gram smear of urethral and cervical discharge for gonococci; Tzank smear for Herpes simplex ; Papanicolou smear 3.RPR and Specific Treponema antibody	1.Culture of urethral and cervical exudate for Gonococci using Amies charcoal transport medium and selective Thayer martin culture medium 2.Public Health aspects-syndromic approach	1.Chlamydial antigen detection and Real time PCR for chlamydiae 2. Real time PCR for HPV

C 7	**Applied microbiology**			
Sl.No	**Content**	**Must Know**	**Desirable To Know**	**Nice to Know**
		tests; HBSAg test 4.Rapid HIV antibody tests : Counselling, Test strategies, window period & Interpretation of tests		
13	Skin & Soft tissue Infections	1.Cellulitis, Abscess, carbuncle, impetigo, ulcer, necrotizing fasciitis Surgical site infection, 2.List of Pathogens: S. aureus, beta hemolytic Group A streptococci, Enterococci, Pseudomonas aeruginosa , Escherichia coli, Proteus sp, atypical mycobacteria 3. Specimen: exudate by aspiration, and swabs with minimal contamination by normal flora and colonizers of the wound 4. Direct Gram smear examination, culture and AST & Interpretation of culture report .	Anaerobic culture of exudate from deep seated abscess MRSA	
14	ZOONOSES	1.Definition; WHO classification of zoonoses; 2.List of Bacterial ,Viral ,Parasitic and Fungal zoonoses 3.Zoonoses of clinical & public health importance in India : e.g. Leptospirosis, Anthrax, Plague, Rabies, Influenza A, Japanese encephalitis, toxoplasmosis, echinococcosis, Taeniasis, KFD	Prevention and control of rabies in animals	Surveillance of Zoonoses : Plague , Japanese encephalitis ;

C 7	**Applied microbiology**			
Sl.No	**Content**	**Must Know**	**Desirable To Know**	**Nice to Know**
15	DIARRHOEA & FOOD POISONING	**1.List of Pathogens causing infectious diarrhoea** poisoning; , Vibrio spp. Salmonella serotypes; Shigella spp. Campylobacter spp; Diarrhoeagenic Escherichia coli (EHEC;EPEC; ETEC; EIEC; EAEC;STEC) & C. difficile; 2.**Preformed toxin mediated** : 1)S.aureus; 2) B.cereus;3) C.botulinum 3. Specimens to be subjected for culture of enteric pathogen 1.Stool/rectal swab in Caryblair ; 2.Suspected food transported in cold chain	1.Aeromonas spp; P. shigelloides; Y. enterocolitica ;Listeria mono-cytogenes (rare); Clostridium perfringens; 2.Steps in the Investigation an outbreak of food poisoning : 3.Food hygiene and safety	1.ELISA for the detection of exotoxins . 2.Molecular diagnostic tools to detect foodborne pathogens like Diarrhoeagenic E.coli

D	**Teaching methodology**

PRACTICAL SYLLABUS

A.Laboratory biosafety

B.Microscopy -Handling & maintenance of light microscope

C.Gram Stain – Principles and procedure of Grams stain demonstration followed by hands on exercise ; Examination and interpretation of Direct Gram smear of clinical specimens : pus,urine, CSF,sputum

D.**Special Stains** – 1)Acid fast staining-instructions for sputum collection with biosafety precautions, importance of sputum quality, role of AFB stain in the RNTCP program principles of staining, procedure and demonstration of AFB from sputum specimen. Hands on exercise : staining, examination and reporting

2) Albert stain -Demonstration

E. Demonstration of motility by Hanging drop

F. Demonstration of culture media / methods

G. Demonstration of sterilization and disinfection techniques : 1. Autoclave: equipment

operation and monitoring; methods of packing; indicators of sterilization and visit to

Central sterile supply department. 2. Hot air oven : Operation and use

H : Systematic bacteriology– Identification of the pathogen from the given clinical material

D	**Teaching methodology**

based on Gram stain, cultural characters and biochemical tests ; Demonstration of

antimicrobial susceptibility testing by disc diffusion method

I : Immunology – Blood collection and separation of serum ;Demonstration & discussion

principles of the serological tests, methods, reading and interpretation of the following tests:

Widal, Non treponemal Rapid Plasma Reagin test, ELISA for HIV antibody and HBSAg

Latex agglutination : rheumatoid factor, anti streptolysin

Demonstration : Rapid Tests and various strategies in HIV testing;

Rapid Antigen detection tests in malaria

F: Parasitology –

1)Stool examination; Saline and iodine preparation, Direct and concentration techniques;

Demonstration of normal constituents, cysts and trophozoites of Entamoeba histolytica, Giardia gamblia ; ova of Ascaris lumbricoides, Ankylostoma duodenale, eggs of Taenia solium

2) finger prick blood collection and making of thick and thin smears: Giemsa/JSB staining for malarial parasites demonstration and examination of various stages of P. falciparum and P. vivax.

3) Demonstration of microfilariae

G: Applied Microbiology:

Demonstration and discussion of specimen collection-blood, urine, CSF, throat swab, exudates, sputum ,BAL bronchial aspirates

Demonstration and hands on hand Hygiene :Hand washing and Hand rub

Demonstration of Personal protective equipments and Biomedical waste management

NO	THEORY : TOPICS	NUMBER OF HOURS TO BE DEDICATED			
		Didactic	Integrated seminar		125
D	Teaching methodology				
1	General Microbiology	12	4		
2	Immunology	14	…		
3	Systematic Bacteriology	28	2		
4	Virology	18	4		
5	Mycology	10			
6	Parasitology	12	2		
7	Applied Microbiology	7	12		
	Total	101	24		
	PRACTICALS	**Demonstration**	**Hands on exercise**	**Other activity (Tutorial)**	**125**
1	General instructions & Laboratory biosafety	2	…..	….	
2	**Microscopy**: Handling &Examination	2	1	1	
2	**Gram's Stain** : Making smears from colony, heat fixation, staining &examination;Direct Gram smear examination of clinical specimen	4	6	1	
3	Demonstration of motility by hanging drop	2	…..	….	
4	Sterilization & Disinfection & infection control	4	…..	2 (Visit to	

G METHODOLOGY

D	**Teaching methodology**

E	**Internal Assessment and Medical Ethics**

Theory Question Paper Pattern

Exam. Category	**No. of Questions**	**Marks**
1. Essay	1 x 10 marks	= 10
2. Brief answers	6 x 4 marks	= 24
3 Short answers	6 x 1 marks	= 6
	Total	40

The above pattern is to be implemented from February 2018 onward

PRACTICAL EVALUATION

The TN Dr. M.G.R. Medical University Microbiology II M.B.B.S Practical Examination Format with exercises and marks distribution.

S.No:	**Name of the Exercise**	**Procedure& Observation**	**Identification**	**Interpretation& Discussion**	**Time**	**Total**
1	Gram's Staining15	1.5		1.5	15	3
2	Acid Fast Staining20	1.5		1.5	20	3
3	Stool Examination10	1.5		1.5	10	3
4	Bacterial Culture Identification10		1.5	1.5	10	3

E	**Internal Assessment and Medical Ethics**

5	Immunoserology10		1.5	1.5	10	3
6	Spotters10		5		10	5
7	OSPE :10 1)5 stations 1 mark each General bacteriology-1;Systematic bacteriology-1;virology-1;applied microbioloigy-1; mycology-1; 2)One of the exercises may be testing of skills for e.g., .hand hygiene . 3.To be carried out in the practical session 4.To identify the particular clinical scenario or picture or photograph and answer three question of clinical or microbiological importance related to the particular topic 5.Marks can be distributed according to the questions. Key question : 0.5 mark; Two questions : 0.25 mark each 6.Answer keys have to be provided to the examiners. 7.Ambiquous questions have to be avoided.					5
Total						**25**

Viva Voce :

E	**Internal Assessment and Medical Ethics**

Internal Assessment Scheme for II MBBS Microbiology

Students come into the II year in the third week of October and the protocol for IA is as follows :**THEORY SCHEDULES.No.**	**Tentative Month**	**Portions**
1.	December	General Microbiology
2.	March	Immunology
3.	May	Protozoalogy
4.	July	Helminthology
5.	August	Systematic Bacteriology – I (Staphylococcus upto Nonsporing anaerobes)
6.	September	Systematic bacteriology II (Escherichia coli upto Mycobacterium tuberculosis)
7.	October first week	Systematic bacteriology III

E	**Internal Assessment and Medical Ethics**

		(Mycobacterium leprae upto Chlamydia)
8.	October last week	Virology I (Introduction to virology to Paramyxoviruses)
		rology II (Arboviruses upto HIV)
		ycology
		plied Microbiology Seminars
		odel Exams as per University pattern

S.No.	TOPIC	MARKS
1.	General Bacteriology & immunology.	4
2.	Systematic Bacteriology	4
3.	Virology & Applied Microbiology	4
4.	Parasitology & Mycology	3
Total		15

E	**Internal Assessment and Medical Ethics**

1.The questions can be structured i.e. sets of questions with answer keys can be prepared and given to the examiners in each topic. This can make the oral examination fairly uniform and objective similar to OSPE. Multiple sets of questions may be prepared to avoid monotony.

2.Questions of reasoning type are preferred to recall type of questions.

Laboratory Record

1.The record can have standard instructions for the particular procedure for g., Gram stain to maintain uniformity in the hands on practical

2.Excercises in the form of Questions that are reasoning type with clinical orientation can be asked at the end of each exercise.

3.The records have to be periodically checked by the staff and included in the formative assessment.

4.The students are expected to complete the documentation of the exercises and submitted for the formative assessment

Record should be followed as recommended by the University

1.Internal Assessment can be sent to the University in 6 terms of 3 months each. The assessment has to be submitted on or before 15th

day of the following term .The following are the methods and topics for formative assessment .The methods except seminar/symposium have to be uniformly applied to all terms.

E	**Internal Assessment and Medical Ethics**

Formative assessment methods	I term September to December	II term- January to April	III term-May to August	IV term-September to December	Percentage of total assessment
	General Bacteriology, Immunology,	Systematic Bacteriology I&II	Virology, Mycology.	Parasitology, Applied Microbiology	
1.Participation in Seminar/symposia	At least 1 seminar/symposium per student throughout the course				10
2.Asssignment in topics of clinical or public health importance	1	1	1	1	10
3.Tutorials/Group discussion	1	1	1	1	10
4.Theory : written test & Viva voce	2	2	2	2	40
5.Practicals : A. Group discussion B. Objective type questions C. Hands on assessment D.OSPE	1.Microscopy 2.Gram's Staining 3.Sterilization &Disinfection 4.Biomedical waste management	1.Acid Fast Staining 2.Bacterial Culture Identification 3.Immunoserology-I -Widal, RPR	1.Stool Examination 2.Immunoserology-II – ASO,RF,CRP & ELISA	1.Fungal culture Identification 2.Applied microbiology	30

The TN Dr. M.G.R. Medical University Microbiology II M.B.B.S Medical Ethics :

1.Definition of Ethics :

Medical ethics is a compilation of moral principles that apply values and judgments to the practice of medicine and govern the professional and personal conduct of all students and staff of the institution .As a scholarly discipline, medical ethics encompasses its practical application in clinical settings as well as work on its history, philosophy, and sociology. The medical ethics

E	**Internal Assessment and Medical Ethics**

inspire the professionals to become the most honorable ideals. Besides medical ethical guidelines direct the students, doctors and other staff to act with ethical reasoning.

2.Ethical Reasoning

1. **The problem**: Identification and understanding the problem. for e.g. diagnosis of pulmonary tuberculosis by x- ray chest without doing sputum microscopy. As the X-ray findings -shadows is not specific for tuberculosis there will be over diagnosis of pulmonary tuberculosis which is ethically not acceptable as the wrong diagnosis can lead to unnecessary mental agony and stigma to the patient.

2. Information: Collection of right information relevant for the clinical diagnosis is very important for the diagnosis of infectious diseases of clinical and public health importance -for example, Dengue fever - fever and duration , body ache, headache, vomiting, complete blood examination, platelets count ,positive tourniquet test duration, are important clinical and laboratory features one should try to elicit from the patient to assess the severity of the illness and thereby preventing the patient going for severe dengue which in turn will prevent mortality. Failure to collect relevant epidemiological data especially in a case of fever may lead to delay in the diagnosis of falciparum malaria as early diagnosis is very critical for the prevention of life threatening cerebral malaria that can occur rapidly and cause mortality. This is ethically unacceptable as there is an effective therapy available.

3**. Options**. The various options available for the diagnosis, treatment and prevention have to be considered in each patient depending upon the accuracy of the diagnostic test, cost of the test, and the equipment. For example, In the diagnosis of multidrug resistant Tuberculosis, the options available are : AFB Culture and molecular diagnostic tools such as line probe assay and realtime PCR multiplex Tuberculosis .However for the benefit of the patient either line probe assay or the real time PCR assay (CBNAAT) is the best option .Though the tests are costly the molecular tests are cost effective in terms of early diagnosis of MDRT.

E	**Internal Assessment and Medical Ethics**

The treatment options based on the suitability, cost, adverse reactions for e.g., treatment of community acquired urinary tract infections due to E.coli susceptible to many antimicrobials including with locally & systemically acting drugs .The best option is treatment with locally acting urinary antiseptics as they will not cause adverse reactions encountered during intake of systemically acting drugs.

Consider all available reasonable options, choices and/or actions under the circumstance which you can apply to solve the problem. The goal is to do the right thing at the right time.

4.Ethical issues in the laboratory :

A. Maintenance of confidentiality of laboratory test results: The maintenance of confidentiality is very important for the laboratory to gain confidence from the clients of the laboratory. Generally the results are conveyed to the clients who inturn will convey the results to the treating professional .in some cicumstances the laboratory may have to convey the results directly to the treating physician for management purpose. Maintenance of the confidentiality is mandatory in certain tests like HIV testing as the results may lead to alienation from the family thus causing mental agony to the client.

Counselling has to be given both before and after testing in HIV /AIDS setting as the results may lead to sometimes suicides .Besides the spouse and the partner also have to be counselled to facilitate the process of antiretroviral treatment that will definitely prolong the survival of the patient.

E	**Internal Assessment and Medical Ethics**

Consent from the patient: Written consent has to be always obtained from the patient for any procedure that can potentially harm the individual particularly invasive techniques. All research scholars should get clearance from the institutional ethical committee before any study involving the patients. The consent has to be obtained always in the local language.

F	**Internal Assessment & University Exam Marks Distribution pattern**

INTERNAL ASSESSMENT : 30 Marks

Theory: 15 Marks

Practical and viva voce: 10 Marks

Record-5 marks

Total: 30 Marks

NB: Each Lecture class will be of one hour duration only; Each Practical class will be for 2 hours duration only; Applied and Clinical Microbiology are to be dealt by problem based learning methods

F	**Internal Assessment & University Exam Marks Distribution pattern**

Recommended Text Books :.

a) Text Book of Microbiology 9th edition by Ananthanarayan and Paniker

b) Medical Microbiology by David Greenwood - 18th edition

c) Medical microbiology by Jawetz-27th edition

d) Medical microbiology by Murray 2015 edition

e) **PRESCOTT'S MICROBIOLOGY – 2014 EDITION BY JOANNE WILLEY**

f) Review of Medical Microbiology and Immunology2014 by Warren Leviinson

g) Immunology by Donald Weir 8 th edition

h) Essential Immunology by I.M.Roitt 12 th edition

i) Parasitology by K.D. Chatterjee - 13th edition

j) Textbook of Medical Parasitology: Protozoology and Helminthology 4th edition S.C. Parija

Reference books :

k) Topley and Wilson's microbiology and microbial infections 10th edition-8 vol

l) District laboratory practice in tropical counties-second edition 2 volumes (practical)

m) Textbook Of Practical Microbiology Paperback – 29 Mar 2007 by Subhash Chandra Parija

n) Harrisons principles of internal medicine 19th edition

o) Principles and Practice of infectious diseases 9th edition-Mandell and Douglas

p) Kuby immunology- 8th edition

q) Cellular & molecular immunology, Abbas litchman

PATHOLOGY

I) GOAL

The broad goal of the teaching of undergraduate student in Pathology is to provide the students with a comprehensive knowledge of the mechanisms and causes of disease, in order to enable him/her to achieve complete understanding of the natural history and clinical manifestations of disease.

II) SPECIFIC LEARNING OBJECTIVES

a) **Knowledge**

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

1. Describe the structure and ultra structure of a sick cell
2. Mechanisms of cell degeneration.
3. Cell death and repair and be able to correlate structural and functional alterations.
4. Describe the mechanisms and patterns to tissue response to injury such that she/he can appreciate the patho-physiology of disease processes and their clinical manifestations.
5. Explain the patho-physiological processes which govern the maintenance of homeostasis and mechanisms of their disturbance and the associated morphological and clinical manifestations.
6. Correlate normal and altered morphology (gross and microscopic) of different organ systems in common diseases including neoplasia to the extent needed for the understanding of disease processes and their clinical significance.
7. Develop an understanding of neoplastic change in the body in order to appreciate the need for early diagnosis and its role in the management of neoplasia.

b) **Skills**

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

1. Describe the rationale and principles of technical procedures of the diagnostic laboratory tests
2. Interpretation of the results
3. Perform simple bed-side tests on blood, urine and other biological fluid samples
4. Draw a rational scheme of investigations aimed at diagnosing and managing patients with common disorders
5. Understand biochemical/physiological basis of tests to understand the disturbances that occur as a result of disease in collaboration with pre-clinical departments.
6. Understand the need and methodologies for proper interpersonal relationships between the diagnostic wing and patient care wing of the hospital.
7. Understand the need for quality control in such tests.

c) **Integration**

At the end of training he/she should be able to integrate the knowledge of

1. Normal tissue morphology,
2. Causes of Disease,
3. Relationship of various causative factors (social, economic and environmental),
4. Tissue changes due to such diseases,
5. Effect of such changes on the patients well being,
6. Easy, Accurate and Low Cost Methods of Diagnosis of such diseases
7. Long term implications of the disease on the patient and community.
8. Natural history of such diseases as prevalent in India, especially in the local region of the Teaching Hospital.

II. TEACHING METHODOLOGY AND TEACHING HOURS

No	Teaching Method	Detailed Time Distribution	**Minimal Number of Hours to be Dedicated**
1	Didactic Lectures		**110 Hours**
	a. General Pathology	40 Hours	
	b. Systemic Pathology	40 Hours	
	c. Hematology	15 Hours	
	d. Clinical Pathology	15 Hours	
2	Practical Demonstrations		**100 Hours**
	a. General Pathology	20 Hours	
	b. Systemic Pathology	50 Hours	
	c. Hematology	10 Hours	
	d. Clinical Pathology	20 Hours	
3	Integrated Teaching (Horizontal and vertical)		**40 Hours**
	a. Systemic Pathology	30 Hours	
	b. Hematology	10 Hours	
4	Clinical Interaction & Lab Work		**20 Hours**
	Clinical Pathology	8 Hours	
	Blood Banking	3 Hours	
	Cytology	3 Hours	
	Histopathology	3 Hours	
	Autopsy & Museum	3 Hours	
5	Short Term Student Research		**10 Hours**
6	Internal Assessment Tests		**20 Hours**
	Theory	12 Hours	
	Practicals	6 Hours	
	Communicative Skills Assessment (Viva Voce & OSPE)	2 Hours	
	TOTAL		**300 Hours**

NB: Each lecture class will be of one hour duration only
Each practical class will be for 2 hours duration only
Clinical interaction to include case studies, clinicopathological correlation, and performance and interpretation of relevant laboratory tests

III.THEORY SYLLABUS

A. Introduction to Pathology

Must Know

a. Role of a pathologist in a hospital and importance in diagnosis.
b. Ethics and the pathologist
c. Safe laboratory practices including universal precautions and disposal of biomedical waste

Desirable to Know

a. History of pathology with special mention of pioneers
b. Evolution of pathology with special mention of the role of autopsy in development of modern pathology and its present day importance.
c. The cell in health and disease
Cellular housekeeping and cell signalling,
d. Signal transduction pathways
e. Cytoskeleton and cell-cell Interactions

B. Cell **injur**y **an**d **Adaptations**:

Must Know

a. Causes and mechanisms of cell injury and the macroscopic and microscopic features of reversible and irreversible cell injury
b. Definition and types of necrosis and characteristics of each type of necrosis with examples
c. Apoptosis : definition, examples, , morphological changes and its difference from necrosis
d. Definition of gangrene ,different types of gangrene with morphology and examples
e. Adaptations – Definitions of hyperplasia, hypertrophy, atrophy, metaplasia, dysplasia, hypoplasia with examples. Differences between hypertrophy and hyperplasia, atrophy and hypoplasia
f. Calcification – Types and Importance

Desirable to Know

Mechanism of apoptosis

Nice to Know

a. Basics of Cellular Ageing
b. Necroptosis

C. Inflammation & **Repai**r

Must Know

a. Acute inflammation: Definition of acute inflammation and its causes
b. Vascular phenomena of inflammation
c. Cellular phenomenon chemotaxis, phagocytosis and formation of exudates
d. Chemical mediators of inflammation with special reference to histamine, complement, arachidonic acid metabolites, coagulation cascade
e. Clinical features , morphological types and outcome of acute inflammation with examples

f. Chronic inflammation: Definition, examples, morphology and cells of chronic inflammation with emphasis on epithelioid cells & giant cells

g. Granuloma: definition pathogenesis & description of a granuloma with special emphasis on tuberculous granuloma Other types of granulomas: Syphilis, Sarcoidosis and Leprosy and foreign body
h. Giant cells different types, morphology & examples
i. Tissue repair, regeneration and fibrosis
j. Cell cycle and different types of cells
k. Normal cell growth and Regeneration
l. Repair : role of collagen, formation and morphology of granulation tissue, angiogenesis and fibrosis
m. Wound healing first and second intention
n. Factors affecting wound healing
o. Complications of wound healing
p. Healing in bone and specialized tissue

Desirable to Know

a. Cytokines, interleukins, mononuclear phagocytic system
b. Mechanisms of microbial killing

Nice to Know

a. Steps in angiogenesis
b. Role of growth factors and extracellular matrix

D. Hemodynamic disorders, thromboembolism and shock

Must Know

a. Hyperemia and congestion: definition and morphology
b. Normal hemostasis: mechanism and pathways
c. Thrombosis : definition, pathogenesis, causes, morphology and fate
d. Differences between thrombophlebitis and phlebothrombosis
e. Differences between antemortem thrombus and postmortem clot
f. Embolism & Infarction: definition, types and pathogenesis with examples
g. Oedema : definition, types, pathogenesis with examples
h. Differences between transudate and exudate
i. Shock: definition, types, pathogenesis, clinical manifestations and examples

Desirable to Know

a. Role of endothelium in coagulation and hypercoagulable state

Nice to Know:

a. Antiphospholipid syndrome
b. Anticoagulant proteins

E. Neoplasia

Must Know

a. Definition of neoplasia (Willis' definition), classification and nomenclature
b. Characteristics of benign and malignant neoplasms
c. Differences between benign and malignant neoplasms and carcinoma and sarcoma
d. Spread of a malignant tumor, routes of spread with examples, mechanisms of spread
e. Metastasis : Definition, mechanisms and significance
f. Carcinogenesis: Physical, chemical & biological carcinogens and their mechanisms of action
g. Molecular basis of carcinogenesis and role of TP53 and RB1 genes
h. Clinical features and staging and grading of neoplasia
i. Laboratory diagnosis of neoplasia

Desirable to Know

a. Epidemiology of cancer
b. Pre-cancerous lesions
c. Hallmarks (physiological properties) of cancer cells
d. Systemic changes due to neoplasia and paraneoplastic syndromes
e. Multistep carcinogenesis and progression of cancer
f. Occupational cancers

Nice to know

a. Knudson's two-hit hypothesis
b. Genetic changes in cancer
c. Tumour markers
d. Host defences against cancer
e. Tumour-like lesions – hamartoma and choristoma

F. Genetic disorders –

Must know

a. Basic facts about the human genome; structure of DNA and chromosomes
b. Mutations : definition, types
c. Classification of genetic disorders
d. Single gene (Mendelian) disorders
e. Patterns of inheritance of autosomal dominant, autosomal recessive and X- linked recessive disorders.
f. At least **one** example each of autosomal dominant, autosomal recessive and X-linked recessive disorders.
g. Cytogenetic disorders
h. General features
    i) Parts of a chromosome and types of chromosomes
    ii) Numerical disorders of autosomes– Down syndrome
    iii) Numerical disorders of sex chromosomes _ Turner and Klinefelter syndromes
    iv) Structural abnormalities of chromosomes
    v) At least **one** example of a microdeletion syndrome
    vi) Indications for genetic analysis
    vii) Multifactorial disorders – at least two examples of these disorders.

Nice to know

a. Human genome project
b. Fragile X syndrome
c. Genomic imprinting disorders
d. Storage disorders: Classification ; lysosomal & glycogen storage disorders
e. Laboratory diagnosis of genetic disorders : karyotyping, fluorescence in situ hybridisation, DNA microarrays, polymerase chain reaction, RFLPs, VNTR analysis, linkage analysis, genome-wide association studies, Southern blotting, DNA sequencing.

G. Immune diseases

Must know

a. Types of immunity
b. Immune mediated injury – causes and types of hypersensitivity reactions,
c. Autoimmune disorders: mechanism and pathology of systemic lupus erythematosus.
d. HIV infection and AIDS :pathogenesis, clinical manifestations, diagnosis, and pathology including opportunistic infections , diagnostic procedures and handling of infected materials and health education.

Desirable to know

a. Cells and tissues of the immune system
b. Normal immune responses
c. Immunologic tolerance
d. Mechanisms of autoimmunity
e. Amyloidosis
f. Graft rejection

Nice to know

a. Primary immunodeficiency disorders
b. Other autoimmune disorders
c. Graft versus host disease

H. Environmental and nutritional diseases

Must Know

a. Effects of tobacco and alcohol,
b. Injury produced by ionizing radiation: morphology and effects of radiation on organs

Desirable to know

a. Vitamin deficiency syndromes including rickets and osteomalacia
b. Protein energy malnutrition
c. Other nutritional diseases
d. Obesity
e. Thermal injury
f. Electrical injury
g. Occupational (industrial and agricultural) exposure

Nice to know

a. Lead poisoning
b. Mercury poisoning
c. Diet and cancer
d. Injury due to therapeutic drugs
e. Effects of (non therapeutic) drug abuse

I. Infectious diseases:

Must know

a. Mycobacterial diseases: tuberculosis and leprosy
b. Bacterial diseases: pyogenic infections , typhoid, diptheria, bacillary dysentery, syphilis
c. Fungal and opportunistic infections
d. Parasitic diseases: malaria, filaria, amoebiasis, cysticercosis, hydatid , kala azar.

Desirable to know

a. General host factors
b. Polio, herpes, rabies, measles, rickettsial, chlamydial infections

Nice to know

a. General principles of microbial pathogenesis
b. Transmission and dissemination of disease
c. Mechanisms of microbial injury
d. Agents of bioterrorism
e. Immune evasion by microbes

J. Hematology:

Must Know

a. Haematopoiesis and microscopy of normal marrow
b. Definition and classification of anemia
c. Iron deficiency anemia : causes, pathogenesis, clinical manifestations and lab diagnosis
d. Megaloblastic anemia : causes, pathogenesis, clinical manifestations and lab diagnosis
e. Aplastic anemia : causes, pathogenesis, clinical manifestations and lab diagnosis
f. Classification of haemolytic anemia : Clinical features, pathogenesis, pathology and laboratory diagnosis of Hereditary spherocytosis, sickle cell anemia and thalassemia,
g. Non neoplastic white cell disorders : Leukopenia, agranulocytosis, leukocytosis, leukemoid reaction and infectious mononucleosis,
h. Classification of leukemia (FAB & WHO)
i. Acute myeloid and acute lymphoblastic leukemia
j. Chronic myeloid leukemia and chronic lymphocytic leukemia,
k. Myeloma
l. Physiology of haemostasis and thrombosis
m. Disorders of haemostasis and thrombosis :
   i) Haemophilia A and B,
   ii) von Willebrand disease,
   iii) Disseminated intravascular coagulation
   iv) Idiopathic thrombocytopenic purpura

Blood groups and Blood Transfusion

a. Blood groups and their clinical significance
b. Determination of blood groups
c. Significance of reverse grouping and cross-matching
d. Blood donation, collection, preservation, tests performed
e. Indications for blood transfusion
f. Transfusion reactions and transfusion associated infections
g. Rational use of blood including component therapy

Desirable to know

a. Anemia of chronic disease
b. G6PD deficiency
c. Myelodysplastic syndromes
d. Immunophenotype and karyotype findings in acute and chronic leukemias
e. Laboratory tests of haemostasis and thrombosis

Nice to Know

a. Paroxysmal nocturnal haemoglobinuria
b. Immune haemolytic anaemia
c. Pure red cell aplasia
d. Haemolytic uremic syndrome and thrombotic thrombocytopenic purpura
e. Myeloproliferative neoplasms
f. Prognostic features of leukemias
g. Other plasma cell dyscrasias
h. Heparin-induced thrombocytopenia
i. Coombs test

K. Cardiovascular Pathology

Must know

a. Atherosclerosis: Definition, risk factors, etiopathogenesis, gross and microscopic description, complications and clinical correlations.
b. Aneurysms
c. Hypertension: Relate the mechanisms of the disease to the clinical course and sequelae.
d. Cardiac failure
e. Ischaemic heart disease and myocardial infarction: Incidence, risk factors, pathogenesis, morphological changes, clinical course, complications and investigations.
f. Infective endocarditis: Pathogenesis, morphology, differential diagnosis of cardiac vegetations
g. Cardiomyopathies – Recognize the disorders as part of differential diagnosis in primary myocardial disease.
h. Pericardial Diseases: Pericarditis - Aetiology and basic morphology of different forms

Desirable to know

a. Thrombophlebitis
b. Aortic dissections
c. Superior vena cava syndrome
d. Congenital heart disease: Correlate the anatomical malformations of disorders to the clinical consequences of the disease.

e. Rheumatic heart disease: Incidence, etiopathogenesis, morbid anatomy, histopathology, lesions in other organs, clinical course and sequelae.
f. Tumours of heart: Classification & Morphology

Nice to know

a. Vasculitides : infectious and non infectious
b. Metabolism of cholesterol, HDL, LDL
c. Pathology of vascular interventions – stenting and vascular replacement
d. Myocarditis

L. Respiratory Pathology

Must know

a. Pulmonary tuberculosis
b. Pneumonias: Aetiology, classification, gross, histopathology of different forms and complications.
c. Lung Abscess and Bronchiectasis: Etiopathogenesis, morphological appearances and complications.
d. Chronic obstructive lung diseases: Chronic bronchitis and emphysema - pathogenesis, definition of chronic bronchitis, morbid anatomy and cardiac sequelae, types of emphysema,
e. Occupational lung diseases: Types, etiopathogenesis, gross anatomical differences between different forms and sequelae; names of different types of pneumoconiosis; pathology of coal worker's pneumoconiosis, asbestosis and silicosis
f. Pulmonary vascular disorders: pulmonary embolism, infarction, and edema
g. Tumours of lung: Classification, aetiology, gross appearances, histology of important forms, natural history, pattern of spread
h. Non -neoplastic lesions of pleura

Desirable to know

a. Pulmonary hyperpertension : Classification, Etiopathogenesis, morphological appearances and complications
b. Chronic interstitial (restrictive, infiltrative) lung diseases: Classification, etiopathogenesis, morphological appearances and complications; differences between obstructive and restrictive lung diseases.
c. Pneumonia in the immunocompromised host
d. Acute respiratory distress syndrome
e. Atelectasis
f. Pathology of carcinoid tumour
g. Para-neoplastic syndromes and secondary pathology.
h. Tumours of upper respiratory tract: Nasopharyngeal carcinoma,carcinoma larynx

Nice to know

a. Basic pathology of atypical pneumonia
b. Fungal pneumonias
c. Mesothelioma

M. Gastro Intestinal Pathology:

Must know

a. Oral cancer : etiopathogenesis, gross and histopathological descriptions.
b. Barrett esophagus
c. Carcinoma oesophagus: etiopathogenesis, morphological features
d. Esophageal varices
e. Gastritis and peptic ulcer : Definition of peptic ulcer, etiological factors, gross and microscopic appearances and sequelae ;etiology and types of gastritis; helicobacter pylori and chronic gastritis ; differences between benign and malignant gastric ulcers
f. Gastric tumours: Classification, morbid anatomy and histopathology
g. Ulcers of intestines: Etiology, morphological appearances of typhoid, tuberculous and amoebic ulcers and bacillary dysentery ; differential diagnosis of different forms of ulcers; differences between primary and secondary intestinal tuberculosis.
h. Causes of intestinal obstruction
i. Idiopathic inflammatory bowel disease: Enumerate similarities and differences between Crohn's disease and ulcerative colitis.
k. Appendicitis
l. Intestinal polyps
m. Carcinoma colon.
n. Hepatic failure
o. Jaundice and cholestasis
p. Viral hepatitis: Etiology, clinical source and enzymology, salient histological features and sequelae.
q. Alcoholic liver disease: Pathogenesis, morphological manifestations and correlation with clinical features
r. Liver abscess
s. Cirrhosis: Classification, etiopathogenesis, morphology and differential diagnosis and complications
t. Tumours of liver: Etiopathogenesis and pathology of hepatocellular carcinoma and metastatic carcinoma
u. Cholecystitis: Clinical features and morphology
v. Gall stones : classification , etiopathogenesis, pathology and complications

Desirable to know

a. Classification of salivary gland tumours; pathology of pleomorphic adenoma.
b. GI Lymphomas : Classification, etiological factors, gross and microscopic appearances
c. GI stromal tumours.
d. Carcinoid tumours of GIT.
e. Wilson disease
f. Acute and chronic pancreatitis : etiopathogenesis and pathology; complications

Nice to know

a. Malabsorption syndromes
b. Hirschprung disease
c. G.I. infections in immunocompromised individuals
d. Neuroendocrine tumours
e. Meckel’s diverticulum
f. Primary biliary cirrhosis
g. Metabolic disorders such as haemochromatosis, alpha-1 antitrypsin deficiency
h. Non-alcoholic steatohepatitis.
i. Benign tumours of liver: Haemangioma, Hepatocellular adenoma

j. Tumours of gall bladder : Cholangiocarcinoma , Gross types
k. Tumours of pancreas: Adenocarcinoma and endocrine tumours.

N. Diseases of Kidney:

Must know

a. Nephrotic syndrome and nephritic syndrome : Integrate clinical and pathological features of this disorder.
b. Glomerulonephritis: Acute streptococcal glomerulonephritis, crescentic glomerulonephritis, chronic glomerulonephritis
c. Diabetic glomerulosclerosis
d. Renal failure: Definitions, criteria, aetiology, systemic manifestations and investigations; etiopathogenesis & morphology of acute tubular necrosis, acute and chronic renal failure,
e. Urinary tract infection : Acute pyelonephritis, chronic pyelonephritis, tuberculous pyelonephritis - etiology, pathogenesis, morphological features and clinical correlations
f. Chronic kidney disease and end-stage kidneys
g. Urinary tract obstruction : Calculi - etiopathogenesis & morphology; hydronephrosis - – etiopathogenesis & morphology
h. Renal tumours: Renal cell carcinoma, Wilms tumour : Morphology and clinical course

Desirable to know

a. Pathogenesis of glomerular disease
b. Malignant hypertension
c. Adult and infantile polycystic kidney disease
d. Urinary bladder tumours

Nice to know

a. Interstitial Nephritis
b. Lupus nephritis
c. Renal amyloidosis
d. Acute papillary necrosis: etiopathogenesis & morphology
e. Renal changes associated with hypercalcemia & hyperparathyroidism.
f. Other glomerulopathies, IgA nephropathy

O. Pathology of Male Genital Tract:

Must know

a. Penis – carcinoma and premalignant lesions
b. Testis – classification of tumours, clinical course and pathology of seminoma
c. Prostate – Benign prostatic hyperplasia
d. Hydrocoele

Desirable to know

a. Torsion of testis
b. Cryptorchidism
c. Orchitis and epididymitis
d. Genital tuberculosis
e.Adenocarcinoma prostate

Nice to know

a. Pathology of other testicular tumours

P. Pathology of Female Genital Tract:

Must know

Cervix

a. Chronic cervicitis with squamous metaplasia
b. Cervical intraepithelial neoplasia (dysplasia) and role of cytological screening.
c. Carcinoma cervix

Uterus

a. Endometrial Hyperplasia and polyps
b. Endometrial Carcinoma
c. Endometriosis
d. Adenomyosis,
e. Leiomyomas

Ovary

a. Classification of tumours
b. Mucinous and Serous tumours, Dysgerminoma, Teratoma, Krukenberg tumour

Diseases of pregnancy

a. Ectopic pregnancy
b. Hydatidiform mole
c. Choriocarcinoma

Desirable to know

a. Congenital abnormalities of uterus
b. Prolapse
c. Endometritis

Nice to know

a. Paget disease of vulva
b. Sarcoma botryoides of vagina
c. Haematocolpos / haematometra
d. Salpingitis and pelvic inflammatory disease
e. Genital infections – herpes, genital tuberculosis,
f. Dysgenetic gonads and their significance.
g. Liquid-based cytology.
h. Other ovarian tumours – Granuloasa cell tumour, Grem cell tumours, other surface epithelial tumours.

Q. Pathology of Breast:

Must know

a. Fibrocystic disease
b. Classification of breast tumours
c. Fibroadenoma,

d. Carcinoma breast: Pathology of in situ and invasive carcinoma, not otherwise specified (NOS, NST) – aetiopathogenesis and prognostic factors

Desirable to know

a. Duct papilloma and phyllodes tumour
b. Other types of carcinoma – mucinous (colloid), medullary, papillary carcinoma
c. Carcinoma male breast,

Nice to know

a. Gynaecomastia
b. Molecular subtypes in breast carcinoma – only the names
c. HER-2-neu in breast carcinoma

R. Pathology of Lymphoreticular System:

Lymph nodes

Must know

a. Tuberculous lymphadenitis, filarial lymphadenitis and non specific lymphadenitis
b. Metastatic tumours
c. Non Hodgkin lymphomas : Classification; pathology of diffuse large cell lymphoma, Burkitt lymphoma
d. Hodgkin lymphoma : Classification and morphology of all subtypes.
e. Differences between Hodgkin and non Hodgkin lymphomas.
f. Ann Arbor staging of lymphomas.

Desirable to know

a. Basic concepts of immunohistochemistry of lymphoid cells – one or two markers for each type of cell.
b. Names of at least two high-grade and low-grade non Hodgkin lymphoma
c. Follicular lymphoma and mantle cell lymphoma

Nice to know

a. Current WHO Classification of lymphoid neoplasms
b. Extranodal lymphomas
c. Adult T cell leukemia/lymphoma
d. Mycosis fungoides

Spleen

Must know

a. Causes of splenomegaly
b. Pathology of chronic venous congestion,
c. Splenic infarction

Desirable to know

a. Pathology of spleen in malaria and kala azar,

Nice to know

a. Common neoplasms – lymphomas , haemangiomas, chronic myeloid leukemia
b. Rupture spleen

Thymus

Nice to know

a. Thymomas and Myasthenia gravis.
b. Invasive and non-invasive thymoma
c. Thymic hyperplasia
d. Other anterior mediastinal tumours– germ cell tumours

S. Pathology of Skin

Must know

a. Premalignant lesions
b. Tumours of skin : Basal cell carcinoma, squamous cell carcinoma, malignant melanoma.
c. Naevi – intradermal, junctional and compound naevi
d. Skin lesions in leprosy

Desirable to know

a. Molluscum contagiosum
b. Verrucae(warts)

Nice to know

a. Bullous lesions of skin– Classification and morphological features :pemphigus, pemphigoid
b. Immunofluorescence in dermatopathology
c. Chronic inflammatory dermatitis : Psoriasis, lichen planus
d. Epidermal cyst, pilar cyst, seborrheic keratosis

T. Bone & Joints and and Soft Tissue

Must Know

a. Osteomyelitis: Pyogenic osteomyelitis, pathogenesis, pathology and complications. Tuberculous osteomyelitis and psoas abscess
b. Bone tumours: Classification : pathology of osteogenic sarcoma, chondrosarcoma, giant cell tumour, Ewing's tumour, myeloma and metastatic tumours
c. Soft tissue tumours: Classification; pathology of lipoma, fibroma, haemangioma, neurofibroma, schwannoma, leiomyoma,

Desirable to know

a. Arthritis - osteoarthritis and rheumatoid arthritis, septic arthritis, gout;
b. Chronic synovitis,
c. Other infections : Mycetoma, syphilis

Nice to know

a. Metabolic bone disorders: Brown tumour of hyperparathyroidism, rickets, osteomalacia
b. Avascular necrosis,
c. Aneurysmal bone cyst, fibrous dysplasia, Paget disease.
d. Soft tissue sarcomas: classification and histopathology

U. Central Nervous System, Peripheral Nervous System & Muscle:

Must Know

a. Pyogenic meningitis and brain abscess
b. Tuberculous meningitis and tuberculoma
c. Cysticercosis

d. Role of CSF examination in meningitis
e. Cerebral infarction: Gross and microscopic features
f. Tumours of the CNS: Pathology of meningioma, schwannoma, astrocytoma, glioblastoma, Medulloblastoma; metastatic tumours
g. Subarachoid hemorrhage, Epidural haemorrhage, Intracranial aneurysm

Desirable to know

a. Cerebral edema, herniation and hydrocephalus
b. Hypertensive encephalopathy
c. Venous sinus and cortical vein thrombosis
d. Watershed infarcts
e. Cerebral malaria – aetiological agent, basic pathology
f. Hydatid cyst
g. Alzheimer disease

Nice to know

a. Morphological features and differential diagnosis of encephalitis.
b. Amoebic meningoencephalitis – aetiological agent, basic pathology
c. Viral meningitis
d. HIV infection in the CNS
e. Molecular basis of gliomas and its impact on diagnosis and prognosis
f. Syndromes associated with brain tumors
g. Cerebral lymphomas
h. Neurodegenerative disorders
i. Diseases of myelin
j. Congenital malformations
k. Prion disease
l. Myopathies: Differential diagnosis of common muscle disorders.

V. Endocrinology

Must know

a. Diabetes mellitus: Classification, pathogenesis of system involvement, sequelae and complications.
b. Hypothyroidism and Hyperthyroidism
c. Thyroiditis, Colloid goiter, Multinodular goiter
d. Differential diagnosis of thyroid nodules and diffuse thyroid enlargement
e. Classification of tumours of thyroid; pathology of papillary carcinoma thyroid

Desirable to know

a. Graves disease
b. Other thyroid tumours
c. Parathyroid, adrenal and pituitary hypofunction and hyperfunction .
d. Tumours of parathyroid, adrenal ,including pheochromoctyoma, and pituitary

Nice to know

a. Adrenalitis – etiopathogenesis, pathology, classification and complications,
b. Multiple endocrine neoplasia syndromes- names and components

W. Perinatal and Pediatric Pathology

Must know

a. Hydrops fetalis
b. Hemolytic disease of newborn: Etiopathogenesis, pathology, and complications
c. Childhood tumours: Neuroblastoma, retinoblastoma, wilms tumour, embryonal rhabdomyosarcoma

Desirable to know

a. Perinatal infections
b. Neonatal respiratory distress syndrome and hyaline membrane disease – etiopathogenesis, pathology and complications.
c. Cystic fibrosis – etiopathogenesis, pathology, diagnosis and prognosis.

Nice to know

a. Pathology of prematurity: Necrotising enterocolitis; sudden infant death syndrome
b. Terms used to describe errors in morphogenesis

X. Developments in Pathology:

Desirable to know

a. Immunohistochemistry
b. Immunoflourescence

Nice to know

a. Flow cytometry
b. Fluorescence in situ hybridisation
c. Image analysis & digital morphometry
d. Methods of molecular diagnosis
e. DNA microarray technology and sequencing

IV. PRACTICAL SYLLABUS

The Clinical Pathology teaching is to be done as [a] bed-side and / or hospital laboratory-based demonstrations and evaluation sessions. [b] Departmental practical classes of 2 hours duration each.
The Clinical Pathology classes shall be drawn from the time allotted in the first clinical year – clinical posting schedules.

The individual institutions could modify the classes and have their own schedule. These are only guidelines and suggestions

Clinical Pathology postings to be included in clinical posting schedule - 15 days.
The students to be taught theoretical aspects, demonstration of various tests and they will be introduced to the equipments and instruments in the clinical pathology laboratory

The tests which they have to perform during the examination could be included in the regular 2 hour practical classes in the afternoon, to give enough time for practice, so that the students become proficient in performing these tests.

On completion of Clinical Pathology Postings, the students need to know both theoretical aspects and practical aspects. They should have enough exposure to the various tests performed in the clinical pathology laboratory.

The procedures to be demonstrated and practiced are:

A) Clinical Pathology – Blood

1 Anticoagulants and their use – Practice
2 Drawing of blood, preparation of smears and staining of smears – Practice
3 Using the microscope – Practice
4 Differential Leucocyte Count of blood smears – Practice
5 Reporting of peripheral smear – Practice
6 Hemoglobin estimation by acid hematin method – Practice
7 Blood grouping – ABO & Rh – Practice
8 ESR by Westergren pipette – demonstration
9 Total count of WBC, RBC and Platelets by Neubauer chamber – demonstration
10 Hemoglobin estimation by Drabkin's method – demonstration
11 PCV by Wintrobe's tube – Demonstration
12 Bleeding time, clotting time, prothrombin time, APTT – Demonstration
13 Osmotic fragility test, coombs tests and sickle test – Demonstration
14 Use of automated cell counters and coagulation analysers – Demonstration
15 Reporting peripheral blood and bone marrow – typical stained slides to be provided **(**List appended Table2A)

B) Clinical Pathology – Urine and Body Fluids

1 Urine – assessment of the physical characters, to measure specific gravity and pH– Practice
2 Urine – chemical tests for Protein, Reducing substances, blood, bile salts, bile pigments and Ketone bodies– Practice
3 Use of different stix and their interpretation – Demonstration
4 Microscopic examination of urine – Demonstration
5 Automated Urine Analysis – Demonstration
6 CSF – Demonstration of cell types in a normal CSF sample and a case of meningitis
7 Ascitic and Pleural Fluids – Demonstration of cell types
8 Semen Analysis – Demonstration

C) Histopathology and Cytopathology

1 Preservation and Transport of Specimens – Demonstration
2 Laboratory Techniques in Histopathology – Demonstration
3 Laboratory Techniques in Cytopathology : FNAC, Pap Smears, Fluid Cytology– Demonstration
4 H & E staining and other special staining – Demonstration
5 Demonstration of Histopathology slides along with tutorial classes in general and systemic pathology – typical stained slides to be provided (see list in Appended Table 1)
6 Demonstration of Cytology slides along with tutorial classes in general and systemic pathology – typical stained slides to be provided (see list in Appended Table 2A)
7 Demonstration of Gross Specimens along with tutorial classes in general and systemic pathology – typical specimens to be provided **(**see list in Appended Table 2B)

D)) Histopathology and Cytopathology Exercise

1. Each students is instructed to accompany five surgical samples from operation theatre in which he is posted in the concerned hospital.with the concurrence of the surgical and allied specialities department

2. He is to ensure the tissue sample(biopsy/resected) is transported in adequate formalin along with complete details of the patient :- (Name , age , unit,I.P. Number, nature of tissue,) in the sample and request form with the signature of the concerned unit assistant.

3. Specimen should be submitted to the pathology reception, there the **Pathology Number** to be noted, sample followed up in the Histopathology processing lab ,till the concerned slides are ready.

4. the slides shall be viewed along with the concerned professor and to make entries in his/her record

5. This exercise is to ensure that students are educated and oriented regarding collection, transporting, processing and diagnosis of a human tissue.

6. The students has to observe 5 FNAC procedure and familiarize himself/herself with the processing, staining, interpretation of the slide and make entries in his/her record.

Students shall be evaluated according to this exercise

LISTS OF SLIDES AND SPECIMENS FOR HISTOPATHOLOGY, CYTOLOGY, HEMATOLOGY AND GROSS SPECIMENS HAVE BEEN APPENDED HEREWITH.
These lists are only a guideline of the minimal requirements.

NO.	DIAGNOSIS	NO.	DIAGNOSIS
1.	FATTY CHANGE LIVER	26.	INTESTINAL TUBERCULOSIS
2.	ACUTE APPENDICITIS	27.	STOMACH – CHRONIC PEPTIC ULCER
3.	GRANULATION TISSUE	28.	LIVER – HEPATOCELLULAR CARCINOMA
4.	LUNG – CVC	29.	LIVER CIRRHOSIS
5.	LIVER – CVC	30	KIDNEY – CHRONIC PYELONEPHRITIS
6.	SPLEEN – CVC	31	KIDNEY – RENAL CELL CARCINOMSA
7.	ARTERY – RECENT / ORGANISED THROMBUS	32	KIDNEY – WILMS TUMOUR
8.	KIDNEY / SPLEEN INFARCT	33	BENIGN PROSTATIC HYPERPLASIA
9.	MADURA MYCOSIS - SKIN	34	TESTIS – SEMINOMA
10.	TUBERCULOUS LYMPHADENITIS	35	UTERUS – LEIOMYOMA
11	LEPROMATOUS LEPROSY – SKIN	36	UTERUS – ADENOMYOSIS
12	TUBERCULOID LEPROSY – SKIN	37	PRODUCTS OF CONCEPTION
13.	ACTINOMYCOSIS ABSCESS	38	BREAST – FIBROADENOMA
14	LOBAR PNEUMONIA	39	BREAST – CARCINOMA
15	SKIN – PAPILLOMA	40	HODGKIN / NON HODGKIN LYMPHOMA
16	SQUAMOUS CELL CARCINOMA	41	HASHIMOTO THYROIDITIS
17	ADENOCARCINOMA COLON	42	THYROID – COLLOID GOITRE
18	LIPOMA	43	THYROID – PAPILLARY CARCINOMA
19.	SKIN – CAPILLARY HAEMANGIOMA	44	BONE – OSTEOGENIC SARCOMA
20	CAVERNOUS HAEMANGIOMA	45	BONE – CHONDROMA
21	BENIGN CYSTIC TERATOMA (DERMOID CYST)	46	BONE – OSTEOCLASTOMA
22	LYMPH NODE – METASTASIS	47	BRAIN – MENINGIOMA
23	AORTA – ATHEROSCLEROSIS	48	SOFT TISSUE – SCHWANNOMA
24	LUNG – BRONCHIECTASIS	49	SKIN – MALIGNANT MELANOMA/ NAEVUS
25.	LUNG – FIBROCASEOUS TUBERCULOSIS	50	SKIN - BASAL CELL CARCINOMA

Table 2A: **HEMATOLOGY** & **CYTOLOGY SLIDES**

NO.	DIAGNOSIS	NO.	DIAGNOSIS
1.	ACUTE MYELOID LEUKEMIA (AML) – Blood/ Bone marrow	11.	BLOOD SMEAR WITH MICROFILARIA / PLASMODIUM
2.	ACUTE LYMPHOBLASTIC LEUKEMIA (ALL) – Blood/ Bone marrow	12.	FNAC BREAST – FIBROADENOMA
3.	CHRONIC MYELOID LEUKEMIA (CML) CHRONIC PHASE – Blood/ Bone marrow	13.	FNAC BREAST – DUCTAL CARCINOMA
4.	CHRONIC LYMPHOCYTIC LEUKEMIA (CLL) – Blood	14.	FNAC LYMPH NODE – GRANULOMATOUS LYMPHADENITIS
5.	PLASMA CELL MYELOMA – Bone marrow	15.	FNAC LYMPH NODE –METASTATIC DEPOSIT
6.	NEUTROPHILIA – Blood	16.	FNAC THYROID – COLLOID GOITRE
7.	EOSINOPHILIA – Blood	17.	FNAC THYROID – PAPILLARY CARCINOMA
8.	LYMPHOCYTOSIS – Blood	18.	PAP SMEAR WITH HSIL/ SQUAMOUS CELL CARCINOMA
9.	IRON DEFICIENCY ANAEMIA – Blood	19.	ASCITIC FLUID – POSITIVE FOR MALIGNANCY (ADENOCARCINOMA)
10.	MACROCYTIC ANAEMIA – Blood		

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DIAGNOSIS	DIAGNOSIS	DIAGNOSIS
GP: INFARCT KIDNEY	PLEOMORPHIC ADENOMA SALIVARY GLAND	GUT: RENAL CELL CARCINOMA
GP: FATTY CHANGE LIVER	CARCIN OMA LARYNX	THYROID – ADENOMA
GP: DRY GANGRENE FOOT	GIT: AMOEBIC COLITIS	HASHIMOTO'S THYROIDITIS
GP: WET GANGRENE	GIT: POLYPS	MULTINODULAR GOITRE
GP: INFARCT INTESTINE	GIT: ADENOCARCINOMA – COLON	PAPILLARY CARCINOMA
GP: CASEOUS NECROSIS	GIT: ILEUM TYPHOID ULCER	MEDULLARY CARCINOMA
GP: CVC LUNG/SPLEEN	GIT: AMOEBIC LIVER ABSCESS	BONE: OSTEOGENIC SARCOMA
GP: ACUTE APPENDICITIS	GIT: LIVER – CIRRHOSIS	BONE: EWING SARCOMA
GP: ABSCESS KIDNEY / LIVER /LUNG	GIT: HEPATOCELLULAR CARCINOMA	BONE: CHRONIC OSTEOMYELITIS
GP: MYCETOMA FOOT	GIT: LIVER METASTASIS	BONE: OSTEOCLASTOMA
GP: LIVER – CVC	GIT: OESOPHAGUS CARCINOMA	CNS: MENINGIOMA / GLIOMA
CVS: AORTA – ATHEROMA	GIT: CHRONIC GASTRIC ULCER	CNS: HAEMORRHAGE / CVA
CVS: THROMBUS ARTERY / VEIN	GIT: STOMACH – CARCINOMA	L/RET: TB LYMPHADENITIS
CVS: VENTRICULAR HYPERTROPHY	GIT: INTESTINE ULCER - TB*	L/RET: LYMPHOMA
CVS: HEART HEALED INFARCT	GIT: STRICTURE INTESTINE	SKIN – MALIGNANT MELANOMA
CVS: RHEUMATIC CARDITIS*	GUT: WILMS TUMOUR	SST: PAPILLOMA SKIN
CVS: MITRAL STENOSIS *	GUT: CARCINOMA URINARY BLADDER	SST: SQUAMOUS CELL CA
CVS: AORTIC STENOSIS *	GUT: SCC PENIS	SST: LIPOMA
CVS: BACTERIAL ENDOCARDITIS *	GUT: SEMINOMA TESTIS	BREAST FIBROADENOMA
CVS: PERICARDITIS *	GUT: TERATOMA TESTIS	BREAST – DUCTAL CARCINOMA
RS: LUNG MILIARY TB	GUT: UTERUS LEIOMYOMA	BREAST – PHYLLODES TUMOUR
RS: FIBROCASEOUS TB	GUT: ADENOMYOSIS	
RS: LOBAR / BRONCHOPNEUMONIA	GUT: ENDOMETRIAL POLYP	*OPTIONAL,IF AVAILABLE
RS: BRONCHOGENIC CARCINOMA	GUT: CERVICAL POLYP	
RS: LUNG – ABSCESS	GUT: CARCINOMA CERVIX	
RS: FIBROCASEOUS TB	GUT: CYSTADENOCARCINOMA OVARY	
RS: LUNG CVC	GUT: SHRUNKEN GRANULAR KIDNEY	
RS: METASTASIS LUNG	GUT: KIDNEY STONES	

V. REFERENCES

Text Books:

a) Robbins Pathological Basis of Disease – Kumar, Abbas & Fausto VIII Ed
b) Oxford text book of Pathology Vol. I, II & III
c) Pathology by Rubin and Farber
d) Pathology Illustrated by Reid, Roberts and Macduff

VI. THEORY AND PRACTICAL EXAMINATION

Theory – Pathology - Total 40 Marks
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Theory EXAMINATION

Exam. Category	No. of Questions	Marks
1. Essay	1 x 10 marks	10
2. Brief answers	6 x 4 marks	24
3. Very Short answers	6 x 1 marks	6

	Total	40

The above pattern is to be implemented from 2018 February Exam session onwards

Practicals – Pathology - Total 40 Marks

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Peripheral Smear		- 5 marks
Urine Examination		- 5 marks
Spotters : Hematology		-2 marks (2 slides)
	Cytology	- 2 marks (2 slides)
	Histopathology	- 6 marks (6 slides)
OSPE :	Chart (one)	- 1 marks
	Gross (2 specimen)	- 2 marks
	Blood Grouping/Hemoglobin	- 2 marks

	Total:	25 Marks

VIVA VOCE (Includes instruments)		15 Marks

OSPE chart could be prepared based on guidelines given below for problem based learning.

Guidelines to prepare Modules for Problem Based Learning

a. A brief history with clinical findings, reports of investigations done and imaging if required for that
particular case .

b. Questions on the diagnosis / differential diagnosis

c. Etiopathogenesis of the relevant lesion and / or classifications.

d. Macroscopic / morphological changes in the relevant organ systems.

e. Microscopic features: FNAC / peripheral blood smear / bone marrow / histopathology / immunohistochemistry.

f. Other laboratory investigations including molecular testing as relevant: principles and methodology of performing the tests. Differential diagnosis of the interpretations.

g. Mention the complications.

h. Prognostic factors as relevant (eg., for malignant neoplasms)

i. Significance of diagnosis and its therapeutic relevance.

Some examples are given below:

PBL – CYTOLOGY

a. A 25-year-old female presented with a thick curdy white discharge per vaginum and itching. Speculum examination showed thick discharge and congested vagina.

b. What test needs to be done to evaluate this patient.
PAP smear kit
c. What are the kits/instruments used to do the test.
– Pap smear kit
- Endocervical brush
-Ayres spatula

- Slides
- Fixatives

d. How are the smears transported
- In a Coplin jar with alcohol fixatives / spray fixatives.

f. What are the latest methods in evaluating these smears.
- Liquid-based cytology
- Thin prep

g. Place pictures of the smear from the patient with description and diagnosis: Smear shows a mixture of superficial squamous cell, intermediate cells, endocervical cells in an inflammatory background of polymorphs. Psuedohyphal forms and hyphal forms of candida are seen.

h. What are the stains used to demonstrate the organisms
– Pap stains H & E
- MGG
- Pap

i. Name a special stain which can be used to confirm the diagnosis
- PAS

j. Name two predisposing factors
- Diabetus mellitus
- Pregnancy
- OCP

k. What are the other infections that can be indentified in a cervical smear
- Trichomonas vaginalis
- Gardnerella vaginalis
- TB

l. What are clue cells
- They are seen in bacterial vaginosis and are vaginal squamous epithelial cells covered by gram negative bacilli such as Gardnerella

m. What are tadpole cells and where do you see them
- Squamous cell carcinoma cervix

n. What is the Bethesda system and its classification.
It is used to report Pap smears from the cervix or vagina. It ensures that everyone who reports these smears uses the same terminology. For example, it uses the following terms to classify abnormal squamous cells : low-grade or high-grade squamous intra-epithelial lesions (LSIL or HSIL) ; atypical squamous cells of undetermined significance (ASC-US) ; carcinoma. Terminology has also been described for other cells in the smear.

PBL NEOPLASM

A 20- year-old female presented with a solitary nodule in the left lobe of the thyroid. Imaging indentified a 1 cm cold nodule with specks of calcification. Patient later underwent total thyroidectomy with neck node dissection.

1. What is the probable diagnosis/differential diagnosis?
Hyperplastic nodule in a goitre, adenoma, papillary carcinoma

2. What are tests used to confirm the diagnosis?
FNAC, Histopathology.

3. What are the indications for FNAC thyroid?
Solitary nodule / multinodular goiter / Hashimoto thyroiditis / neoplasms

4. What is the size of the bore of the needle used for FNA of the thyroid?
23 G

5. How do you position the patient?
Patient lies down on his /her back with neck hyperextended by using a pillow beneath the neck

6. How do you fix the smears?
If H & E – alcohol
If MGG – no fixation ; air dried

7. How are the smears transported?
In Coplin jars with fixative for H & E.

8. What do you use to write the hospital / laboratory number on the slide with smear?
Diamond pencil

9. What does the FNA of a nodule with papillary carcinoma show?

- Papillary clusters with anatomical borders
- Ground-glass nuclei intranuclear inclusions.
- Psammoma bodies
- Chewing gum colloid.

10. Name 2 other conditions which show intranuclear inclusions.
    - Hyalinizing trabecular adenoma
    - Medullary carcinoma.

11. Where else do you see psammoma bodies?
Meningioma
Papillary serous cystadenocarcinoma of the ovary

12. What is a psammoma body?
Rounded, concentrically lamellated masses due to dystrophic calcification. Provides evidence of
papillary carcinoma thyroid.

13. What does the histopathology of the lesion disclose?
Papillary structures lined by cuboidal epithelium with crowded, overlapping nuclei showing nuclear grooves and intra nuclear inclusions. The papillae enclose fibrovascular cores.

14. Why is neck dissection done?

Papillary carcinoma spreads via lymphatics to the cervical nodes

15. What are the different modes of metastasis in other neoplasms Lymphatic / Blood/ Transcoelomic

16. Mention the molecular changes associated with this tumour RET /PTC rearrangements.

VII. INTERNAL ASSESSMENT (40 Marks)

Theory	– 20 Marks
Practical	– 15 Marks
Record	– 5 Marks
Total	- 40 Marks

The above sub-clause VII has been substituted in terms of syllabus and the same is as under:

VII. INTERNAL ASSESSMENT (30 Marks)

Theory	– 15 Marks
Practical	– 10 Marks
Record	– 5 Marks
Total	- 30 Marks

The following are guidelines. The topics to be assessed are as follows.

General Pathology and Haematology:

1. Inflammation and repair
2. Haemodynamic disorders
3. Infectious diseases
4. Neoplasia
5. Genetics, Immunologic disorders
6. Environmental and nutritional disorders, diseases of infancy and childhood
7. Diseases of blood, lymph nodes, spleen,thymus

Systemic Pathology:

1. Respiratory system, Cardiovascular system
2. Gastrointestinal system, Hepatobiliary system
3. Urinary system
4. Male and female genital system
5. Endocrine system
6. Musculoskeletal system and skin
7. Nervous system.

6 tests may be conducted for theory during first week of December, February, April, June, August, October followed by model exam – 2 in No. Paper I & II in December. For Practical 3 tests may be conducted in February, June, October followed by Model exam in December.

VIII MEDICAL ETHICS AND CRRI ORIENTATION

Medical ethics is included in the curriculum as part of both theory and practical syllabus.
Students to be taught basic medical ethics, create awareness and sensitized to the ethical issues involved.

CRRI orientation to be done with the following guidelines.

1. Should know the correct method of writing request for specific laboratory tests.
2. Should be trained in sample collection of blood, urine, body fluids, CSF – method of collection, anticoagulants and preservatives to be used, proper transportation to the laboratory.
3. Should know proper labelling and method of transportation of biopsy specimens with proper fixatives.
4. To be sensitized about inadequate and unsatisfactory samples for laboratory investigation and rejection criteria of such samples.

XI INTEGRATED TEACHING

From the integrated teaching of other basic sciences, student shall be able to describe the regulation and integration of the functions of the organs and systems in the body and interpret the anatomical basis of disease processes.

Topic for Integration

1. Tuberculosis - Horizontal Integration with Microbiology and Pharmacology
2. Leprosy - Horizontal Integration with Microbiology and Pharmacology
3. Diabetes Mellitus - Vertical integration with Anatomy, Physiology, Microbiology, Pharmacology, Medicine
4. Myocardial Infarction - Vertical Integration with Anatomy, Physiology, Pharmacology, Medicine

Note: The above are examples and suggestions. Other topics may be included by individual institutions

RECORD

Record should be followed as recommended by the University

FORENSIC MEDICINE

FORENSIC MEDICINE PRESCRIBED TEACHING HOURS – 100 Hrs.
(INCLUDING MEDICAL JURISPRUDENCE AND TOXICOLOGY)

GOAL :

The Broad Goal of teaching undergraduate students the subject of Forensic Medicine and Toxicology is to :

1. Impart Knowledge about Medical, Legal and Medicolegal responsibilities of a physician.
2. Create awareness of laws in relation to Medical Practice.
3. Impart knowledge of Medical Ethics and Ettiquette to be followed during Medical Practice.
4. Create ability to develop observation skills in Medicolegal cases.
5. Develop logical thinking to set enquiries on possible track on Medicolegal issues.

SPECIFIC LEARNING OBJECTIVES :

(A) KNOWLEDGE

***At the end of the course the student shall be* :**

1. Able to identify and deal with all Medicolegal cases
2. Able to know the procedure of examination of a Medicolegal case and be aware about the procedure of collection of the requisite evidential materials.
3. Aware about the prevelant law and legal procedures and be able to appear in a court of law as a Registered Medical Practioner and give evidence in cases of Homicide, Assault, Sexual offences, Alcoholic intoxication, Drug dependence and other cases requiring medical opinion
4. Aware about the procedure of preparation of Medicolegal reports.
5. Practice medicine in the society following medical ethics and etiquette as prescribed by the Indian Medical Council.

(B) SKILL

***At the end of the course a student must be* :**

1. Able to conduct a proper Medicolegal examination, document and report in all Medicolegal cases.
2. Able to conduct the Medicolegal Autopsy
3. Able to examine, document and preserve evidence in sexual offence cases
4. Able to diagonise and treat cases of poisoning.
5. Able to examine, document and report in cases of drunkenness
6. Able to collect, preserve and dispatch specimens and relevant materials to the concerned centers in Medicolegal cases.
7. Prepare Medical record and reports
8. Able to properly depose evidence in a court of law.
9. Competent to issue all Medical and Medicolegal certificates.

(C) INTEGRATION

Identification Forensic Osteology	Anatomy	Vertical Integration
Age Estimation	Radiology and Dentistry	Vertical Integration
Clincial Forensic Medicine	OBG, Orthopaedics, Radiology, EMD	Vertical Integration
Toxicology	Bio-chemistry, Pharmocology, Internal Medicine, EMD	Vertical Integration & Horizontal Integration
Thanatology	Pathology, Microbiology	Horizontal Integration

TEACHING HOURS – THEORY

Introduction History of Forensic Medicine, Ethics, Medical Jurisprudence, legal Proceedure	08 hours
Identification	07 hours
Thanatology, PM changes, Medicolegal Autopsy, Exhumation	09 hours
Injuries - Mechanical, Thermal, Physical Agents, Radiation, Firearms, RTA and Regional Injuries	12 hours
Asphyxial deaths	06 hours
Anasthetic and Operative deaths	01 hours
Sexual Jurisprudence - Impotence, Sterility, AI, Virginity, Pregnancy, Delivery, Abortion, MTP act, ART, Sexual offences	10 hours
Infanticide, Child Abuse	02 hours
Toxicology	12 hours
Psychiatry	05 hours
FSL, Trace Evidence, Artifacts, Blood Stains & body fluids	03 hours
TOTAL	**75 Hours**

TEACHING HOURS – PRACTICALS

Estimation of Age by a. Physical and Dental examination b. Radiological Examination	04 hours
Thanatology	04 hours
Injuries	04 hours
Asphyxial Deaths	02 hours
Infanticide	01 hours
Sexual Jurisprudenace	04 hours
Toxicology	06 hours
TOTAL	**25 hours**

TEACHING METHODOLOGY

Legal Procedures, Ethics, Medical Jurisprudence	1
Identification	1,2,3
Thanatology	1,2,3,4
Injuries	1,2,3,4
Asphyxial deaths	1,2
Anaesthetic and Operative Deaths	1
Sexual Jurisprudence	1,2,3
Infanticide	1.2
Toxicology	1,2,3,4
Psychiatry	1,2,3
FSL, Blood stains, Biological fluids	1,4

1 : DIDATIC LECTURES

2 : STUDENT SEMINARS

3 : SMALL GROUP TEACHING

4 : HANDS ON TRAINING

SYLLABUS

FORENSIC MEDICINE-INCLUDING MEDICAL JURISPRUDENCE AND TOXICOLOGY

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1. MEDICAL JURISPRUDENCE

Legal Procedure : Inquests, Subpoena, Conduct money, Procedure of Criminal trial, Record of evidence, Types of evidence, Medical evidence, Types of witness.

2. MEDICAL ETHICS AND LAW

Laws governing medical profession :
Indian Medical Council and State Medical Council organisations, functions, and powers
Rights and privileges of Registered Medical Practitioner. Infamous Conduct. Professional Negligence (malpractice)

3. DUTIES OF MEDICAL PRACTITIONER

Doctrine of Resipsa Loquitor, Contributory Negligence, Vicarious responsibility, Consent, Euthanasia.

4. IDENTIFICATION

Definition and data to establish identity.
Race, Religion, Sex, Age, Stature, complexion and features, external peculiarities, anthroprometry, dactylography, and poroscopy, Superimposition Technique
Forensic odontology. Medico-legal importance of Age and Sex.

5. THANATOLOGY (DEATH)

Types of death. Modes of death and their patho-physiology, Causes of death,
Classification and medico-legal aspects of natural death

6. POST MORTEM CHANGES

Signs of death. Changes following death and their medico-legal importance
Adipocere, Mummification, Embalming
Estimation of Post mortem Interval (time of death)
Presumption of death and survivorship.

7. MEDICO-LEGAL AUTOPSY

Protocol, Technique, Postmortem report.
Examination of set of bones.
Exhumation.

8. MECHANICAL INJURIES (WOUNDS).

Classification and mechanism of wound production
Abrasions, Contusions, Incised wounds, Chop wounds, Stab wounds and Lacerated wounds and their medico-legal Importance,
Firearms classification and cartridges.
Firearm wounds by different firearms and their medico-legal importance
Bomb Explosion Wounds.
Regional injuries on the body and Medico-legal importance.
Medico- legal aspects of wounds – Issue of medico – legal certificates for legal purposes.
Homicide & types of homicide.
Simple and Grievous injuries – causes of death from wounds

9. DEATH DUE TO COLD, HEAT, ELECTRICITY AND RADIATION

10. VIOLENT ASPHYXIAL DEATHS

Classification - Hanging, Strangulation by ligature Throttling, Smothering, Gagging, Overlaying, Burking, Choking, Drowning and Sexual asphyxia

11. ANAESTHETIC AND OPERATIVE DEATHS.

12. IMPOTENCE AND STERILITY

Definition, causes, and medico-legal importance.
Sterilization and Artificial insemination and their medico-legal importance.

13. VIRGINITY, PREGNANCY AND DELIVERY

Definition, diagnosis and medico-legal importance,
Pseudocyesis, Super fecundation, Superfoetation,
Legitimacy, Paternity and their medico-legal importance.

14. ABORTION

Definition, classification, methods of procuring abortion,
Diagnosis and evidences of abortion, medico-legal questions arising in suspected cases of abortion. Medical Termination of Pregnancy Act.

15. INFANTICIDE

Definition, still birth, dead birth and live birth
Signs of live birth and autopsy in suspected case of infanticide
Causes of death and medico-legal importance.
Abandoning of infants, Concealment of birth, Battered baby syndrome, Cot death.

16. SEXUAL OFFENCES

Classification
Rape – definition, examination of victim and the accused – Incest,
Unnatural sexual offences, types and their medico-legal importance.
Sexual Perversion – types and their medico-legal importance – Indecent assault.
Examination of seminal fluid.

17. TOXICOLOGY

General consideration - Law on poisons, classification of poisons.
Diagnosis of poisoning in the living and dead.
Duties of the Registered medical practitioner in suspected case of poisoning.
General principles of treatment of poisoning

Corrosive poisons, Non-metallic poisons, Insecticides and weed killers, Metallic poison, Organic irritant poison, someferous poisons, Inebriants, Deliriants, spinal poisons, food poisoning, cardiac poisons, Asphyxiants, war gases Curare, Conium. Drug dependence and Addiction.

18. FORENSIC PSYCHIATRY

Delusion, Hallucination, Illusion, Impulse, Obsession, Delirium, Lucid interval Classification of unsoundness of mind and medico – legal aspects.
Restraint of Insane.

19. EXAMINATION OF BLOOD STAINS AND HAIR AND SUSPECTED BIOLOGICAL AND FIBRES STAINS.

20. ORGANISATION OF FORENSIC SCIENCE LABORATORY

Locard’s principle; Lie detection, Narcoanalysis, Hypnosis.

PRACTICAL SYLLABUS

1. Medicolegal Autopsy
2. Autopsy on a decomposed dead body and mutilated bodies
3. Examination of Skeletal remains
4. Identification – Radiological, Physical and dental examination
5. Examination of a medical witness in the court
6. Conduct and duties of doctor in the witness box
7. Examination of Photographs and opinion
8. Examination of victims in sexual offence cases
9. Examination of accused in sexual offence cases
10. Foetal examination
11. Infanticide,
12. Preparation and issual of death certificates
13. Examination of specimen of Pathological and Forensic Significance
14. Examination of Weapons
15. Examination of Toxicology specimens, Plants and Seeds
16. Viscera packing
17. Examination of blood stains, hair, seminal stains etc.,

REFERENCE BOOKS

The essentials of Forensic Medicine and Toxicology - Dr. K.S. Narayan Reddy

Principles of Forensic Medicine and Toxicology - Dr. Apurba Nandy

Text book of Medical Jurisprudence and Toxicology - Dr. C.K. Parik

Modi's medical Jurisprudence and Toxicology - Dr. C.A. Franklin

Medico Legal Post Mortem in India Published - Dr. C.K. Parik

Forensic Medicine - Dr. Keith Simpson

Text Book of Forensic Medicine - Dr. V.V. Pillay

Lyons Medical Jurisprudence and Toxicology - Dr. Dogra

Text Book of Forensic Medicine Toxicology - Dr. R.N. Karmarkar

Principles of Forensic Medicine and Toxicology - Dr. Rajesh Bardale

Theory EXAMINATION

Exam. Category	**No. of Questions**	**Marks**
1. Essay	1 x 10 marks	10
2. Brief answers	6 x 4 marks	24
3. Very Short answers	6 x 1 marks	6

	Total	40

The above pattern is to be implemented from 2018 February Exam session onwards

PRACTICAL EXAMINATION PATTERN

1. Examination of Skeletal Remains
   or
   Estimation of Age by Radiological Examination
   or
   Estimation of Age by physical and Dental Examination = 05 marks

2. Examination of a case of Drunkennes
   or
   Examination of Injured person and issual of Wound Certificates = 05 marks

3. Examination of a of Victim / Assailant in case of sexual offence = 03 marks

4. Examination of Foetus = 03 marks

5. Issual of Medical Certificate

   (Birth/Death/Physical Fitness / Medical Leave) = 03 marks

6. Interpretation of Autopsy Findings and opining on cause of deaths and time since death = 03 marks

7. SPOTTERS (5 NOS) = 05 marks

   a. Forensic Specimen
   b. Toxicology : Plant
   c. Toxicology : Seed
   d. Weapon
   e. Photograph

8. OSPE – 3 Stations = 03 marks

   a. Viscera Packing
   b. DNA Sampling
   c. Correlation of weapon/object with injury

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30 Marks

VIVA VOCE EXAMINATION PATTERN

MAX MARKS : 10

STATION	MARKS	TOPICS
EXAMINER 1	2.5	• MEDICAL JURISPRUDENCE • MEDICAL ETHICS & LAW • IDENTIFICATION • THANATOLOGY • PM CHANGES, MEDICOLEGAL AUTOPSY
EXAMINER 2	2.5	• MECHANICAL INJURIES • THERMAL INJURIES • DEATHS DUE TO ELECTRICITY, RADIATION • ASPHYXIAL DEATHS • ANAESTHETIC & OPERATIVE DEATHS
EXAMINER 3	2.5	• IMPOTENCE, STERILITY • VIRGINITY, PREGNANCY, DELIVERY • ABORTION, MTP ACT, INFANTICIDE • SEXUAL OFFENCES • FORENSIC PSYCHIATRY
EXAMINER 4	2.5	• TOXICOLOGY • FSL • EXAMINATION OF BLOOD, BIOLOGICAL STAINS, HAIR, FIBRE

INTERNAL ASSESMENTS PATTERN

FIVE INTERNAL ASSESMENT EXAMS MUST BE CONDUCTED DURING THE ACADEMIC YEARS AS DETAILED UNDER.

	SCHEDULED DURING	**UNIT / TOPICS**	**MARKS TO REACH UNIVERSITY BY**
IAE 1	JANUARY	• MEDICAL JURISPRUDENCE • MEDICAL ETHICS & LAW • IDENTIFICATION • THANATOLOGY, PM CHANGES	FEBRUARY
IAE 2	APRIL	• MEDICOLEGAL AUTOPSY • MECHANICAL INJURIES • THERMAL INJURIES • DEATHS DUE TO ELECTRICITY, RADIATION	MAY
IAE 3	JULY	• ASPHYXIAL DEATHS • ANAESTHETIC & OPERATIVE DEATHS • IMPOTENCE, STERILITY • VIRGINITY, PREGNANCY, DELIVERY • ABORTION, MTP ACT, INFANTICIDE	AUGUST
IAE 4	OCTOBER	• SEXUAL OFFENCES • FORENSIC PSYCHIATRY • TOXICOLOGY	NOVEMBER
IAE 5 / MODEL EXAM	DECEMBER	ALL TOPICS	JANUARY

STUDENTS SHALL MAINTAIN A RECORD / LOG BOOK IN WHICH HE / SHE RECORDS THE DETAILED PROCEDURES OF THE PRACTICAL EXERCISES PERFORMED / OBSERVED BY THEM INCLUDING TEN MEDICOLEGAL AUTOPSIES WITNESSED BY THEM IN THE MORTUARY. THIS RECORD / LOG BOOK WILL BE CHECKED PERIODICALLY BY THE FACULTY.

INTERNAL ASSESSMENT : 20 MARKS

{THEORY 10 + PRACTICAL 5 + RECORD 5}

CRRI ORIENTATION

EVERY CRRI WILL PARTICIPATE IN A ONE DAY ORIENTATION PROGRAM / WORKSHOP ORGANISED BY THE DEPARTMENT OF FORENSIC MEDICINE WHERE HE WILL BE TAUGHT ABOUT

- ETHICS & ETIQUETTE IN CLINICAL PRACTICE
- CONFIDENTIALITY IN CLINICAL PRACTICE
- LEGAL ASPECTS OF MEDICAL PRACTICE

FURTHER EVERY CRRI POSTED IN THE CASUALTY UNDER THE DEPARTMENT OF FORENSIC MEDICINE WILL UNDERGO TRAINING ABOUT

- IDENTIFICATION OF MEDICOLEGAL CASE
- APPROACH TOWARDS A MEDICOLEGAL CASE IN A HOSPITAL SET UP / DURING CLINICAL PRACTICE
- PREPARING & SUBMITTING RELEVANT DOCUMENTS / REPORTS RELATED

TO MEDICOLEGAL CASES

- CONFIDENTIALITY OF RECORDS & MAINTAINACE OF CHAIN OF CUSTODY
- DIAGNOSIS & MANAGEMENT OF CASES OF POISONING
- IDENTIFY & MANAGE CASES RELATED TO SEXUAL OFFENCES
- COLLECTION & PRESERVATION OF EVIDENTIAL MATERIALS
- CERTIFICATION / DECLARATION OF DEATH
- CONDUCTION OF MEDICOLEGAL AUTOPSY

RECORD:

Record should be followed as recommended by the University

	TOPIC	MUST KNOW	DESIRABLE TO KNOW	NICE TO KNOW
1	**INTRODUCTION & HISTORY OF FORENSIC MEDICINE**		*	
2	**LEGAL PROCEDURE**			
	INTRODUCTION TO LEGAL TERMINOLOGIES	*		
	INQUEST	*		
	COURTS OF LAW & THEIR POWERS	*		
	NHRC & OTHER AGENCIES		*	
	COURT PROCEEDINGS	*		
	SUBPOENA OR SUMMONS	*		
	CONDUCT MONEY	*		
	WITNESSES	*		
	RECORDING OF EVIDENCE	*		
	DYING DECLARATION	*		
	CONDUCT AND DUTIES OF THE DOCTOR IN THE WITNESS BOX	*		
	INVESTIGATION OF THE SCENE OF DEATH			*
	PROCEDURE OF CRIMINAL TRIAL		*	
	WORKMANS COMPENSATION ACT, ESI ACT, ORS		*	
3	**MEDICAL LAW AND ETHICS**			
	THE INDIAN MEDICAL COUNCIL ACT 1956 ; FUNCTIONS & POWERS OF MEDICAL COUNCILS	*		

	OATH OF HIPPOCRATES, DECLARATION OF GENEVA	*		
	DUTIES OF MEDICAL PRACTITIONERS	*		
	PROFESSIONAL SECRECY	*		
	PRIVILEGED COMMUNICATION	*		
	PRIVILEGES AND RIGHTS OF THE PATIENTS	*		
	INFAMOUS CONDUCT	*		
	PROFESSIONAL NEGLIGENCE (MALPRAXIS)	*		
	THE DOCTINE OF RES IPSA LOQUTTUR	*		
	NOVUS ACTUS INTERVENIENS	*		
	MEDICAL NEGLIGENCE PREVENTION	*		
	SUPREME COURT OF INDIA GUIDELINES ON MEDICAL NEGLIGENCE		*	
	THERAPEUTIC MISADVENTURE	*		
	VICARIOUS LIABILITY	*		
	PRODUCTS LIABILITY	*		
	MEDICAL INDEMNITY INSURANCE		*	
	MEDICAL RECORDS (M.R)	*		
	CONSENT IN MEDICAL PRACTICE	*		
	EUTHANASIA (MERCY KILLING)		*	
	RED CROSS EMBLEM			*
	CONSUMER PROTECTION ACT	*		

4	**IDENTIFICATION**			
	THE CORPUS DELICTI		*	
	IDENTIFICATION IN LIVING & DEAD	*		
	SKELETAL REMAINS EXAMINATION	*		
	ESTIMATION OF AGE BY PHYSICAL, DENTAL & RADIOLOGICAL EXAMINATION	*		
	MEDICOLEGAL IMPORTANCE OF AGE	*		
	ANTHROPOMETRY	*		
	DACTYLOGRAPHY	*		
	SKULL PHOTO SUPERIMPOSITION		*	
	FORENSIC ODONTOLOGY		*	
	BITE MARKS			*
5	**THANATOLOGY**			
	TYPES, MODE, MOMENT, MANNER & CAUSE OF DEATH	*		
	MEDICAL CERTIFICATE OF CAUSE OF DEATH	*		
	BRAIN DEATH	*		
	TISSUE AND ORGAN TRANSPLANTATION		*	
	SUDDEN DEATH	*		
	POSTMORTEM CHANGES	*		
6	**MEDICOLEGAL AUTOPSY**			
	ETHICS OF MEDICOLEGAL AUTOPSY & RESPECT TOWARDS CADAVER	*		

	PROTOCOL, OBJECTIVES, TECHNIQUE OF AUTOPSY	*		
	PREPERATION OF AUTOPSY REPORT	*		
	PSYCHOLOGICAL AUTOPSY		*	
	VIRTUAL AUTOPSY (VIRTOPSY)			*
	ENDOSCOPIC TECHNIQUE OF POSTMORTEM DIAGNOSIS			*
	AUTOPSY OF CASES OF AIDS AND OTHER INFECTIONS		*	
	THE AUTOPSY AND DISPOSAL OF RADIOACTIVE CORPSE			*
	NHRC RECOMMENDATION ON AUTOPSY	*		
	PRESERVATION & DESPATCH OF VISCERA IN CASES OF SUSPECTED POISONING	*		
	LABORATORY PROCEDURES			*
	AUTOPSY OF DECOMPOSED BODIES	*		
	EXAMINATION OF MUTILATED BODIES OR FRAGMENTS		*	
	EXHUMATION	*		
	SECOND AUTOPSY		*	
	NEGATIVE AUTOPSY, OBSCURE AUTOPSY	*		
	EMBALMING		*	
	ESTIMATION OF POSTMORTEM INTERVAL	*		
	RADIOACTIVE CARBON			*
	PRESUMPTION OF DEATH		*	
	PRESUMPTION OF SURVIVORSHIP		*	

	ROLE OF A FORENSIC EXPERT IN A CASE OF MASS DISASTER			*
7	**MECHANICAL INJURIES**			
	CLASSIFICATION OF INJURIES	*		
	MECHANISM OF WOUND PRODUCTION	*		
	ABRASIONS, CONTUSIONS, INCISED WOUNDS, CHOP WOUNDS, STAB WOUNDS AND LACERATED WOUNDS AND THEIR MEDICO-LEGAL IMPORTANCE	*		
	INJURIES CAUSED BY FIRE ARMS	*		
	FORENSIC BALLISTICS, BOMB EXPLOSION		*	
	THERMAL INJURIES	*		
	INJURIES CAUSED BY PHYSICAL AGENTS	*		
	WOUND CERTIFICATION	*		
8	**REGIONAL & TRANSPORTATION INJURIES**	*		
9	**MEDICOLEGAL ASPECTS OF WOUNDS**			
	SIMPLE & GRIEVOUS HURT	*		
	CAUSES OF DEATH FROM WOUNDS	*		
	DOWRY DEATHS		*	
	TORTURE			*
	DEATH IN CUSTODY			*
10	**STARVATION**			*
11	**MECHANICAL ASPHYXIA**			

	CLASSIFICATION	*		
	PATHOPHYSIOLOGY OF ASPHYXIAL DEATH	*		
	AUTOPSY FINDINGS IN ASPHYXIAL DEATHS	*		
	JUDICIAL HANGING			*
	DISSECTION OF NECK & HYOID BONE FRACTURES	*		
	DROWNING	*		
	DIATOMS		*	
	SEXUAL ASPHYXIAS			*
12	**ANAESTHETIC AND OPERATIVE DEATHS**		*	
13	**IMPOTENCE AND STERILITY**			
	DEFINITION, CAUSES & MEDICOLEGAL IMPORTANCE	*		
	STERILISATION	*		
	ARTIFICIAL INSEMINATION		*	
	ASSISTED REPRODUCTIVE TECHNIQUE (ART)		*	
	SURROGATE MOTHERHOOD		*	
	CLONING			*
14	**VIRGINITY, PREGNANCY AND DELIVERY**			
	DEFINITION & MEDICOLEGAL IMPORTANCE	*		
	DIAGNOSIS OF PREGNANCY	*		
	SIGNS OF DELIVERY IN LIVING & DEAD	*		

	SUPERFOETATION & SUPERFOECUNDATION		*	
	LEGITIMACY		*	
	DISPUTED PATERNITY		*	
15	**ABORTION**			
	DEFINITION, CLASSIFICATION	*		
	METHODS OF PROCURING ABORTION	*		
	DIAGNOSIS & EVIDENCES OF ABORTION IN LIVING & DEAD	*		
	THE MEDICAL TERMINATION OF PREGNANCY ACT 1971	*		
16	**INFANT DEATHS**			
	DEFINITION & SIGNS OF LIVE BIRTH	*		
	VIABILITY	*		
	STILL BIRTH, DEAD BORN	*		
	BATTERED BABY SYNDROME OR NON ACCIDENTAL INJURY OF CHILDHOOD	*		
	MUNCHAUSEN'S SYNDROME		*	
	SUDDEN INFANT DEATH SYNDROME	*		
	CONCEALMENT OF BIRTH	*		
	ABANDONMENT			*
	FETAL AUTOPSY		*	
17	**SEXUAL OFFENCES**			
	CLASSIFICATION	*		

	DEFINITION OF RAPE	*		
	CLINICAL EXAMINATION OF THE VICTIM & ACCUSED IN CASES OF SEXUAL ASSAULT	*		
	EVIDENTIAL MATERIAL COLLECTION IN CASES OF SEXUAL ASSAULT	*		
	EXAMINATION OF ACCUSED FOR POTENCY	*		
	TYPES & MEDICOLEGAL ASPECTS OF UNNATURAL SEXUAL OFFENCES		*	
	TYPES & MEDICOLEGAL ASPECTS OF SEXUAL PERVERSIONS		*	
	CERTIFICATION IN CASES OF SEXUAL OFFENCES	*		
	INDECENT ASSAULT		*	
18	**EXAMINATION OF BLOOD STAINS & BIOLOGICAL MATERIAL**			
	SUBSTANCES RESEMBLING BLOOD STAINS	*		
	BLOOD GROUPS IN TISSUES	*		
	CHEMICAL EXAMINATION		*	
	MICROSCOPIC EXAMINATION		*	
	MICROCHEMICAL EXAMINATION		*	
	SPECTROSCOPIC EXAMINATION		*	
	SEROLOGICAL EXAMINATION		*	
	DNA FINGERPRINTING		*	
	BIOLOGICAL SAMPLES ENCOUNTERED IN FORENSIC PRACTICE : COLLECTION, PRESERVATION & EXAMINATION		*	
	EXAMINATION OF HAIR		*	
19	**ARTEFACTS**			*

20	**FORENSIC SCIENCE LABORATORY**			
	LOCARD'S PRINCIPLE		*	
	POLYGRAPHY		*	
	NARCO ANALYSIS		*	
	BRAIN MAPPING		*	
21	**FORENSIC PSYCHIATRY**			
	WHO CLASSIFICATION PSYCHIATRIC DISORDERS		*	
	CLINICAL & MEDICOLEGAL ASPECTS OF PSYCHIATRIC DISORDERS	*		
	LEGAL ASPECTS OF PSYCHIATRIC DISORDERS	*		
	McNAUGHTANS RULE, Sec 84 Ipc & ORS	*		
	LUCID INTERVAL	*		
	RESTRAINT OF THE MENTALLY ILL PERSON	*		
	THE MENTAL HEALTH ACT 1987		*	
	FEIGNED INSANITY		*	
22	**TOXICOLOGY**			
	GENERAL CONSIDERATIONS	*		
	THE LAW ON POISONS			*
	CLASSIFICATION	*		
	IDENTIFICATION OF POISONOUS PLANTS, SEEDS & ANNIMALS	*		
	DIAGNOSIS OF POISONING IN LIVING & DEAD	*		

	ANALYTICAL TOXICOLOGY : TLC, HPLC, GC & UVS		*	
	DUTIES OF A MEDICAL PRACTITIONER IN A CASE OF SUSPECTED POISONING	*		
	GENERAL PRINCIPLES OF TREATMENT OF POISONING	*		
	PRESERVATION & DESPATCH OF EVIDENTIAL MATERIALS IN CASES OF SUSPECTED POISONING	*		
	SIGNS, SYMPTOMS, TREATMENT, AUTOPSY FINDINGS & MEDICOLEGAL ASPECTS IN CASES OF CORROSIVE POISONS	*		
	SIGNS, SYMPTOMS, TREATMENT, AUTOPSY FINDINGS & MEDICOLEGAL ASPECTS IN CASES OF METALLIC POISONS	*		
	SIGNS, SYMPTOMS, TREATMENT, AUTOPSY FINDINGS & MEDICOLEGAL ASPECTS IN CASES OF NON METALLIC POISONS	*		
	SIGNS, SYMPTOMS, TREATMENT, AUTOPSY FINDINGS & MEDICOLEGAL ASPECTS IN CASES OF PLANT & ANNIMAL POISONS	*		
	SIGNS, SYMPTOMS, TREATMENT, AUTOPSY FINDINGS & MEDICOLEGAL ASPECTS IN CASES OF AGRICULTURAL POISONS	*		
	SIGNS, SYMPTOMS, TREATMENT, AUTOPSY FINDINGS & MEDICOLEGAL ASPECTS IN CASES OF POISONS ACTING ON CARDIOVASCULAR SYSTEM	*		
	SIGNS, SYMPTOMS, TREATMENT, AUTOPSY FINDINGS & MEDICOLEGAL ASPECTS IN CASES OF POISONS ACTING ON NERVOUS SYSTEM INCLUDING SPINAL CORD	*		
	SIGNS, SYMPTOMS, TREATMENT, AUTOPSY FINDINGS & MEDICOLEGAL ASPECTS IN CASES OF INNEBRIANT POISONS AND CERTIFICATION OF DRUNKENNESS	*		
	SIGNS, SYMPTOMS, TREATMENT, AUTOPSY FINDINGS & MEDICOLEGAL ASPECTS IN CASES OF POISONS ACTING ON RESPIRATORY SYSTEM	*		
	FOOD POISONING : BACTERIAL, VIRAL, CHEMICAL & MUSHROOM		*	
	DRUG DEPENDANCE		*	

	DOMESTIC & HOUSEHOLD POISONS		*	
	THERAPEUTIC DRUGS TOXICITY		*	
	OCCUPATIONAL & ENVIRONMENTAL TOXICOLOGY			*

This Syllabus and Curriculum is applicable for the Second MBBS Students admitted from the academic year 2015-2016 and appearing for the Examination from February 2018 session onwards