



D. Y. Patil University

Pharmacology and Pharmacotherapeutics

1. Goal

The broad goal of teaching pharmacology to undergraduate students is to inculcate in them a rational and scientific basis of therapeutics.

2. Educational objectives

(a) Knowledge

At the end of the course, the student shall be able to -

- i. Describe the pharmacokinetics and pharmacodynamics of essential and commonly used drugs
- ii. List the indications, contraindications, interactions and adverse reactions of commonly used drugs
- iii. Indicate the use of appropriate drug in a particular disease with consideration of its cost, efficacy and safety for –
 - individual needs, and
 - mass therapy under national health programmes
- iv. Describe the pharmacokinetic basis, clinical presentation, diagnosis and management of common poisonings
- v. Integrate the list the drugs of addiction and recommend the management
- vi. Classify environmental and occupational pollutants and state the management issues
- vii. Explain pharmacological basis of prescribing drugs in special medical situations such as pregnancy, lactation, infancy and old age
- viii. Explain the concept of rational drug therapy in clinical pharmacology
- ix. State the principles underlying the concept of 'Essential Drugs'
- x. Evaluate the ethics and modalities involved in the development and introduction of new drugs

(b) Skills

At the end of the course, the student shall be able to -

- i. prescribe drugs for common ailments
- ii. identify adverse reactions and interactions of commonly used drugs
- iii. interpret the data of experiments designed for the study of effects of drugs and bioassays which are observed during the study
- iv. scan information on common pharmaceutical preparations and critically evaluate drug formulations
- v. be well-versed with the principles of pharmacy and dispense the medications giving proper instructions



(c) Integration

Practical knowledge of rational use of drugs in clinical practice will be acquired through integrated teaching vertically with pre-clinical & clinical subjects and horizontally with other para-clinical subjects.

3. Total duration of para-clinical teaching	3 Semesters (III,IV,V)
	Total 360 teaching days
Total number of teaching hours allotted to Pharmacology	300 hours

4. Syllabus

A) Learning methods

Lectures, tutorials, Practicals
Distribution of teaching hours

i) *Theory*

• Lectures	109 + 5
• Tutorials	17 + 5
Total	126 + 10

ii) Practicals	120 + 5
iii) Revision & Evaluation (Internal Assessment)	60

B) Sequential organisation of contents & their division

a) **INTRODUCTION:** Pharmacology - a foundation to clinical practice (N=1)
Development of the branch of pharmacology; Scope of the subject; role of drugs as one of the modalities to treat diseases,
Definition of drug;
Nature and sources of drugs;
Subdivisions of pharmacology
Rational pharmacotherapy



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b) GENERAL PHARMACOLOGY:	(N=7 ± 2)
Pharmacokinetics: Absorption, Distribution, Biotransformation, Elimination	
Pharmacodynamics: Principles of Drug Action, Mechanisms of drug action	(n=3)
Receptors (Nature, Types, Theories, Principles, Regulation)	(n=1)
Application to pharmacotherapeutics: Relevance of Pharmacokinetics and dynamics in clinical practice, Sequale of repeated administration of drug	(n=2)
Adverse Drug Reactions	(n=1)
New Drug delivery system, New Drug development (Bioassay & animal studies are minimized as part of NDD)	
c) AUTONOMIC PHARMACOLOGY:	(N= 8 ± 2)
General Considerations	(n=1)
Adrenergic agonists	(n=1)
Adrenergic antagonists I: β-blockers	(n=1)
Adrenergic antagonists II: β-blockers	(n=1)
Cholinergic agonists	(n=1)
Anticholinesterases	(n=1)
Antimuscarinic drugs	(n=1)
Skeletal muscle relaxants	(n=1)
d) CARDIOVASCULAR SYSEM INCLUDING DRUGS AFFECTING COAGULATION and those acting on kidneys:	(N=14 ± 2)
General Considerations and Overview of antihypertensive therapy;	
Diuretics	(n=2)
Angiotensin Converting Enzyme (ACE) inhibitors	(n=1)
Sympatholytics & vasodilators	(n=1)
<i>Management of hypertension</i>	
Antianginal: Nitrates & others	(n=1)
Calcium channel blockers	(n=1)
<i>Pharmacotherapy of chest pain</i>	
Anticoagulants & Coagulants	
Thrombolytics & Antiplatelet Agents	(n=2)
Drugs for CCF: Digitalis glycosides, Others agents	(n=2)
<i>Management of CCF</i>	
Antiarrhythmic Agents	(n=1)
Agents used for the management of shock	(n=1)
Hypolipidaemic drugs	(n=1)
Role of Nitric oxide and endothelin to be covered in CVSDK



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- e) HAEMATINICS AND HAEMATOPOIETIC FACTORS:** (N=1)
Agents used in therapy of iron deficiency anaemia and megaloblastic anaemia;
Erythropoietin,
GM-CSF (n=1)

Management of anaemia

- f) NEUROPSYCHIATRIC PHARMACOLOGY INCLUDING INFLAMMATON, PAIN & SUBSTANCE ABUSE (N=15 ± 2)**
General Considerations (n=1)
Sedative-Hypnotics (n=2)
Psychopharmacology: Antianxiety; Antipsychotics; Antidepressants (n=3)
Antiepileptics (n=2)
Therapy of neurodegenerative disorders:
Anti-Parkinsonian agents; cerebral vasodilators/nootropics (n=1)
Local anaesthetics (n=1)
Analgesics: Opioids; NSAIDs (n=3)

*Pharmacotherapy of pain including migraine
Pharmacotherapy of rheumatoid arthritis and gout*

- Substance abuse: Management of opioid, alcohol and tobacco addictions (n=1)

- g) MISCELLANEOUS TOPICS - I: (N=6 ± 2)**
Autocoids (to be covered before pain lectures) (n=1)
Antiallergics: Antihistaminics (n=1)
Drugs used for bronchial asthma (n=1)

Pharmacotherapy of cough

- Drugs acting on immune system:
Immunostimulants, immunosuppressants; pharmacology of vaccines & sera (n=1)
Drugs acting on the uterus (n=1)
Pharmacovigilance and ADR-form filling & Monitoring (n=1)

- h) CHEMOTHERAPY INCLUDING CANCER CHEMOTHERAPY: (N=22 ± 2)**
General considerations (n=1)
Antimicrobial agents: (n=7)
• Sulphonamides & Cotrimoxazole
• Quinoline derivatives
• Penicillins, Cephalosporins & Other β Lactams



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- Aminoglycosides
- Macrolides
- Tetracyclines & Chloramphenicol

Pharmacotherapy of UTI

General principles of Antimicrobial use (n=1)

Antimycobacterial therapy: Anti-Kochs agents; Anti-leprotic agents (n=3)

Pharmacotherapy of tuberculosis

Antiprotozoal agents:

Antiamoebic, Antimalarials and Anti Kala azar (n=3)

Pharmacotherapy of malaria

Anthelmintics (n=1)

(against intestinal Nematodes and Cestodes; extra intestinal Nematodes and Trematodes)

Antifungal agents (n=1)

Antiviral agents including antiretroviral agents (n=2)

Pharmacotherapy of STDs (n=1)

Principles of cancer chemotherapy and their adverse drug reactions (n=1)

(Individual agents and regimes need not be taught)

i) ENDOCRINOLOGY: (N=12 ± 2)

Introduction to endocrinology

(Including Hypothalamic and Anterior Pituitary hormones) (n=1)

Steroids (n=2)

Glucocorticoids: Use and Misuse

Oestrogens & antagonists (n=1)

Progestins & antagonists (n=1)

Oral contraceptives & profertility agents (n=1)

Testosterone & anabolic steroids (n=1)

Fertility control

Thyroxine and antithyroid agents (n=2)

Agents affecting calcification (n=1)

Antidiabetic agents: Insulin; Oral antidiabetic drugs (n=2)

Pharmacotherapy of Diabetes Mellitus

j) AGENTS USED IN GASTROINTESTINAL DISORDERS: (N=2)

Pharmacotherapy of nausea & vomiting (n=1)

Pharmacotherapy of peptic ulcer (n=1)



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Management of dyspepsia

Management of diarrhoea and constipation

k) PERIOPERATIVE Management: to be covered as a case study

Preanaesthetic medication

Preparation of surgical site: antiseptics etc.

Local Anaesthetics

Skeletal muscle relaxants

Drugs used in post-operative period: analgesics, antiemetics etc.

l) MISCELLANEOUS TOPICS – II

(N=5-7)

Drug-Drug Interactions

(n=1)

Drug use at extremes of age, in pregnancy & in organ dysfunction

(n=2)

Use of chelating agents in heavy metal poisonings; Environmental & occupational toxicants and principles of management (particularly cyanide and CO)

(n=1)

Ocular pharmacology

(n=1)

Dermatopharmacology

(n=1)

Pharmacotherapy of glaucoma and conjunctivitis

m) RATIONAL PHARMACOTHERAPY:

(N=4)

Prescription writing and P-drug concept

Rational Drug Use; Essential Drug List (EDL)

Criticism with reference to Fixed Drug Combinations (FDCs)

Use and misuse of commonly used preparations: vitamins, antioxidants, enzymes etc.

C) Term-wise distribution

III term

Section B

General Pharmacology including drug interactions

Drugs used in pregnancy, at extremes of age & in organ dysfunction

Gastro intestinal system

Section C

Autonomic nervous system and skeletal muscle relaxants

Glaucoma

Respiratory System with Histaminics, Antihistaminics



IV term

Section B

Blood
Diuretics &
Cardiovascular system

Section C

Central nervous system
Parkinsonism, Autocoids,
Endocrinology 1-Pituitary, Thyroid, Diabetes

V term

Endocrinology and Chemotherapy with miscellaneous would be taught during V term but examination will be preliminary as per university examination pattern.

D) Practicals: Total hours, number & contents

Total hours: 120
Number: 18

Contents:

I term practicals

(N=7)

Introduction to Practical Pharmacology, Prescription Writing, Pharmacokinetics I, Routes of Administration: Oral, Routes of Administration: Topical, Routes of Administration: Parenteral, Pharmacokinetics II: Applied Pharmacokinetics

II term practicals

(N=7)

Pharmacodynamics I (Isolated Tissue, Cat NM junction), Pharmacodynamics II (Dog: BP and Respiration), Screening Techniques for New Drugs, Adverse Drug Reactions, Rational Pharmacotherapy I, Rational Pharmacotherapy II, Sources of Drug Information including scrutiny of Promotional Literature

V term practicals

(N=4)

Case Study 1, Case Study 2
Revision Practicals (n=2)



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e. Books recommended:

1. Basic & Clinical Pharmacology. Katzung BG (Ed), Publisher: Prentice Hall International Ltd., London.
2. Pharmacology & Pharmacotherapeutics. Satoskar RS, Bhandarkar SD (Ed), Publisher: Popular Prakashan, Bombay.
3. Essentials of Medical Pharmacology. Tripathi KD (Ed), Jaypee Brothers, publisher: Medical Publishers (P) Ltd.
4. Clinical Pharmacology. Laurence DR, Bennet PN, Brown MJ (Ed). Publisher: Churchill Livingstone
5. Pharmacology Book by H. L. Sharma

Reference books:

1. Goodman & Gilman's The Pharmacological Basis of Therapeutics. Hardman JG & Limbird LE (Ed), Publisher: McGraw-Hill, New York.
2. A Textbook of Clinical Pharmacology. Roger HJ, Spector RG, Trounce JR (Ed), Publisher: Hodder and Stoughton Publishers.

5. Evaluation

a. Methods

Theory, Practical & viva

b. Pattern of Theory Examination including Distribution of Marks, Questions & Time

Nature of Question Paper

- i) Total duration -6 hrs (each paper of 3 hrs or 180 minutes)
- ii) Each paper of 3 sections
- iii) Pattern and marking for each paper of 60 marks

Sections	Nature of Questions	Total No. of Questions	Mark (s) per Question	Total Marks
A)	Multiple Choice Questions (MCQs)	10	1	10
B)	Short Note B1	3 out of 4	5	15
	LAQ B2	1 out of 2	10	10
C)	Short Note B1	3 out of 4	5	15
	LAQ B2	1 out of 2	10	10
Total				60

c. Topic distribution

PHARMACOLOGY-PAPER I

Section B-

General Pharmacology including drug -drug interactions and
New Drug Delivery systems and new drug development



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Drug use at extremes of age, in pregnancy & in organ dysfunction;
Pharmacovigilance;
Autonomic Nervous System and skeletal muscle relaxants;

Section C-

Glaucoma and Ocular pharmacology
Haematinics Agents
Cardiovascular System including drugs affecting Coagulation and those acting on the Kidneys;
Gastro-Intestinal Disorders;

PHARMACOLOGY- PAPER II

Section B-

Neuro-Psychiatric Pharmacology including Antiinflammatory-Analgesics and Addiction & its management; Pharmacology in Surgery (particularly peri-operative management);
Allergy - Histaminics & Antihistaminics including anti-vertigo; Anti Asthmatics;
Anti-tussive agents
Diagnostic & Chelating agents
Vitamins

Section C-

Chemotherapy including Cancer Chemotherapy;
Endocrinology including Drug Acting on uterus
Dermatology;
Immunomodulators Gene Therapy
Vaccines & sera;
Environmental & Occupational Pollutants;

d. Nature of practicals and duration

Practical Heads	Marks 40
1. Prescription writing	8 Marks
Long	(5)
Short	(3)
2. Criticism	12 Marks
Prescription & rewriting	(6)
Fixed dose formulation	(6)
3. Clinical Pharmacy	10 Marks
dosage forms, label information and instructions	(5)
routes of administration in the form of OSPE	(5)



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4. Spots

10 Marks

- Experimental Pharmacology – Graphs, Models for evaluation, Identification of a drug, Interpretation of data (2 Spots)
- Human Pharmacodynamics - Drug Identification – urine analysis, eye chart, - Subjective / objective effects of a drug (2 Spots)
- Therapeutic problems based on pharmaceutical factors - Outdated tablet, Bioavailability, Dosage form, Ethics and Sources of drug information (2 Spots)
- Recognition of ADRs & interaction of commonly used drugs (2 Spots)
- Recent advances and rational pharmacotherapy. (2 Spots)

From **each** of the five groups (a, b, c, d, e), **two spot** should be kept to answer the number of questions based on respective spot. **Each** spot to carry **1 mark** amounting to a total of **10 marks** for spotting.

Time distribution:

For prescription and criticism, the time given will be ½ hour.

For clinical pharmacy practical viva will be taken on pre-formed preparations and/or marketed formulations. The students may be asked to write labels and instructions to be given to the patients or demonstrate how specific dosage forms are administered and state the precautions to be taken/ explained to the patients while using them. The time for this will be 5 min.

For spots 20 min will be given (2 min per spot).

Thus the total time for the practical examination will be approximately 2 hour.

e. Viva: duration and topic distribution

Viva	20 marks
Duration	10 mins
Four examiners	5 mins with each candidate
Two examiners	for topics of paper I - systems to be distributed
Two examiners	for topics of paper II - systems to be distributed
At each table marks will be given out of 10.	
- 20 marks of viva to be added in theory marks in university exams.	

f. Plan for internal assessment

The time-table for internal assessment will be as follows:

III term

1st midterm: After 60 teaching days in the form of viva-voice

1st term ending: After 120 teaching days (Theory and Practicals)



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IV term

2nd midterm: After 60 days of 2nd term in the form of viva-voice

2nd term ending: At the end of 2nd term (Theory and Practicals)

For each mid-term examination total marks will be 50.

Term Ending

The term ending examination will be of 50 marks theory consisting of one paper with duration of 2 hours.

This will be followed by practical of 40 marks (total time 1½ hours).

Term Ending Theory Paper – III & IV term

Sections	Nature of Questions	Total No. of Questions	Mark (s) per Question	Total Marks
A)	Multiple Choice Questions (MCQs)	10	1	10
B)	Short Note B1	2 out of 3	5	10
	LAQ B2	1 out of 2	10	10
C)	Short Note B1	2 out of 3	5	10
	LAQ B2	1 out of 2	10	10
Total				50

Term Ending Practical

Sections	Question	Marks	Total
A	Table-Work	3+2	5
B	Spots	5	5
C	Pharmacy Tray	5	5
D	OSPE	5	5
E	Viva-I	10	10
F	Viva-II	10	10
Total			40 Marks

V term

Prelims examination on the basis of University pattern -Theory, Practicals and Viva

(Minimum 4 weeks gap mandatory between Preliminary and University examinations)

Preliminary Examination would be of 120 marks theory consisting of two paper 60 marks each with duration of 3 hours and Practical of 60 marks. The pattern would be similar to University Examination Pattern.

Internal Assessment

Internal Assessment would be of 20 Marks.

50% would be passing – 10 and

35% would be for eligibility to appear in University Exam-7

Distribution of Marks has been divided as follows-



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- a. Theory Marks – total 220 marks (50+50+120) will be reduced to out of 10
- b. Practical Marks- total 140 marks (40+40+60) will be reduced to out of 7
- c. Departmental performance during the whole IInd MBBS will be assessed for 3 marks of Internal Assessment. Headings in which it would be done are following-
 - i) Seminar
 - ii) Attendance
 - iii) Internal Exams and Tests
 - iv) Journal
 - v) Over all behaviour, attitude and punctuality throughout IInd MBBS.

Standard of Passing (Theory/Practical/Internal Assessment)

The student must secure 50% marks in Internal Assessment also. However, even if the student secures minimum 35% marks, he/she will be allowed to appear for University Examination subject to compensating 15% marks more than minimum 50% in the concerned subject.

In University Exam the division of marks would be as follows-

Subject Name	Maximum Marks	Minimum Marks
Pharmacology		
Theory	120	
Oral Viva	20	
Theory + Oral viva	140	70
Int-Theory	10	
Int-Practical	10	
Internal Assessment	20	7/20
Practical Exam	40	20



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Curricula for II M.B.B.S. (Subject-wise)

- Phase II- (3 semesters consisting of Para-Clinical/Clinical subjects. During this phase teaching of Para-Clinical & Clinical subjects shall be done concurrently. The Para-Clinical subjects shall consist of Pathology, Pharmacology, Microbiology, Forensic Medicine including Toxicology and Part of Community Medicine.)
- Out of the time for Para-Clinical teaching approximately equal time be allotted to Pathology, Pharmacology, Microbiology, Forensic Medicine and Community Medicine combined ($\frac{1}{3}$ Forensic Medicine & $\frac{2}{3}$ Community Medicine)

Pathology

1. Goal

The goal of teaching pathology is to provide undergraduate students comprehensive knowledge of the causes and mechanisms of disease, in order to enable them to achieve complete understanding of the natural history and clinical manifestations of the disease.

2. Educational objectives

(a) Knowledge

At the end of one and half years, the student shall be able to -

- i. Describe the structure and ultra structure of a sick cell, the mechanisms of the cell degradation, cell death and repair.
- ii. Correlate structural and functional alterations in the sick cell.
- iii. Explain the Patho physiological processes which governs the maintenance of homeostasis, mechanism of their disturbances and the morphological and clinical manifestation associated with it.
- iv. Describe the mechanisms and patterns of tissue response to injury to appreciate the Pathophysiology of disease processes and their clinical manifestations.
- v. Correlate the gross and microscopic alterations of different organ systems in common diseases to the extent needed to understand disease processes and their clinical significance.
- vi. Develop an understanding of neoplastic change in the body in order to appreciate need for early diagnosis and further management of neoplasia.
- vii. Understand mechanisms of common haematological disorders and develop a logical approach in their diagnosis and management.



(b) Skills

At the end of one and half years, the student shall be able to -

- i. Describe the rationale and principles of technical procedures of diagnostic laboratory tests.
- ii. Interpret diagnostic laboratory tests and correlate with clinical and morphological features of diseases.
- iii. Perform simple bedside tests on blood, urine and other biological fluid samples.
- iv. Draw a rational scheme of investigations aimed at diagnosing and managing common disorders.
- v. Recognise morbid anatomical and histopathological changes for the diagnosis of common disorders.

(c) Integration

At the end of one and half years, the student shall be able to integrate the causes and mechanisms of disease most prevalent in India with their natural history for the understanding of their clinical course and management.

3. Total duration of teaching

3 Semesters (III, IV and V)
Minimum 315 working days.

Total number of teaching hours allotted to the discipline

300 hrs

Distribution of teaching hours

A) Theory (lectures & tutorials)	101 58
Total	159
B) Practicals	110
C) Revision & Evaluation (Internal)	31

4. Syllabus

I. Learning methods

Distribution of teaching hours

DIVISIONS	A) LECTURES(n)	B) TUTORIALS (n)	C) PRACTICALS (n)
	(1 hr)	(2 hrs)	(2 ½ hrs)
1. General Pathology	35	07	12
2. Haematology	15	04	07
3. Systemic Pathology	47	13	18
4. Clinical Pathology	03	04	05
5. Autopsy	01	01	02
TOTAL	101	29x2	44x2.5



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II. Sequential organization of course contents

The Broad area of study shall be:-

- General Pathology (including general neoplasia)
- Systemic Pathology (including systemic neoplasia)
- Haematology/ Blood Transfusion
- Clinical Pathology

A) GENERAL PATHOLOGY: (n=35)

1. Definitions and causes of diseases:-
Must know: - Able to recall common definitions in Pathology and causes of cell injury.
2. Modes of cell injury:-
Must know: - Able to appreciate mechanisms of cell injury & relate them to the morphological changes.
3. Necrosis & gangrene:-
Must know: - Able to recognize types of necrosis and gangrene at gross and microscopic levels.
Must know: - Apoptosis and its relevance.
4. Intracellular accumulations and alterations:-
Must know:- Able to list the types of intracellular accumulations & alterations in reversible cell injury along with alterations in cell organelles and cytoskeleton.
5. Cellular Adaptations/ Growth disturbances:-
Must know:- Define the various growth disturbances and appreciate the clinical significance of each.
6. Acute inflammation:-
Must know: - Define and describe changes occurring in acute inflammation and integrate the changes with morphological patterns of injury.
7. Chemical mediators of Inflammation:-
Must know:- Definition, Classification, description of each type, role of acute chronic inflammation.
8. Chronic inflammation (including granulomatous):-
Must know:- differentiate it from acute inflammation, describe aetiology, patterns and systemic effects of granulomas.
9. Regeneration and repair (general):-
Must know:- Define & describe regeneration and repair and understand the mechanisms and list factors modifying repair.



10. Repair in specialized tissues:-
Must know:- Describe repair in fractures and parenchymal organs and list modifying factors and complications.
11. Oedema: -
Must know: - Define oedema, classify and describe pathogenesis & correlate morphology with clinical significance with emphasis on transudate and exudate.
12. Shock: -
Must know: - Define, classify and understand pathogenesis, recognize the of mediators and stages of shock.
13. Thrombosis: -
Must know:- Describe etio-pathogenesis, fate, morphology and effects of thrombosis.
14. Embolism and Infarction:-
Must know: - Enumerate types of embolism and infarction, recognize morphological changes and correlate clinical significance.
15. Hyperaemia and Haemorrhage:-
Must know: - Definitions, morphology of acute and chronic congestions, clinical significance of haemorrhage.
16. Disturbances of pigment metabolism:-
Must know: - State the type of pigment disturbances and describe the changes associated with common disturbances like lipofuscin, melanin, Hemosiderin and Bilirubin.
17. Disturbances of Mineral metabolism:-
Must know: - Describe the types and morphological changes of calcification.
Desirable to know: - Disturbances of other minerals like zinc etc.
18. Genetic disorders: -
Must know: - Normal karyotype, classification of genetic disorders, types of genetic change, Down's syndrome, Klinefelter's syndrome, Turner's syndrome
Desirable to know: - Lysosomal storage disorders, glycogen storage diseases, methods of disease diagnosis.
19. Hypersensitivity reactions: -
Must know: - Classify, differentiate between different types of Hypersensitivity reactions.
Desirable to know: - Be conversant with transplant rejections.



20. Autoimmune diseases:-
Must know: - Understand mechanisms of autoimmunity and diagnose common autoimmune diseases; overview of SLE.
21. Amyloidosis:-
Must know: - Definition, physical characters, chemical characters, classification, pathogenesis morphology, clinical correlation and lab diagnosis.
22. AIDS:-
Must know:- Understand the natural history of the disease and recommend relevant investigations in the management.
23. Typhoid fever:-
Must know:- Correlate Pathogenesis with morphology and clinical features of the disease.
24. Syphilis:-
Must know:- Classify and describe lesions in various stages of syphilis
- 25,26,27 (3 lectures) Tuberculosis:-
Must know:- Appreciate the importance of tuberculosis in the present day Context, its Pathogenesis & basic histopathology. List and describe the various pulmonary lesions of tuberculosis. Describe changes in various organs in TB and understand their functional correlation, sequelae, lab diagnosis and TB in AIDS.
28. Leprosy:-
Must know:- Classify, differentiate between different types of leprosy and describe the diagnostic histologic features and sequelae.
29. Fungal diseases:-
Desirable to know:- Classification and be conversant with relevance of fungal diseases in the world with emphasis on opportunistic fungal infections.
30. Malaria:-
Must know:- Identify, morphological features in vivax and falciparum malaria and recommend lab investigations in the management. Dengue, Chikungunya, Swine flu.
- 31 & 32. Neoplasia - Nomenclature and classification:-
Must know:- Define important terms, classify and differentiate benign from malignant neoplasms.
Desirable to know: Precancerous conditions
33. Neoplasia - Carcinogenesis:-
Must know:- Understand carcinogenesis and analyse the mechanism of genetic changes in carcinogenesis.



34. Neoplasia - Biology and Lab diagnosis:-
Must know:- Understand the tumour host interactions in neoplasia and recommend the diagnostic workup for detection of cancer.
35. Neoplasia - Spread, grading and staging:-
Must know:- Biology of tumour growth, metastases, types, mechanisms, clinical correlations, grading of cancer and staging of cancer.

B) HAEMATOLOGY : (n=15)

1. Introduction to haematology and hemopoiesis:-
Must know:- Understand the importance of haematology in clinical practice and enumerate the stages of hemopoiesis.
2. Anaemias (general):-
Must know:- Definition, classify anaemia by various methods, clinical features and lab approach to anaemias.
3. Iron deficiency anaemia:-
Must know:- Definition, causes, haematological features, morbid anatomical features, laboratory diagnosis and differential diagnosis.
4. Megaloblastic anaemia:-
Must know:- Definition, causes, haematological features, morbid anatomical features, laboratory diagnosis and differential diagnosis.
5. Haemolytic anaemia:-
Must know:- Definition, classification, Pathogenesis and haematological features.
6. Haemoglobinopathies:-
Must know:- Definition, classification, Lab diagnosis of Thalassaemia and Sickle cell anaemia.
- 7&8. Haemorrhagic disorders:-
Must know:- Classify haemorrhagic disorders, describe clinical distinction between Purpuras and Coagulation disorders and laboratory screening tests for haemorrhagic disorders. Normal coagulation and fibrinolytic mechanism. Describe etio-pathogenesis, clinical significance and lab diagnosis of haemophilia and DIC. Describe etio-pathogenesis, morphological features (haematological and morbid anatomical) clinical significance and lab diagnosis of ITP.
9. Leukocytic disorders:-
Must know:- Leukocytosis, Leukopenia and Leukemoid reactions.



10. Acute Leukaemias:-
Must know:- Classify and differentiate different types of acute Leukaemias.
11. Chronic Leukaemias:-
Must know:- Definition, general features, classification, aetiology, haematological change, morbid anatomy, clinical course and lab. investigations. Myelodysplasia , Myeloproliferative D (Desirable to know)
12. Paraproteinemia:-
Must know:- Understand the relevance of paraproteinemia's and integrate the various diagnostic modalities with the diagnosis, multiple myeloma.
13. Aplastic Anaemias:-
Desirable to know:- Aplastic anaemias and Agranulocytosis.
14. Blood groups:-
Must know:- Appreciate the relevance of blood groups in haematology and transfusion medicine. Erythroblastosis foetalis
15. Blood Transfusion:-
Must know:- Indications, selection of blood donors, autologous transfusions, complications of blood transfusions, investigation of suspected transfusion reactions, Component Therapy

C) SYSTEMIC PATHOLOGY : (n=46)

1. Atherosclerosis:-
Must know:- Definition, etiopathogenesis, gross and microscopic description, complications and clinical correlation.
2. Hypertension:-
Must know:- Relate the mechanisms of the disease to the clinical course and sequelae.
3. Other diseases of blood vessels:-
Must know:- Develop an index of suspicion for vasculitides and aneurysms.
4. Ischaemic heart disease:-
Must know:- Incidence, risk factors, Pathogenesis, morphological changes, clinical course, complications and investigations including MI
5. Congenital heart disease:-
Desirable to know:- Correlate the anatomical malformations of disorders to the clinical consequences of the disease.



6. Rheumatic heart disease:-
Must know:- Incidence, etiopathogenesis, morbid anatomy, histopathology, lesions in the organs, clinical course and sequelae.
7. Endocardial and pericardial diseases:-
Must know:- Infective endocarditis - Pathogenesis, morphology, differential diagnosis of cardiac vegetations, aetiology and basic morphology of different forms of pericarditis.
8. Cardiomyopathies:-
Desirable to know:- Recognize the disorders as part of differential diagnosis in primary myocardial diseases.
9. Pneumonias:-
Must know:- Aetiology, classification, gross, histopathological description in different forms and complications.
10. Lung Abscess and Bronchiectasis:-
Must know:- Etiopathogenesis, morphological appearances and complications.
11. Chronic Bronchitis and Emphysema:- Bronchiectasis, Br. Asthma (COPD)
Must know:- Pathogenesis, types of emphysema, definition of chronic bronchitis, morbid anatomy and cardiac sequelae.
12. Occupational lung diseases:-
Must know:- Types, etiopathogenesis, gross anatomical differences between different forms and sequelae.
13. Tumours of lung and pleura:-
Must know:- Classification, aetiology, gross appearances, histological description of important forms, natural history, pattern of spread, Para neoplastic syndromes and secondary Pathology.
14. Lesions of oral cavity and salivary glands:-
Must know:- Differential diagnosis of swelling of salivary glands, oral cancer - etiopathogenesis, gross and histopathological descriptions.
15. Gastritis and Peptic Ulcer:-
Must know:- Definition of peptic ulcer, etiological factors, gross and microscopic appearances and sequelae.
Desirable to know:- Overview of aetiology and types of gastritis.



16. Ulcers of Intestines:-
Must know: - Etiological classifications, Morphological appearances of typhoid, tubercular, amoebic ulcers and bacillary dysentery. Differential diagnosis of different forms of ulcers.
17. Idiopathic Inflammatory Bowel disease:-
Must know:- Enumerate similarities and differences between the two component disorders viz., Crohn's disease and ulcerative colitis.
18. Tumours of upper GIT:-
Must know:- Etiopathogenesis, morphological features of carcinoma oesophagus, classification and morbid anatomy and histopathology of gastric carcinomas.
Desirable to know:- Overview of carcinoid tumours of GIT.
19. Tumours of lower GIT:-
Must know:- Pathology of carcinoma colon.
Desirable to know:- Intestinal polyps & GI stromal tumours.
20. Viral Hepatitis:-
Must know:- Aetiology, clinical source and enzymology, salient histological features and sequelae.
21. Alcoholic liver disease:-
Must know:- Pathogenesis, morphological manifestations and correlation with clinical features.
22. Cirrhosis:-
Must know:- Etiopathogenesis, classification, important histological features and differential diagnosis.
23. Tumours of liver, Pancreas and gall bladder:-
Must know: - Pathology of Hepatocellular carcinoma.
Must know: - Pathology of tumours of Pancreas and gall bladder and Gall bladder Stones
24. Diabetes mellitus:-
Must know: - Classification, pathogenesis of system involvement, sequelae and complications.
25. Acute nephritis and rapidly progressive GN:-
Must know:- Understand and integrate clinical and pathologic features of these syndromes.



26. Nephrotic syndrome:-
Must know:- Integrate clinical and pathological features of this disorder.
27. Renal failure:-
Must know:- Definitions, criteria, aetiology, systemic manifestations and investigations.
28. Pyelonephritis and interstitial Nephritis:-
Must know:- Aetiology, Pathogenesis of Pyelonephritis acute and chronic morphological features and clinical correlation.
- 28A. Obstructive uropathy: -
Must know: - Types of kidney stones, Pathogenesis and complications.
29. Tumours of kidney and Pelvis:-
Must know:- Classification, Morphological features, clinical course including Para neoplastic syndromes of common tumours.
30. Male Genitel System :- Cryptorchidism, Infections & torsion
Must know:- Classification, salient morphological features of most common tumours and clinical course. Male Genitel System – Lesions of penis + Tumors
31. Tumours of Cervix and Uterus:-
Must know:- Etiopathogenesis, salient morphological features, dysplasia and role of cytological screening.
32. Tumours of Ovary and trophoblastic tissue:-
Must know:- Classification and morphological description of important types.
33. Non-neoplastic and Neoplastic lesions of the breast:-
Must know:- Classification, morphological features and grading of carcinoma breast and differential diagnosis of breast swellings.
34. Non-neoplastic lesions of lymph nodes and Spleen:-
Must know:- Aetiology, differential diagnosis, morphological features of common causes of lymphadenopathy, common causes and appearances of splenomegaly.
35. Hodgkin's Lymphoma:-
Must know:- Definition, classification, salient diagnostic features and clinical course.
36. Non-Hodgkin's Lymphoma:-
Must know:- Definition, classification, salient diagnostic features and clinical Correlation.
Desirable to know:- Extra nodal lymphomas.



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37. Tumours of skin - Non-pigmented:- Lesions of skin – Psoriasis, Lichen Planus
Must know:- Classification, morphological features of most common types and natural history.
38. Tumours of skin – Pigmented & Non Pigmented staging :-
Must know:- Classification, morphological features
- 39 & 40. Soft tissue tumours :-
Must know:- Classification, morphological features of lipomatous, fibrous and blood vessel tumours. Morphological features of neural, muscle and fibro histiocytic tumours.
41. Non-neoplastic lesions of bone and joints:-
Must know:- Etiopathogenesis and morphological changes of OA/RA and osteomyelitis.
- 42 & 43. Tumours of bone, cartilage and joints:-
Must know:- Classification, radiological and pathological features of important bone tumours (Osteosarcoma, Osteochondroma, GCT and Ewing's sarcoma).
44. Inflammatory and neoplastic conditions of CNS:-
Must know:- Morphological features and differential diagnosis of meningitis.
Desirable to know:- Classification, morphological features of important CNS tumours, clinical course and sequelae (Meningioma and Astrocytome).
45. Lesions of Thyroid:- / Tumors of thyroid
Must know:- Differential diagnosis of thyroid nodule ,Goiter
46. Myopathies:-
Desirable to know:- Differential diagnosis of common muscle disorders.
47. Molecular Diagnosis
48. Flow Cytometry
49. Recent Advances in Blood Bank
50. Thyroid Function tests
51. Immuno-histochemistry
- Interdepartmental Seminars – leptospirosis, Chikungunya, Swineflu, Dengue, Tuberculosis

D) CLINICAL PATHOLOGY: (n=3)

1. Differential diagnosis of Jaundice:- LFT.
Must know:- The differential diagnosis and laboratory investigations in jaundice



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2. Renal function tests:-
Must know:- Laboratory approach to a case of renal dysfunction
3. Diabetes mellitus:-
Must know:- Laboratory diagnosis of Diabetes mellitus

TUTORIALS-

GENERAL PATHOLOGY:

1. Cell injury and cell death
2. Cellular accumulations
3. Inflammation and repair
4. Circulatory disturbances
5. Immunological disorders
6. Infections
7. Neoplasia

HAEMATOLOGY:

1. Anaemias
2. Leukaemias
3. Interpretation of haematological case charts and identification of instruments
4. Haemorrhagic disorders

SYSTEMIC PATHOLOGY:

1. Atherosclerosis and IHD
2. Rheumatic heart disease
3. Pneumonias
4. Tumours of lung
5. Oral cancer
6. Peptic Ulcer
7. Cirrhosis
8. Glomerulonephritis
9. Carcinoma Breast
10. Carcinoma Cervix
11. Bone Tumours
12. Revision of Specimens

CLINICAL PATHOLOGY:

1. Glucose Tolerance Test
2. Renal Function Tests
3. Differential Diagnosis of Meningitis
4. Identification of needles and instruments used in clinical pathology



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5. Molecular Diagnosis - D
6. Flow Cytometry- D
7. TFT
8. CSF Analysis
9. Pregnancy test
10. Semen Analysis
11. Cell counter Routine, Histogram. Tutorials

III. Term-wise distribution

1st term: 1. General Pathology 2. General Neoplasia 3. Haematology & Transfusion Medicine

2nd term: 1. Systemic Pathology 2. Systemic Neoplasia 3. Clinical Pathology

3rd term: System Path + Tutorials + Revision

IV. Practicals: Total hours, number & contents

Total hours: 110

Number: 44

Contents :

A) GENERAL PATHOLOGY: (n=12)

1. Microscopy and tissue processing
2. Identify the common types of cells by light microscopy
3. Intracellular accumulation
4. Acute inflammation
5. Chronic inflammation and Repair
6. Thrombosis, embolism, infarction and gangrene
7. Oedema and congestion
8. Disturbances of pigment metabolism
9. Tuberculosis
10. Leprosy
11. Amyloidosis
12. Disturbances of growth (Atrophy, hypertrophy, hyperplasia, metaplasia, Dysplasia, hypoplasia)

B) HAEMATOLOGY: (n=7)

1. Collection of specimen, anticoagulants and common haematological tests (Hb)
2. Common Haematological Counts (TLC, DLC) & Interpretation of ESR/ PCV
3. Haemopoiesis
4. Investigations in Anaemia
5. Investigations in Leukaemia
6. Investigations in haemorrhagic disorders – BT CT D-PT
7. Blood Banking - Grouping



C) SYSTEMIC PATHOLOGY: (n=18)

1. Diseases of blood vessels (Atherosclerosis, syphilitic aortitis)
2. Diseases of Heart (IHD & RHD)
3. Pneumonias
4. Tumours of lung - Squamous cell
5. Diseases of kidney
6. Gross and Microscopic features of peptic ulcer and duodenal ulcer
7. Gross and Microscopic features of other intestinal ulcers
8. Tumours of GIT
9. Diseases of Liver
10. Lymphomas
11. Diseases of male and female genital system
- 12 & 13. Tumours of breast
14. Tumours of skin (Pigmented)
15. Tumours of skin (non-pigmented)
16. Soft tissue tumours
17. Tumours of bone
18. Diseases of thyroid

D) CLINICAL PATHOLOGY: (n=5)

1. Urine RE - Carryout a bedside routine urine examination and interpret the results.
2. Pregnancy test and Semen Analysis - (Practical demonstration).
3. Common cytological preparations (lecture demonstration).
4. CSF examination.
5. Serous effusion examination.

E) AUTOPSY: (n=2)

1 & 2) To study and describe five autopsy reports.

CPC of common diseases like 1. Tuberculosis 2. Myocardial infarction 3. Carcinoma/sarcoma
4. Hypertension by students (2 or 3), RHD, dM, Liver Cirrhosis, HIV

List of Slides and Specimens that should be shown during the Pathology Practical Classes

These are grouped under two headings: The students

- 1) must see (M)
- 2) desirable to see (D)

Please note that this will be applicable for the batch which will be joining Pathology term in August 2012 and later.



DRAWING SLIDES:

HISTOPATHOLOGY:

1. Kidney cloudy change (M)
2. Fatty change liver (M)
3. Uterus - leiomyoma with hyaline change (M)
4. Kidney - amyloid (M)
5. Lymph node - caseous necrosis (M)
6. Kidney - infarct (Coagulation necrosis) (M)
7. Acute ulcerative appendicitis (M) GIT
8. Pyogenic meningitis (M)
9. Lepromatous leprosy - skin (M)
10. Tuberculoid leprosy - skin (M)
11. Actinomycosis (M)
12. Granulation tissue (M)
13. Ileum - typhoid ulcer (M) GIT
14. Tuberculous lymphadenitis (M)
15. Amoebic colitis (M) GIT
16. Lung - haemosiderin pigment or CPC (M)
17. Liver - CPC (M)
18. Artery - recent / organised thrombus (M)
19. Hashimoto's thyroiditis (D)
20. Skin - papilloma (M)
21. Squamous cell carcinoma (M) GIT
22. Adenocarcinoma - Colon (M) GIT
23. Lymph node - metastasis (M)
24. Skin - capillary haemangioma (M)
25. Cavernous haemangioma (M)
26. Benign cystic teratoma (Dermoid cyst) (M)
27. Stomach - chronic peptic ulcer (M)
28. Liver- portal and biliary cirrhosis (M)
29. Lung - lobar and broncho pneumonia (M)
30. Lung - fibrocaceous tuberculosis (M)
31. Heart - healed infarct (M)
32. Aorta - atherosclerosis (M)
33. Kidney - chronic glomerulonephritis (M)
34. Kidney - chronic pyelonephritis (M)
35. Kidney - RCC (D)
36. Benign prostatic hyperplasia (M)



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37. Testis - seminoma (M)
38. Uterus - leiomyoma (M)
39. Products of conception (M)
40. Hodgkin's lymphoma (M)
41. Brain - tuberculous meningitis (M)
42. Brain - meningioma (D)
43. Bone - osteogenic sarcoma (M)
44. Bone - osteoclastoma (M)
45. Breast - fibroadenoma (M)
46. Breast - carcinoma (M)
47. Thyroid - colloid goitre (D)
48. Thyroid - papillary carcinoma (M)
49. Skin - basal cell carcinoma (M)
50. Lipoma (M)
51. Neurofibroma (M)
52. Neurilemmoma (M)
53. Pleomorphic Adenoma (M)
54. Rhinosporidiosis (M)
55. Seminoma (M)
56. Actinomyces (M)
57. Pyogenic & TB (M)

HAEMATOLOGY:

1. Acute blast cell leukaemia (M)
2. Chronic myeloid leukaemia (M)
3. Eosinophilia (M)
4. Iron deficiency anaemia (M)
5. Haemolytic anaemia (M)
6. Macrocytic anaemia (M)
7. Leucocytosis (M)
8. Various biochemical charts - LFT, GTT, CSF, etc (M)
9. M.M.

LIST OF SPECIMEN:

1. Cell injury and adaptation (Degeneration)
 - a) Liver - fatty change (M)
 - b) Aorta - atheroma (M)
 - c) Atheroma with calcification (D)
 - d) Kidney stones (M)



2. Amyloidosis
 - a) Kidney - amyloidosis (M)
 - b) Spleen - amyloidosis (M)
3. Necrosis and Gangrene
 - a) Spleen - infarct (M)
 - b) Intestine - gangrene (M)
 - c) Foot - gangrene (M)
 - d) Lymph node - caseation (M)
4. Acute inflammation
 - a) Lobar pneumonia (M)
 - b) Kidney - abscess (D)
 - c) Liver - abscess (D)
 - d) Mycetoma - foot (D)
 - e) Acute appendicitis (M)
 - f) Purulent meningitis (M)
 - g) Fibrinous pericarditis (M)
5. Chronic inflammation
 - a) T.B.- LN
6. Repair
 - a) Heart - healed infarct (M)
7. Specific inflammation
 - a) Ileum - typhoid (M)
 - b) Amoebic colitis (M)
 - c) Amoebic liver abscess (M)
8. Chronic specific granulomatous inflammation
 - a) Intestine - TB ulcer (M)
 - b) Brain - TB meningitis (M)
 - c) Lymph node - TB (M)
 - d) Lung - miliary TB (M)
 - e) Fibrocaceous TB (M)
9. Pigment disorders
 - a). Liver and spleen - Prussian blue reaction (D)
 - b). Liver and spleen - malaria (M)
 - c). Skin - melanoma (any site) (M)
10. Disorders of vascular flow and shock
 - a). Liver - CPC (M)
 - b). Lung - CPC (M)



11. Thrombosis embolism and infarction
 - a) Thrombus - artery / vein (M)
 - b) Infarction - kidney / spleen / brain (M)
 - c) Intestine gangrene (M)
12. Immunopathology
 - a) Heart - Rheumatic carditis (M)
 - b) Kidney - acute glomerulo nephritis (M)
13. Growth disorders
 - a) Heart - LVH (M)
 - b) Kidney - Hydronephrosis (M)
14. Neoplasm
 - a) Papilloma skin (M)
 - b) Adenomatous polyp (M)
 - c) Fibroadenoma - breast (M)
 - d) Squamous cell carcinoma - skin (M)
 - e) Adenocarcinoma - colon (M)
 - f) Metastasis - lung (M)
 - g) Leiomyoma - uterus (M)
 - h) Soft tissue - lipoma (M)
 - j) Haemangioma - any site / type (M)
 - k) Melanoma (M)
 - l) Dermoid cyst (M)
 - m) Teratoma (M)
15. Alimentary System
 - a) Oesophagus carcinoma (M)
 - b) Stomach - chronic peptic ulcer (M)
 - c) Perforated peptic ulcer (M)
 - d) Stomach - carcinoma (linitis plastica) (M)
 - e) Intestine - TB ulcer (M)
 - f) Colon - Amoebic colitis / bacillary colitis / carcinoma ulcerative / carcinoma polypoidal growth (M)
16. Liver
 - a) Acute diffuse necrosis (D)
 - b) Amoebic abscess (M)
 - c) Micronodular / macronodular / mixed cirrhosis (M)
 - d) Hepatoma (M)
 - e) Metastasis (M)



17. Respiratory system
 - a) Lung - lobar / bronchopneumonia (M)
 - b) Bronchogenic carcinoma (M)
 - c) Lung - abscess (D)
 - d) Fibrocaceous TB (M)
18. Cardiovascular System
 - a). Rheumatic endocarditis (D)
 - b) Fibrinous pericarditis (M)
 - c) Mitral stenosis (M)
 - d) Aortic stenosis (M)
 - e) Bacterial endocarditis (M)
 - f) Recent myocardial infarct (D)
 - g) Healed myocardial infarct (M)
 - h) Atheroma aorta (M)
 - j) Atheroma with complications (M)
19. Urinary System
 - a) Shrunken granular kidney (M)
 - b) Acute pyelonephritis (M)
 - c) RCC (D)
 - d) Wilm's tumour (D)
20. Male Reproductive System
 - a) SCC - penis (M)
 - b) Seminoma - testis (M)
 - c) Teratoma - testis (M)
 - d) Benign prostatic hyperplasia (M)
21. Female Reproductive System
 - a) Uterus - leiomyoma (M)
 - b) Carcinoma cervix (D)
 - c) Ovary - cyst adenocarcinoma (D)
 - d) Ovary - dermoid cyst (D)
21. Lymphoreticular System
 - a) Lymph node - TB Lymphadenitis (M)
 - b) Lymph node - lymphoma (M)
 - c) Spleen - infarct (M)
22. Central Nervous System
 - a) Brain - purulent meningitis (M)
 - b) Brain - tuberculous meningitis (M)
 - c) Tuberculoma (D)



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- d) Meningioma (D)
- e) Glioma (D)
- f) Haemorrhage - CVA (D)
- 23. Bone lesions
 - a) Chronic osteomyelitis (D)
 - b) Osteoclastoma (M)
 - c) Osteogenic sarcoma (M)
- 24. Skin lesions
 - a) Squamous cell carcinoma (M)
 - b) Basal cell carcinoma (M)
 - c) Melanoma - skin (any site) (M)
- 25. Diseases of Endocrine organs
 - a) Breast - fibroadenoma (M)
 - b) Breast - carcinoma (M)
 - c) Thyroid - multinodular goitre (M)

f. Books recommended:

- a) Text book of Pathology by Robbins
- b) Text book of General Pathology Part I & II by Bhende and Deodhare
- c) Clinical Pathology by Talib
- d) Text book of Pathology by Harsh Mohan, Tejender Singh- Pathology + Haematology .
- e) Text book of Pathology by Muir
- f) Haematology De Gruchi
- g) Clinical Pathology: Ramnik Sood, Todd Sanfard, Godkar, Kawathalkar

Reference books:

- a) Anderson's text book of Pathology Vol I & II
- b) Oxford text book of Pathology Vol. I, II & III
- c) Pathology by Rubin and Farber
- d) Pathologic basis of Disease Robbins
- e) Haemetology – Wontrobes, Hoffbrand, Melunzi, Rodakk



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5. Evaluation Methods

1. Theory

Practicals and Viva

Pattern of Theory Examination including Distribution of Marks, Questions, Time.

Nature of Question Paper

- i) Total duration – 6 hrs (each paper of 3 hrs or 180 minutes)
- ii) Each paper will have 3 sections.

Pattern of Theory Exam

III rd Terminal - 50 Marks (Gen Pathology + Neoplasia)

MCQ – 1 x 10 = 10 Marks (50% Problem based)

SAQ (4/5) - 5 x 4 = 20 Marks

LAQ (2/3) - 2 x 10 = 20 Marks

IV th Terminal – 50 Marks (Systemic Pathology + Hematology)

MCQ – 1 x 10 = 10 Marks (50% Problem based)

SAQ (4/5) - 5 x 4 = 20 Marks

LAQ (2/3) - 2 x 10 = 20 Marks

Prelims – Paper – I (Haematology + Gen Pathology) = 60 Marks

Section –A – Gen Pathology

MCQ – 10 Marks (50% Problem based)

SAQ (3/4) - 5 x 3 = 15 Marks

LAQ (1/2) - 1 x 10 = 10 Marks

Section –B – Haematology

SAQ (3/4) - 5 x 3 = 15 Marks

LAQ (1/2) - 1 x 10 = 10 Marks

Prelims – Paper – II (60 Marks) – Systemic Pathology + Clinical Pathology

Section –A – Systemic Pathology

MCQ - 1 x 10 = 10 Marks (50% Problem based)

SAQ (3/4) - 5 x 3 = 15 Marks

LAQ (1/2) - 1 x 10 = 10 Marks

Section –B – Clinical Pathology

SAQ (3/4) - 5 x 3 = 15 Marks

LAQ (1/2) - 1 x 10 = 10 Marks

Direction:- Only short answer questions may be permitted from the portions marked as "Desirable to know"

Paper wise distribution of theory topics and number of questions:-

Paper I:- General Pathology inclusive of general neoplasia

Haematology inclusive of transfusion medicine.

Out of 2 LAQs in Section C, 1 question should be from General Pathology and General Neoplasia and one question should be from Haematology inclusive of transfusion medicine.



Paper II:- Systemic Pathology inclusive of systemic Neoplasia and Clinical Pathology.
 Out of 2 LAQs in Section C, 1 question should be from Systemic Pathology and Systemic Neoplasia and one question should be from Clinical Pathology.

d. Nature of practicals and duration

2. Practical

- a. 10 Spots 2 minutes each (4 specimen, 1 instrument, 3 histopathology slides, 1 haematology slide and 1 chart) **10**
 Identification - 1/2 mark } together 1 mark for
 Specific short question - 1/2 mark } each spot
- b. Urine Examination - Physical and two abnormal constituents **10**
- c. Histopathology slides : Diagnosis and discussion **10**
- d. Haematology examination
 - i) Peripheral blood smear stain and report **05**
 - ii) Hb/TLC/Blood group **05**

Total **40**

3. Viva : duration and topic distribution **20**

- Gross* **(08)**
- Clinical Tray* **(08)**
- Problem Based(2)* **(04)**

Examination Head Theory

Semester/term wise distribution

marks

- III Term ending examination **50**
- IV Term ending examination **50**
- V (Prelims examination) **120**

Total theory **220**

(reduced to out of 10)

Practicals

- III Semester examination **40**
- IV Semester examination **40**
- Prelims examination **60(Table exam 40, V.V. 20)**

Total Practical **140**

(reduced to out of 7) + Journal (3)

Journal

- Journal** **03**
- Internal assessment Practical** **10 (7+3)**
- Internal assessment Theory** **10**

Total **20**



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Pattern and marking for each paper of 60 marks

Sections	Nature of Questions	Total No. of Questions	Mark (s) per Question	Total Marks
A)	Multiple Choice Questions (MCQs)	10	1	10
B)	Q.1. Short Notes (S.N.)	3 out of 4	5	15
	Q.2. Long Answer Question (LAQ)	1 out of 2	10	10
C)	Q.3. Short Note (S.N.)	3 out of 4	5	15
	Q.4. Long Answer Question (LAQ)	1 out of 2	10	10
Total				60

At the end of Vth semester Prelims examination will be conducted on the basis of University pattern (Theory, practical and viva):

Minimum 4 weeks gap between Prelims and University examination. There will be 2 papers in theory, each of 2 ½ hours duration and 60 marks each.

Standard of Passing (Theory/Practical/Internal Assessment)

The student must secure 50% marks in Internal Assessment also. However, even if the student secures minimum 35% marks, he/she will be allowed to appear for University Examination subject to compensating 15% marks more than minimum 50% in the concerned subject.

In University Exam the division of marks would be as follows-

Subject Name	Maximum Marks	Minimum Marks
Pathology		
Theory	120	
Oral Viva	20	
Theory + Oral viva	140	70
Int-Theory	10	
Int-Practical	10	
Internal Assessment	20	7/20
Practical Exam	40	20



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MICROBIOLOGY

1. Goal

The goal of teaching Microbiology is to provide understanding of the natural history of infectious diseases in order to deal with the etiology, pathogenesis, pathogenicity, laboratory diagnosis, treatment, control and prevention of these infections and infectious diseases.

2. Educational objectives

(a) Knowledge

The student at the end of one and half years should be able to: -

- i. state the etiology, pathogenesis and methods of laboratory diagnosis and apply that knowledge in the diagnosis, treatment, prevention and control of communicable diseases caused by microorganisms.
- ii. understand commensal, opportunistic and pathogenic organisms of human body and describe host parasite relationship.
- iii. know and describe the pathogenesis of diseases caused by microorganisms.
- iv. state the sources and modes of transmission of pathogenic and opportunistic microorganisms including knowledge of insect vectors & their role in transmission of infectious diseases.
- v. choose appropriate laboratory investigations required for clinical diagnosis.

(b) Skills

- i. plan and interpret laboratory investigations for diagnosis of infectious diseases and correlate the clinical manifestations with the etiological agent.
- ii. identify common infectious agents with the help of laboratory procedure, acquire knowledge of antimicrobial agents, use of antimicrobial sensitivity tests to select suitable antimicrobial agents for treatment.
- iii. perform simple laboratory tests, which help to arrive at rapid diagnosis.
- iv. be conversant with proper methods of collection, storage & transport of clinical material for microbiological investigations.
- v. understand the principles of immunology and its application in the diagnosis and prevention of infectious diseases including immunization schedule, acquire knowledge of the scope of immunotherapy and different vaccines available for the prevention of communicable diseases.
- vi. understand methods of disinfection and sterilization and their application to control and prevent hospital and community acquired infections including universal biosafety precautions and waste disposal.



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- vii. recommend laboratory investigations regarding bacteriological examination of food, water, milk and air.
- viii. the student should be well equipped with the knowledge of prevalent communicable diseases of national importance and of the newer emerging pathogens.

(c) Attitude

- i. the student will be regular, sincere, punctual and courteous and regular in studies.
- ii. the student will follow all the rules laid down by the department and participate in all activities.
- iii. the student will understand the importance of, and practice asepsis, waste segregation and appropriate disposal.
- iv. the student will understand the importance of, and practice the best methods to prevent the development of infection in self and patient. (E.g. hand washing, using aprons for hospitals in hospitals only, regularly washing the aprons, wearing gloves (as and when required / handling specimens etc.).
- v. the student will understand the use of the different antimicrobial agents including antibiotics to use judiciously and prevent misuse, (prescribing attitude).
- vi. the student will understand the significance of vaccinations and will receive appropriate vaccines (e.g. TT, Hepatitis B and any other as per needs).
- vii. the student will wash his/her hands with soap after each practical class.
- viii. the student will leave the area allotted for his practical neat and tidy.
- ix. the student will discard the slides in the appropriate container provided for the same.
- x. the student will report any injury sustained in class, immediately.
- xi. the student will report any breakage occurring during class times immediately.
- xii. the student may give suggestions to improve teacher student association.

3. Total duration of para-clinical teaching **3 semesters**
Total 360 teaching days

Total number of teaching hours (n) allotted for Microbiology **250 hrs**
(As per MCI guidelines 1997).

4. Syllabus

a. Learning methods

Lectures, practicals

Distribution of teaching hours

A) Theory :lectures 71

:tutorials seminars 26

Total **97**



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B) Practicals and Revision 120

C) Assessments 33

Total 250

b. Sequential organisation of contents and their division

The areas of study in Microbiology will include General Microbiology, Systemic Microbiology including Bacteriology, Immunology, Mycology, Virology, Rickettsia, Chlamydia, Parasitology and Applied microbiology in relation to infections and diseases of various systems of the body.

i) GENERAL MICROBIOLOGY: (n=10)

No	Topic of lecture	Must know (MK)	Desirable to know (DK)	Hrs
1.	Introduction and Historical background	Definitions: Medical Microbiology, pathogen, commensal, symbiont etc. To cover Anton van Leewenhoek, Pasteur, Lister, Koch, Flemming etc. In History: Scope to cover the importance of Med. Microbiology on diagnosis and prevention of infectious diseases.	Micro-organisms as models in Molecular Biology and Genetic engineering.	1
2.	Morphology of bacteria and Classification	Bacterial cell and its organelles, morphological classification, methods of studying bacteria, staining methods & their principles Grams & Zeil Nelson staining, their importance in presumptive diagnosis, negative staining, dark ground illumination, phase contrast and fluorescent microscopy, briefly about electron microscopy. Principles and applications of all microscopes.		1
3.	Physiology of bacteria including growth requirements & metabolism	Nutrition, respiration (anaerobic & aerobic) and growth of bacteria, growth curve, physical factors influencing growth. Culture media: Definition, classification and application.	Important constituents of culture media.	1
4.	Sterilization	Definition of sterilization, disinfection, asepsis, antiseptics. Ubiquity of bacteria, modes of killing microbes and preventing them, factors determining selection of the mode, factors adversely affecting sterilization. Enumeration of physical methods of sterilization including principle & their application.	Working and efficacy testing of autoclave, inspissator and hot air oven. Central Sterile Supply	1



			Department (CSSD) – concept only.	
5.	Disinfectants	Asepsis and antisepsis, modes of Action of chemical agents on microbes. Phenols, Halogens, Aldehydes, Acids, Alcohol, heavy metals, oxidizing agents etc. Universal biosafety precautions.	Dyes, soaps and detergents. Concentration and contact time.	1
6.	Waste disposal	Definition of waste, classification, segregation, transport and disposal.		1
7.	Bacterial genetics and drug resistance to antimicrobial agents.	Introduction – codon, lac operon, mutation, transformation, transduction & conjugation, R factor, mode of action of antimicrobials on bacteria, mechanism of drug resistance and antimicrobial susceptibility tests, steps taken to minimize emergence of resistant strains (Antibiotic Stewardship ESBL New antimicrobial substances, Nanoparticles for treatment of infectious diseases.		1
8.	Host parasite relationship and bacterial infections	Commensal, pathogenic and opportunistic organisms, their pathogenic factors and modes of transmission. Microbial factors: spores, capsule, toxins, enzymes, intracellular parasitism, antigenic variation & extrinsic factors etc. leading to establishment of infection. Types of infection: primary, secondary, general, local, natural, nosocomial, iatrogenic, zoonotic.		1
9.	Normal flora	Introduction – various sites, types and role, Association of Micro-biome with different diseases.		1
10.	Methods of identification of bacteria. Diagnosis of infectious diseases (direct and indirect)	Principles of laboratory diagnosis of infectious diseases. General procedures for collection transport, processing of specimens for microbiological diagnosis. PCR, RIA, DNA probes.		1



ii) IMMUNOLOGY: (n=12)

No	Topic	Must know	Desirable to know	Hrs
1	Introduction	Definition of immunity, types of immunity, factors responsible, mechanism of innate immunity, active and passive immunity, local immunity.	Herd immunity	1
2	Antigens, HLA	Definition, types, antigen determinants, properties of antigen. MHC- concept, class- I, II & III functions, indication of typing, MHC restriction.	Nature of determinants, e.g. of haptens, e.g. of cross-reactive antigen.	1
3	Antibodies	Definition, nature, structure of immuno-Globulins, papain digestion, understand isotypic, allotypic and idiotypic markers, immunoglobulin classes, physical and biological properties of immunoglobins.,	Pepsin digestion, amino acid sequence, immunoglobulin domain, abnormal immunoglobins.	1
4	Serological reactions	Definition, characteristics, titre, sensitivity & specificity, antigen- antibody interaction- primary, secondary & tertiary, prozone phenomenon, principle, types and application of precipitation, agglutination, complement fixation, enzyme immunoassay, radioimmunoassay, immunofluorescence test, neutralization and opsonisation.	Techniques of precipitation and their uses, blocking antibodies, antiglobulin reactions, co-agglutination, in vitro test, techniques of EIA, IF & electron microscopy.	2
5	Immune response	Types, development, role of --thymus, bone marrow, lymph nodes & spleen, cells of lymphoreticular system, morphology and role of T subsets, NK cells, B cells , plasma cells and macrophages, B & T cell activation, antigen processing and presentation, primary and secondary immune response, principle and uses of monoclonal antibodies, factors affecting antibody production, CMI- definition, types, role of T cell and macrophages, definition of immune tolerance and mechanism of tolerance.	Lymphokines and their role, clonal selection, mechanism of immunoregulation, theories of antibodies formation, techniques of monoclonal antibody formation, detection of CMI, types of	2



6	Complement	Definition, synthesis, pathways, activation, role & biological functions, components, measurement.	immunotolerance Regulation of complement activation, complement deficiency	1
7	Hypersensitivity	Definition, classification, , difference between immediate and delayed reaction, mechanism of anaphylaxis, manifestations of anaphylaxis, types of anaphylaxis, atopy, e.g. of anaphylactic reaction, tests for anaphylaxis, mechanism and e.g. of type-II & type-III reactions, mechanism & types of delayed hypersensitivity.	Desensitization in anaphylaxis, type V reaction, ADCC, Shwartzman phenomenon.	1
8	Autoimmunity	Definition, mechanism, classification, pathogenesis.		1
9	Transplantation & tumour immunology	Types of transplants, mechanism of transplant rejection, prevention of graft rejection, GVH reaction, IR to tumours, tumour antigens, mechanism of IR to tumours.	Type of tumour antigens, immune surveillance.	1
10.	Immuno-Deficiency	Classification, examples, laboratory tests for detection, manifestations.		1
11.	Immunisation	Schedule for different vaccines		1

iii) SYSTEMIC BACTERIOLOGY: (n=21)

Pathogenesis includes:

- Infectious agent - MK *MK- Must know
- Habitat - MK *DK- Desirable to know
- Source / reservoir - MK
- Mode - MK
- Infective dose - MK
- Multiplication, spread - MK
- Clinical features, pathology - MK
- Complications - MK
- Virulence factors - MK
- Immunological response - DK

Laboratory diagnosis:

- MK
- Specimen selection -MK
- Collection -MK
- Transport -MK
- Primary smear, hanging drop -MK



- Selection of media -MK
- Pathogenicity testing -MK
- Anti microbial drug susceptibility testing -MK
- Serological interpretation -MK

Key to the abbreviations used in the table below:

A- Classification, **B-** Morphology, **C-** Culture and isolation, **D-** Biochemical reactions, **E-** Viability, **F -**Virulence, **G-** Diseases, **H-** Antigens, **I-** Pathogenesis, **J-** Laboratory diagnosis, **K-** Prevention and control, **L-** Immune response

No	Topic/ hours	A	B	C	D	E	F	G	H	I	J	K	L
1	Staphylococci (1 hour)	MK	MK	DK	DK	MK	MK	MK	DK	MK	MK	MK	-
2	Streptococci Pneumococci (1 hour)	MK	MK	BA-MK, DK	DK	MK	MK	MK	MK	MK	MK	MK	DK
3	Neisseria (1 hour)	DK	MK	DK	DK	MK	MK	MK	DK	MK	MK	MK	-
4	C.diphtheriae (1 hour)	DK	MK	DK	-	MK	MK	MK	-	MK	MK	MK	DK
5	M.Tuberculosis (1 hour)	MK	MK	LJ,Growth Time MK	DK	MK	MK	MK	MK	MK	MK	MK	DK
6	Atypical mycobacteria (1hour)	MK	MK	DK	DK	MK	MK	MK	-	MK	MK	MK	-
7	M.leprae (1 hour)	MK	MK	Isolation-MK	-	MK	MK	MK	MK	MK	MK	MK	MK
8	Bacillus Methods of anaerobiosis & classification. Non sporing anaerobes (1 hour)	MK	MK	MK	DK	MK	MK	MK	-	MK	MK	MK	-
9	Clostridium welchii, tetani, botulinum (1 hour)	MK	DK	MK	-	-	-	MK	-	-	MK	-	-
10	Enterobacteriaceae	MK	MK	DK	DK	MK	MK	MK	DK	-	MK	-	-



	(1 hour)												
11	Salmonella typhi (1 hour)	MK	MK	DK	DK	MK	MK	MK	DK	-	MK	-	MK
12	Shigella (1 hour)	MK	MK	DK	DK	MK	MK	MK	DK	-	MK	-	-
13	Vibrio & Campylobacter (1 hour)	MK	MK	DK	DK	MK	MK	MK	-	-	MK	-	-
14	Pseudomonas (1 hour)	-	MK	DK	DK	MK	MK	MK	-	-	MK	-	-
15	Other GNB (1 hour)	List only	MK	DK	-	-	MK	-	-	-	MK	-	-
16	Emerging and reemerging bacteria (1 hour)	List only	MK	DK	-	-	-	-	-	-	MK	-	-
17	Spirochetes (3 hour)	MK	MK	DK	-	MK	-	MK	-	-	MK	-	DK
18	Actinomycosis & Nocardia (1 hour)	DK	MK	DK	-	-	-	-	-	-	MK	-	-
19	Rickettsia (1 hour)	MK	MK	-	-	-	-	-	-	-	MK	-	-
20	Chlamydia & Mycoplasma (1 hour)	MK	MK	-	-	-	-	-	-	-	MK	-	-

iv) MYCOLOGY: (n=4)

No	Topic	Must know	Desirable to know	Hrs
1	Introduction to Mycology	Nature of fungus (definition, differences with bacteria), characteristics of fungi, common terminologies, brief account of types of sporulation and morphological classification of fungi. Methods of identification , Infections produced, Lab Diagnosis, processing of skin, hair and nail,	Growth requirements, ecological, medical and industrial importance of fungi (brief account).	1



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2	Agents of Superficial mycosis	Enumerate, predisposing factors, morphological features, Lab. Diagnosis	Colony characteristics of dermatophytes	1
3	Subcutaneous mycosis	Enumerate, predisposing factors, Mycetoma, Rhinosporidiosis, Pathogenesis, Lab. Diagnosis	-	1
4	Systemic mycosis Opportunistic fungal infections	Classification, predisposing factors, Candida, Cryptococcus, Histoplasma morphology, pathogenesis, lab. Diagnosis Classification, predisposing factors, Mucor, Aspergillus, Pneumocystis carinii	Cultural characteristics	1

v) VIROLOGY: (n=12)

Morphology, pathogenesis, laboratory diagnosis, prevention and control for all viruses (Must know).

No	Topic of lecture	Must know	Desirable to know	Hrs
1	General Virology	Size, shape, symmetry, structure, resistance, multiplication, properties and classification of viruses, pathogenesis, bacteriophages, concept of virions	-	1
2	Laboratory diagnosis of viral infections	Collection of samples, transport, cultivation and methods of diagnosis	-	1
3	Viral immunity	Viral immunity, interferon, viral vaccines	-	1
4	Pox viruses	Small pox and Molluscum	-	1
5	DNA viruses	Papova, Adeno, Herpes viruses (Herpes simplex, Varicella zoster, CMV, EBV)	-	1
6	Respiratory viruses	Orthomyxo and Paramyxoviruses, Ag shift and drift H1N1, SARS	Rhinoviruses	1
7	Picornaviruses	Polio, Cocksackie, Enteroviruses, Viruses causing diarrhoea – Rota viruses, Immunity (polio)	-	1
8	Hepatitis viruses	Hepatitis viruses, immunity and laboratory diagnosis	-	2
9	Arboviruses	Dengue, KFD, Japanese encephalitis – definition, classification, enumeration in India, Pathogenesis, laboratory diagnosis and control Chikungunya	-	2
10	Rhabdoviruses	Rabies	-	1
11	Slow and Oncogenic viruses	Characteristics of slow virus infections, pathogenesis and laboratory diagnosis and viruses associated with it	-	1
12	Retroviruses	HIV/AIDS, Immunity, USP	-	2

vi) PARASITOLOGY: (n=11)

Must know –

- Geographical distribution
- Habitat
- Morphology (different stages) found in human beings



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- Life cycle
- Pathogenesis
- Laboratory diagnosis
- Treatment
- Control
- Immunoprophylaxis

No	Topic of lecture	Must know	Desirable to know	Hrs
1	Introduction to medical Parasitology	Parasites: their nature, classification, and explanation of terminologies, epidemiology, emerging parasitic infections, (pathogenicity and laboratory diagnosis)		1
2	E. histolytica	Amoebic infections		1
3	Free living amoebae and flagellates	Free living amoebae, PAME, Giardia & Trichomonas		1
4	Hemoflagellates	L. donovani: life cycle, morphology, pathogenicity, and lab. Diagnosis etc.	Brief account of Trypanosomes	1
5	Malaria	Malarial parasites: life cycle, morphology, pathogenicity, laboratory diagnosis etc.		1
6	Misc. Pathogenic protozoa	Toxoplasma,	Cryptosporidium, Isospora, B.coli	1
7	Cestodes	Taenia saginata & solium, Echinococcus granulosus, life cycle, morphology, pathogenicity and laboratory diagnosis.	Brief mention of other cestodes	1
8	Trematodes	Schistosomiasis: life cycle, morphology, pathogenicity & lab diagnosis.	Brief account of Fasciola hepatica	1
9	Intestinal Nematodes	A.duodenale, A. lumbricoides, E. vermicularis, T. tritura	brief mention of S. stercoralis, life cycle, morphology laboratory diagnosis	2
10	Tissue Nematodes	W. bancrofti, D. medinensis, in brief T. spiralis		1

TUTORIALS (APPLIED MICROBIOLOGY) : (n=26)

Regular tutorials, student seminars & symposia shall be conducted in addition to lectures.

Students must know:

- Micro-organisms causing diseases & pathological lesions
- Methods of collection & transportation of specimens
- Methods of laboratory diagnosis



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- Serological response produced by organisms
- Interpretation of laboratory report

No	Topic of Tutorial	Hrs
1	Gastrointestinal infections (diarrhoea and dysentery) and their laboratory diagnosis	2
2	Upper respiratory tract infection (patch and sore throat) and their laboratory diagnosis	2
3	Lower respiratory tract infection (pneumonia, bronchitis, bronchiolitis etc.) and their laboratory diagnosis	2
4	Urinary tract infection and their laboratory diagnosis	2
5	Infections of the central nervous system (meningitis, encephalitis, brain abscess) and their laboratory diagnosis	2
6	Wound infections and pyogenic infections	2
7	Septicemia and laboratory diagnosis and PUO	2
8	Eye infections and their laboratory diagnosis	2
9	Sexually transmitted disease (STD) and their laboratory diagnosis (genital ulcerative disease)	2
10	Role of laboratory in cross infection, Nosocomial infections / outbreak / epidemic	2
11	Vehicles and vectors of communicable disease & zoonosis	2
12	Preventive inoculations, immunomodulation and immunotherapy	2

Suggested topics for integrated teaching:

- ◆ Tuberculosis and Leprosy
These topics may
- ◆ Pyrexia of Unknown Origin (PUO)
- ◆ Sexually Transmitted Diseases
- ◆ Hepatitis
- ◆ HIV / AIDS
- ◆ Malaria
- ◆ Diarrhoea and Dysentery

Note: Each topic may be allotted 3 hours.
be covered in 2nd and 3rd term of 2nd MBBS.

c. Term-wise distribution

First term (4 months)	Theory- 32 hours	Practical- 32 hours
Second term (5 ½ months)	Theory- 66 hours	Practical- 44 hours
Third term (4 months)	Theory- 48 hours	Practical- 32 hours
Total teaching hours	254 hours	



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System-wise distribution

TERM	BROAD TOPICS	NO. OF CLASSES		TUTORIALS (2 hours)
		Lectures (1 hour)	Practicals (2 hours)	
First term	General Microbiology	10	28	-
	Systemic Bacteriology	18	24	-
Second term	Systemic bacteriology	3	19	-
	Immunology	12	4	-
	Virology	12	4	-
	Mycology	5	4	-
	Parasitology	11	24	-
Third term	Applied microbiology	-	-	26

d. Practicals : Total hours, number & contents : (n=100)

No	Topic	Hrs
1.	Introduction to Microbiology, Microscopy and Micrometry.	4
2.	Morphology and physiology of bacteria and methods staining.	4
3.	Growth requirements of bacteria (media) and identification of bacteria (biochemical reactions).	4
4.	Scheme for laboratory diagnosis of infectious diseases and collection, storage and transport of microbiological specimens and laboratory animals.	4
5.	Sterilization- the physical agents. Sterilization- the chemical agents and method of waste disposal.	4
6.	Serological tests for diagnosis of microbial infections.	4
7.	Staphylococci and other gram-positive cocci.	4
8.	Streptococci and Pneumococci.	4
9.	Gram negative cocci	4
10.	C. diphtheriae and other gram positive non sporing bacilli	4
11.	Mycobacteria	4
12.	Spore bearing aerobic and anaerobic bacilli.	4
13.	Enteric gram-negative bacilli – lactose fermenters - E.coli etc	4
14.	Non lactose fermenters – Salmonella and Shigella	4
15.	V. cholerae and other Vibrio like organisms	4
16.	Other gram-negative bacilli including Pseudomonas, Proteus and hospital acquired infection.	4
17.	Spirochetes	4
18.	Actinomycetes, Nocardia	4
19.	Fungi KOH Mount, LCB mount	
20.	Rickettsia, Chlamydia, Mycoplasma and Viruses	4
21.	Bacteriology of water milk air	
22.	Introduction to Parasitology and Protozoal infections (including Isospora & Cryptosporidium)	4
23.	Haemoflagellates	4



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24.	Plasmodia and toxoplasma.	4
25.	Cystodes and trematodes	4
26.	Intestinal nematodes	4
27.	Extra-intestinal nematodes.	4

The number of practicals and lectures can be changed as per the needs.

e. Books recommended:

1. Essentials of Medical Microbiology - Apurbasankar Sastry & Sandya Bhat K.
2. Textbook of Microbiology - R. Ananthanarayan, C. K. Jayaram Panikar
3. A Textbook of Microbiology - P. Chakraborty
4. Textbook of Medical Microbiology - Rajesh Bhatia & Itchpujani
5. Textbook of Medical Microbiology - Arora and Arora
6. Textbook of Medical Parasitology - C. K. Jayaram Panikar
7. Textbook of Medical Parasitology - Arora and Arora
8. Textbook of Medical Parasitology - S.C.Parija
9. Microbiology in clinical practice - D. C. Shanson
10. A Textbook of Parasitology - Dr. R.P. Karyakarte and Dr. A.S. Damle
11. Microbiology & Immunology - Subhash Chandra Parija
12. Practical Microbiology - C. P. Baveja

Reference books:

1. Mackie McCartney practical Medical Microbiology- Colle JG , Fraser AG
2. Principles of Bacteriology, Virology & Immunology vol. 1, 2 ,3, 4, 5- Topley Wilsons
3. Medical Mycology (Emmons)- Kwon – Chung
4. Review of Medical Microbiology (Lange)- Jawetz
5. Immunology- Weir DM
6. Medical Microbiology-David Greenwood, Richard Stack, John Pentherer
7. Parasitology- KD Chatterjee
8. Medical virology- Timbury MC
9. Mackie McCartney Medical, Microbiology vol.1- Duguid JP
10. Microbial infections- Marmion BP, Swain RHA

5. Evaluation

a. Methods

Theory, Practical & Viva

No		Total marks
1	Theory (2 papers – 60 marks each)	120
2	Oral (Viva) 20	20
3	Practical - 40	40
	TOTAL	180



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Passing: A candidate must obtain 50% in aggregate with a minimum of 50% in Theory including oral and minimum of 50% in practicals and 50% in internal assessment (combined theory and practical).

b. Pattern of Theory Examination including Distribution of Marks, Questions, Time.

Nature of Question Paper

- i) Total duration - 6 hrs (each paper of 3 hrs or 180 minutes)
- ii) Each paper will have 3 sections

Pattern and marking for each paper of 60 marks

Sections	Nature of Questions	Total No. of Questions	Mark (s) per Question	Total Marks
A)	Multiple Choice Questions (MCQs)	10	1	10
B)	Q.1.Short Notes(S.N.)	3 out of 4	5	15
	Q.2. Long Answer Question (LAQ)	1 out of 2	10	10
C)	Q.3. Short Note (S.N.)	3 out of 4	5	15
	Q.4. Long Answer Question (LAQ)	1 out of 2	10	10
Total				60

* One compulsory question of 10 marks on applied Microbiology in paper I.

Paper I - Related to General Microbiology & Systematic Bacteriology & Immunology, Clinical Microbiology

Paper II – Related to Parasitology, Mycology, Virology

c. Topic distribution

MICROBIOLOGY PAPER I

- Section A- MCQs
- Section B - General Microbiology & Immunology
- Section C - Systematic bacteriology including Rickettsia, Chlamydia and Mycoplasma Clinical Microbiology

MICROBIOLOGY PAPER II –

- Section:- A – MCQs
- Section – B- Parasitology
- Section – C- Mycology, Virology

d. Marking scheme

Each paper of 60 marks as shown in the above table.

e. Nature of practicals and duration

Practical examination in MICROBIOLOGY will be of 40 marks and oral (viva) of 20 marks of THREE hours duration.

Q.1: Gram staining/Zeil – Nelson’s staining	10
Q.2: Stool examination for Ova or cyst	10
Q.3 - Clinical Microbiology exercise	10



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Q.4: Spot identification (Ten spots)* - Spot	10
Total-	40

20 added to the Viva

- * Gram staining –of given smear
- * Z.N. staining - of given smear .
- * Clinical Microbiology – Case presentation and writing of lab diagnosis.
- * Stool examination of given stool sample.
- *Spots- Microscopic slides, Mounted specimen, Instruments used in laboratory, Serological tests, Inoculated culture medium, Sterile culture medium, Vaccines / serum.

f. Viva (Two tables)	Marks
A: General Microbiology Systemic Bacteriology, Immunology	10
B: Mycology, Parasitology, Virology,	10

g. Plan for internal assessment

Marks for Internal Assessment:

Theory :	10
Practical:	10

Theory examination

Internal assessment for theory shall be calculated on the basis of two term ending examinations (Ist & IInd), preliminary examination at the end of the course (total 3 examinations).

Marks Distribution for theory examination: (Internal assessment)

For the terminal theory examination students will be evaluated by a combination of 10 MCQs (each worth 1 mark), 4 short notes (options 4 out of 5 each 5 marks and 2 LAQs (option of 2 out of 3 each worth 10 marks). The total time allotted for this 120 marks paper will be 2 hours.

MCQ = Multiple choice questions, SN = Short answer questions, LAQ = Long answer questions

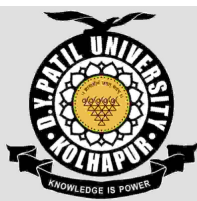
Preliminary examination (as per the University pattern – 2 papers, 3 h each) **120** marks

Internal assessment marks for theory will be computed to **10** out of total **220** marks.

Practicals (Internal assessment):

Two term ending and preliminary practicals only.

Group Project work in clinical microbiology before 4th term end.



Marks Distribution of Practicals:

I st term ending examination	40
II nd term ending examination	40
Preliminary Practical examination	60
Total-	140

Internal assessment marks for Practicals have to be computed **to 07** marks out of 140 at the end of the curriculum and add 3 marks for journals. Thus, total marks for practical assessment will be **10**.

Pattern for computation of ' Internal Assessment ' in the subject of Microbiology.

THEORY:

Internal assessment shall be computed on the basis of three term ending examinations (two terminals & one preliminary examination before the university examination).

EXAMINATION	No. of Papers	Duration of each paper	Total Marks
1 ST TERMINAL	One -50 Marks	2 Hours	50
2 ND TERMINAL	One - 50 marks	2 Hours	50
PRELIMINARY (As per final University pattern)	Two - 60 marks each	3 Hours each paper	120
TOTAL			220

Final internal assessment in THEORY shall be computed on the basis of actual marks obtained out of 220, reduced to marks out of 10.

PRACTICAL:

Internal assessment in PRACTICALS shall be computed on the basis of three term ending examinations and the marks allotted to practical record book.

EXAMINATION	PATTERN	MARKS	TOTAL
1 ST TERMINAL	Exercise (eg.Gram's/ZN Stain)	10	40
	Spotting	10	
	Viva	20	
2 ND TERMINAL	Exercise/ removed KOH & LCB	10	40
	Spotting	10	
	Viva	20	
PRILIMINARY EXAM As per University pattern	Gram's Stain	10	40
	Ziehl-Neelson Stain		
	Stool Exam./ Removed KOH & LCB	10	
	Clinical Microbiology	10	
	Spotting	10	
	Viva	20	
TOTAL			140



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Actual marks obtained out of 140 shall be reduced to **out of 07**. Add marks obtained out of 3 for Practical Record Book. Total internal assessment marks for Practical shall be out of (7+3) 10.

Total Internal Assessment: Theory 10
Practical 10

Total: 20

Standard of Passing (Theory/Practical/Internal Assessment)

The student must secure 50% marks in Internal Assessment also. However, even if the student secures minimum 35% marks, he/she will be allowed to appear for University Examination subject to compensating 15% marks more than minimum 50% in the concerned subject.

In University Exam the division of marks would be as follows-

Subject Name	Maximum Marks	Minimum Marks
Microbiology		
Theory	120	
Oral Viva	20	
Theory + Oral viva	140	70
Int-Theory	10	
Int-Practical	10	
Internal Assessment	20	7/20
Practical Exam	40	20



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FORENSIC MEDICINE AND MEDICAL JURISPRUDENCE INCLUDING TOXICOLOGY

1. Goal

The broad goal of teaching undergraduate students Forensic Medicine and Toxicology is to produce a physician who is well informed about Medico-legal responsibility during his/her practice of Medicine. He/She will also be capable of making observations and inferring conclusions by logical deductions to set enquiries on the right track in criminal matters and associated medico-legal problems. He/She acquires knowledge of law in relation to Medical practice, Medical negligence and respect for codes of Medical ethics.

2. Educational objectives

(a) Knowledge

At the end of the course, the student shall be able to

- i. identify the basic Medico-legal aspects of hospital and general practice
- ii. define the Medico-legal responsibilities of a general physician while rendering community service either in a rural primary health centre or an urban health centre
- iii. appreciate the physician's responsibilities in criminal matters and respect for the codes of Medical ethics
- iv. diagnose, manage and identify also legal aspect of common acute and chronic poisonings
- v. describe the Medico-legal aspects and findings of post-mortem examination in cases of death due to common unnatural conditions and poisonings
- vi. detect occupational and environmental poisoning, prevention and epidemiology of common poisoning and their legal aspects particularly pertaining to Workmen's Compensation Act
- vii. describe the general principles of analytical toxicology

(b) Skills

A comprehensive list of skills and attitude recommended by Medical Council of India Regulation, 1997 desirable for Bachelor of Medicine and Bachelor of Surgery (MBBS) Graduate for Forensic Medicine and Toxicology

At the end of the course, the student shall be able to

- i. Make observations and logical inferences in order to initiate enquiries in criminal matters and Medico-legal problems



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- a. *To be able to carry on proper Medico-legal examination and documentation /Reporting of Injury, Age **and Drunkenness**.*
 - b. *To be able to conduct examination for sexual offences and intoxication*
 - c. *To be able to preserve relevant ancillary materials for medico - legal examination*
 - d. *To be able to identify important post-mortem findings in common unnatural deaths*
- ii. Diagnose and treat common emergencies in poisoning and chronic toxicity
 - iii. Make observations and interpret findings at post-mortem examination
 - iv. Observe the principles of medical ethics in the practice of his profession

(c) Integration

Department shall provide an integrated approach towards allied disciplines like Pathology, Radiology, Forensic Sciences, Hospital Administration etc. to impart training regarding Medico-legal responsibilities of physicians at all levels of health care. Integration with relevant disciplines will provide scientific basis of clinical toxicology e.g. Medicine, Pharmacology etc.

3. Total duration of Para-clinical teaching	3 Semesters Total 360 teaching days
Total number of teaching hours allotted for Forensic Medicine & Toxicology	100 hours

4. Syllabus

a. Learning methods

Lectures, tutorials, practical demonstrations

Distribution of teaching hours

Didactic lectures should not exceed one third of the time schedule, two third schedule should **include Practical, Demonstrations, Group discussions, Seminars and Tutorials.**

Learning process should include living experiences and other case studies to initiate enquiries in criminal matters and Medico-legal problems.

A) Theory (lectures & Tutorials, seminar & allied)	40 20
Total	60
B) Practicals (including demonstrations)	
Practical	25
Demo	15
Total	40



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This period of training is minimum suggested. Adjustments whenever required, depending on availability of time, be made.

b. & c. Sequential organization of contents & their division

Topic wise distribution

The course is designed to meet the needs of a General Practitioner and includes the following topics:

1.	Forensic Medicine	40 Hrs
2.	Toxicology	20 Hrs
3.	Medical Jurisprudence	12 Hrs
4.	Legal Procedures in Medico-Legal cases	08 Hrs
5.	Court attendance when medical Evidence is being recorded	04 Hrs
6.	Integrated approach towards Allied disciplines	06 Hrs
7.	Tutorial and Seminars	10 Hrs
	Total:	100 Hrs

Part – 1 Forensic Medicine: (N=40)

Contents & division

Note: **MUST KNOW (MK)**, Desirable to Know (DK) and `*' is Nice to Know (NK)

A) DEFINITION, SCOPE RELEVANT TO SUBJECT

1. History of Forensic Medicine
2. **Need, Scope, Importance and probative value of Medical evidence in Crime Investigation**

B) PERSONAL IDENTITY NEED AND ITS IMPORTANCE.

1. **Data useful for Identification of Living and Dead**
2. **Age estimation and its medico-legal Importance**
3. **Sex determination and it's medico-legal importance**
4. Other methods of establishing identity: Corpus Delicti, **Dactylography, Tattoo marks, Deformities, Scars** and other relevant factors
5. Identification of decomposed, Mutilated bodies and skeletal remains
6. **Medico legal aspect of DNA fingerprinting - a brief introduction**
7. **Medico - legal aspect of blood and blood stains**

Collection, Preservation and Dispatch of Specimen for Blood and other ancillary material for identification and Medico-legal examination



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C) MECHANICAL INJURIES AND BURNS

1. **Definition and classification of injuries: Abrasions, Contusions, Lacerations, Incised and Stab injury, Firearm and Explosion injury, Fabricated and Defence injury**
2. **Medico-legal aspect of injury/hurt, simple and grievous hurts, murder, Ante –mortem & Postmortem Wounds, Age of the injury, cause of death and relevant sections of I.P.C., Cr.P.C. (Students should not know actual IPC & Cr. P.C. Section)**
3. **Causative Weapon and appearance of Suicidal, Accidental and Homicidal injuries**
4. Physical methods of Torture and their identification
5. **Reporting on Medico-legal cases of Hurts**
6. **Regional injuries: Head injury, cut throat injuries and Road traffic accident injuries**
7. **Thermal injuries: Injuries due to heat and cold, Frostbite, Burns, Scalds and Bride burning**
8. Injuries due to Electricity, Lightening

Collection, Preservation and Dispatch of Specimen for Blood and other ancillary material for Medico-legal examination

D) MEDICO-LEGAL ASPECTS OF SEX, MARRIAGE AND INFANT DEATH

1. **Sexual Offences and perversions: Natural (Rape, Adultery, and Incest), Unnatural (Sodomy, Bestiality and Buccal coitus) Lesbianism, perversions and relevant sections of I.P.C. and Cr.P.C.**
2. **Fertility, Impotence, Sterility, Virginity, and Nullity of marriage and divorce on Medical ground**
3. **Pregnancy, Delivery, Paternity, Legitimacy, Artificial Insemination, *Fertilisation in Vitro, *Sterilization (Family Planning Measures)**
4. **Abortions, Medical Termination of pregnancy, criminal abortions, Battered Baby Syndrome, Cot deaths and relevant sections of I.P.C. and Cr.P.C., M.T.P. Act of 1971 and foetal sex determination Act**
5. **Infant death (Infanticide)**
 - i. **Definition Causes, Manners and Autopsy features**
 - ii. **Determination of age of Foetus and Infant**
 - iii. **Signs of live-born, stillborn and dead born child**
 - iv. **Child Abuse & Protection of Children from Sexual Offences (POCSO) Act, 2012.**

Collection, Preservation and Dispatch of Specimen: Hair, seminal fluid/ stains and other ancillary material for medico-legal examination, examination of seminal stains and vaginal swabs

E) MEDICO-LEGAL ASPECTS OF DEATH

1. **Definition and concept of death, stages, modes, Signs of death and its importance**



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2. **Changes after death**, Cooling, Hypostasis, Changes in eye, Muscle changes, Putrefaction, Saponification, Mummification, **Estimation of time since death**
3. **MCCD (Medical Certification of Cause of Death)**, Proximate causes of death, causes of sudden deaths, Natural deaths. Presumption of death and survivorship, disposal and preservation of dead
4. Introduction to *The Anatomy Act, *The Human organ transplantation Act. 1994
5. Medico-legal aspects and findings of post-mortem examination in cases of **death due to common unnatural conditions**
6. **Sudden unexpected death**, deaths from starvation, cold and heat and their medico-legal importance
7. **Medico-legal aspects of death from Asphyxia, Hanging, Strangulation, Suffocation and Drowning**

F) MEDICO-LEGAL AUTOPSY

1. **Autopsy: Objectives, Facilities, Rules and Basic techniques, Proforma for reporting medico-legal autopsy**
2. **Exhumation**, examination of mutilated remains, Obscure autopsy and **post-mortem artifacts**

Collection, preservation and dispatch of material for various investigations to Forensic Science Laboratory

G) *FORENSIC PSYCHIATRY

1. **Definition, General terminology** and * Hallucination, Delusion, Impulse, Illusion, Testamentary capacity. Civil and Criminal responsibility
2. Examination, * Certification, restraint and admission to Mental Hospital
3. ***Mental Health Act – Principles and Objectives**
4. True insanity & feigned insanity

Part – 2 Toxicology: (N=20)

A) POISONS AND THEIR MEDICO-LEGAL ASPECTS

1. **Definition of poison, General consideration and Laws in relation to poisons** \Narcotic drugs and psychotropic substances Act, *Schedules H and L drugs, *Pharmacy Act, **Duties and responsibilities of attending physician**
2. **Common poisons and their classification, Identification of common poisons**, Routes of administration, Actions of poisons and factors modifying them, **Diagnosis of poisoning (Clinical and Confirmatory) , Treatment/ Management of cases of acute and chronic poisonings**



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3. Addiction and Habit forming drugs, drug dependence
4. **Occupational and environmental poisoning, prevention and Epidemiology of common poisoning and their legal aspects particularly pertaining to Workmen's Compensation Act**
5. **Medico-Legal aspects and findings of postmortem examination in cases of death due to poisonings**
6. Centres for diagnosis of poisoning.

B) POISONS TO BE STUDIED

1. **Corrosive: Sulphuric Acid, Nitric Acid, Hydrochloric Acid, Carbolic Acid and Oxalic Acid, Sodium and Potassium and Ammonium Hydro-Oxide**
 2. **Non-metallic, Metallic Poisons and Industrial hazards: Phosphorus** and compounds of **Lead, Arsenic, Mercury, Copper,** and Glass powder
 3. **Plant Poisons: Castor, Croton, Capsicum, Semicarpus Anacardium (Bhilawa), Calatropis Gigantea, Abrus Precatorius (Ratti), Dhatura, Cannabis Indica, Cocaine, Opium, Aconite, Yellow Oleander, Strychnine**
 4. **Animal and Bacterial Poisons: Snakes, Scorpion and Food poisoning**
 5. **Alcohol (Drunkeness) Ethyl Alcohol, Methyl Alcohol, Kerosene, Barbiturates**
 6. **Asphyxiant & Gaseous Poisons: Carbon Monoxide, War gases, Hydrocyanic acid, and Cyanides**
 7. **Insecticides, pesticides and Miscellaneous poisons: Organo-Phosphorus Compounds, Organo-Chloro Compounds, Carbamates (Carbaryl) and Rodenticides (Phosphides)**
- Collection, Preservation and forwarding of evidence, remains of poison, body discharges and viscera etc. to Forensic Science Laboratory in cases of poisoning**

C) FORENSIC SCIENCE LABORATORY: (BRIEF)

1. **Aims, objects, general knowledge about Forensic Science Laboratory**
2. **General principles of analytical toxicology**

Part – 3 Medical Jurisprudence: (N=12)

A) LEGAL AND ETHICAL ASPECTS OF PRACTICE OF MEDICINE

1. The **Indian Medical Council**, the Act, Formation and Functions;
State Medical Council: Formation, Functions, and Registration
2. **Rights and obligations of Registered Medical Practitioners and patient, Duties of physicians and patients, Euthanasia**
3. **Infamous conduct, Professional secrecy and privileged communications**
4. **Codes of Medical Ethics, medical etiquette, Medical Negligence** and contributory negligence, **Precautionary measures and defenses for Medical Practitioners against**



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legal actions, Medical/Doctors indemnity insurance, Consumer Protection Act relevant to medical practice

5. Medical Ethics and prohibition of Torture & care of Torture Victims

B) DEFINITION OF HEALTH AND ITEMS TO CERTIFY ABOUT HEALTH

1. **Common medico-legal problems in Hospital practice, Consent in Medical Examination and treatment, under treatment/ Sickness and Fitness certificate, maintenance of medical records**
2. ***Social, Medical, Legal and Ethical problems in relation to AIDS**

C) ACTS AND SCHEMES RELATED TO MEDICAL PROFESSION IN BRIEF:

Workmen's compensation Act, * Mental Health Act, **Medical Practitioner Act**, Protection of human rights Act, 1993, * National Human Rights Commission, * Human Organ Transplantation Act and other relevant sections of I.P.C., Cr.P.C. and I.E. Act. Maharashtra civil medical code, Hospital administration manual

Part – 4 Legal procedures in medico-legal cases: (N=8)

- A. **Medico-Legal Investigations of death** in suspicious circumstances, **Inquest and it's types**
- B. **Types of Criminal courts and their powers**, punishments prescribed by law, **kinds of witnesses, Evidence, Documentary Medical evidence, Dying declaration**
- C. The Trial of criminal cases, **Rules and Conventions to be followed by Medical Witness at Medical evidence, subpoena, conduct money**
- D. **Relevant Sections from the Indian Evidence Act, Indian Penal code and Criminal Procedure code**

NOTE : **Must know**, desirable to know and ' * ' is nice to know

d. Term-wise distribution

Terms Lectures	Non – Lectures	Pracs.	Demos.	Tuts/Sem/Allied
I Term	15	08	06	06
II Term	15	10	05	06
III Term	10	07	04	08
Total	40	25	15	20

This period of training is the minimum suggested. Adjustments whenever required, depending on availability of time, be made



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e. Practicals (including demonstrations) : Total no. of hours & contents

Practicals will be conducted in the laboratories.

Objective will be to assess proficiency in skills, conduct of experiment, interpretation of data and logical conclusion.

Emphasis should be on candidate's capacity in making observations and logical inferences in order to initiate enquiries in criminal matters and medico-legal problems.

Total Time: 25 + 15 = 40

Contents:

Part 1 Forensic Medicine

Report on:

1. Estimation/Certification of Age
2. **Recording of fingerprints – to be deleted**
3. Examination/Certification of the Injured
[Prescribed Forms]
4. Examination of the Causative Agents in cases of Injuries
(e.g. Weapons, Instruments)
 - a. Hard and blunt weapons
 - b. Sharp cutting, sharp pointed and Sharp Heavy cutting weapons
 - c. Firearm weapons
5. Sexual offences :
 - a. Examination/Certification of Victim
 - b. Examination/Certification of Accused
6. Examination of Foetus to opine about age
7. Examination of Bones and teeth for Medico-legal purpose to determine age, sex, stature, cause of death, time since death
 - a. Skull and Mandible
 - b. Scapula, Sternum and Upper limb bones
 - c. Sacrum and hip bone/ Pelvic bone
 - d. Lower limb bones

Study of:

8. Medical certification of cause of Death as per Birth and Death registration Act [Prescribed Forms]
9. Studies of Skiagrams for estimation of age, bony injury, foreign body, and pregnancy
10. Photograph of different events of Medico-legal importance and post-mortem changes
11. Study of Various museum specimens of medico-legal significance
12. Study of Various slides of medico-legal significance
13. Demonstration of Instruments:



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- a. Used in treatment of acute poisoning cases
 - b. Used for causing abortions
 - c. Used for carrying out autopsy
- [Standard human autopsy dissection Box/set]

Part 2 Forensic Toxicology

1. Examination/Certification of Alcoholic [Prescribed Forms 'A' & 'B']
2. Study of Common poisons:

[Sulphuric Acid, Nitric Acid, Hydrochloric Acid, Carbolic Acid and Oxalic Acid, Sodium and Potassium Hydro-Oxide, Phosphorous, Lead, Arsenic, Mercury, Copper, Glass powder, Castor, Croton, Capsicum, Semicarpus Anacardium (Bhilawa), Calatropis Gigantea, Abrus Precatorius (Ratti), Dhatura, Cannabis Indica, Opium, Aconite, Yellow Oleander, Strychnine, Snakes, Scorpion, Alcohol, Methyl Alcohol, Kerosene, Barbiturates, Organo-phosphorus compounds, Organo Chloro compounds, Carbamates (Carbaryl)] and other commonly used poisons, antidotes and preservatives

Part 3 Medical Jurisprudence

Study of Medical Certificates [Prescribed Forms]

- a. Sickness Certificate
- b. Fitness Certificate
- c. Certificate of Physical fitness
- d. * Medical certificate prescribed under Mental Health Act : 1987
- e. * Medical Certificate of Sound/ Unsoundness of mind.

Part – 4 Legal procedures in medico-legal cases

Study of the various prescribed Forms:

Consent to surgery Anaesthesia and other Medical services, Request for sterilization, Consent to access to hospital records, Authorization for Autopsy, **Dead body Challan used for sending a dead body for post-mortem examination**, Request for the second inquest by Magistrate on the dead body, **Provisional post-mortem certificate, Post-mortem form, Pictorial Post-mortem form, Form for the Final cause of death**, Forms for despatch of exhibits other than the viscera to chemical analyser, Forms for despatch of Viscera for Histopathological Examination, **Form for dispatch of viscera to chemical analyser**, Forensic Science Laboratory report form, Summons to witness.

Each student shall attend and record as a clerk

- a. As many as possible cases / items of medico-legal importance
- b. 10 cases of medico-legal autopsies



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Both above 'a' and 'b' should be recorded in the approved Proforma in the single Journal. The Journal should be scrutinised by the teacher concerned and presented for the inspection and evaluation during the university examination.

Each student shall attend the court at least 2 cases when Medical Evidence is being recorded.

f. Books recommended

1. **The Essentials of Forensic Medicine & Toxicology 34th Edition 2017 by K.S. Narayan Reddy.**
2. **Parikh's Textbook of Medical Jurisprudence and Toxicology. 6th Edition**
3. **Modi's Textbook of Medical Jurisprudence and Toxicology Ed. 25th, 2016, by B.V. Subramanyam, Butterworth**
4. **Tetbook of Forensic Medicine & Toxicology. By V.V. Pillay. 18th Edition 2017.**
5. **Principles of Forensic Medicine & Toxicology. By Rajesh Bardale. 2nd Edition 2017.**
6. Bernard Knight' Forensic Pathology, 4th edition 2016.
7. Text Book of Forensic Medicine – J.B. Mukherjii VOL 1 & 2
8. Principles of Forensic Medicine - A. Nandy
9. Toxicology at a Glance by Dr S.K. Singhal

Reference books

1. Russell S. Fisher & Charles S. Petty: Forensic Pathology
2. Keith Simpson: Forensic Medicine. **13th Edition**
3. Jurgen Ludwig: Current Methods of autopsy practice.
4. Gradwohl – Legal Medicine
5. A Doctors Guide to Court – Simpson
6. Polson C.J. : The essentials of Forensic Medicine
7. Adelson, L.: The Pathology of Homicide.
8. Atlas of Legal Medicine (Tomro Watonbe)
9. Sptiz, W.U. & Fisher, R.S.: Medico-legal Investigation of Death.
10. A Hand Book of Legal Pathology (Director of Publicity)
11. Taylor's Principles & Practice of Medical Jurisprudence. Edited by A.Keith Mant, Churchill Livingstone.
12. Ratanlal & Dhirajlal, The Indian Penal Code; Justice Hidayatullah & V.R. Manohar
13. Ratanlal & Dhirajlal, The Code of Criminal procedure; Justice Hidayatullah & S.P. Sathe
14. Ratanlal & Dhirajlal, The Law of Evidence; Justice Hidayatullah & V.R. Manohar
15. Medical Law & Ethic in India – H.S. Mehta
16. Code of medical ethics: Medical Council of India, approved by Central Government, U/S 33 (m) of IMC Act, 1956 (Oct 1970)
17. Krogman, W.M.: The human skeleton in legal medicine.
18. FE Camps, JM Cameren, David Lanham: Practical Forensic Medicine
19. V.V. Pillay : Modern Medical Toxicology.



5. Evaluation

a. Methods

Theory, Practical & viva

b. Pattern of Theory Examination including Distribution of Marks, Questions, Time

Nature of Question Paper

Faculty with year: Second MBBS

Subject: Forensic Medicine & Toxicology

Paper: Total Marks: 60, Time: 3 hours. The paper will be in 3 sections.

Sections	Nature of Questions	Total No. of Questions	Mark (s) per Question	Total Marks
A)	Multiple Choice Questions (MCQs)	20	1/2	10
B)	Short Answer Questions (SAQs) (Attempt any 6 out of 7) (must include 3 questions from Toxicology)	6 out of 7	5	30
C)	Long Answer Questions (LAQ) (Attempt any 2 out of 3)	2 out of 3	10	20
Total				60

c. Topic distribution in the theory paper

Section A & C: Forensic Medicine, Toxicology, Medical Jurisprudence, Legal Procedure

Section B: Forensic Medicine, Toxicology and/or Medical Jurisprudence, Legal Procedure

d. Marking scheme

As shown above

e. Nature of practicals and duration

Time: about 1 hrs.

Marks 20

Practicals

A) Spotting: 5 spots of 1 mark each with 2 minutes time per spot

Marks 05

B) Medicolegal Report on Three Exercises 15 minutes time for each exercise

Marks 15

1. An Injured OR Age of the child/Foetus OR An alcoholic OR Sexual Offence

Marks 05

2. Bone OR Weapon

Marks 05

3. Certificate of Sickness, fitness OR Death

Marks 05

In respect of items B)1 to 3, students will be expected to prepare their reports as if they would be required to submit it to the investigating authority concerned within the time allotted, and the examiners will be assessing proficiency in skills, conduct of experiment, interpretation of data and logical conclusion. Emphasis should be on candidate's capacity in making observations and logical inferences in order to initiate enquiries in criminal matters and medico-legal problems.

f. Viva : duration and topic distribution

Viva-vocé:

Time: About 30 Min



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There will be TWO tables examining each student separately on the topics 'a' and 'b'.

Viva 20 marks

Duration 30 mins

Four examiners 15 mins with each candidate

Two examiners for topics **a. Toxicology and Medical Jurisprudence**

Two examiners for topics **b. Forensic Medicine and Legal Procedures**

At each table marks given will be out of 10 and then added together (total out of 20)

g. Plan for internal assessment

The time-table for internal assessment will be as follows:

SCHEME OF INTERNAL ASSESSMENT WITH FREQUENCY OF EXAMINATIONS

Marks for internal assessment 'A' (10 marks) shall be calculated on the basis of three terminal college examinations conducted.

Marks for internal assessment 'B' (10 marks) shall be calculated on the basis of three terminal college examinations (7 marks) & day-to-day class practical work and Record (3 marks).

Department will maintain a register for periodic evaluation of their students. The internal assessment will be done separately for theory and practical examinations.

A total of 3 (three) examinations will be conducted as under:

FREQUENCY AND MARKING OF EXAMINATION FOR INTERNAL ASSESSMENT

Term wise distribution	Theory/Practical (Total Marks)
I Term	A/B
1 st Terminal	30 / 20
II Term	
2 nd Terminal	30 / 20
III Term	
3 rd Term ending (Preliminary)	60 / 40

SCHEME OF INTERNAL ASSESSMENT WITH FREQUENCY OF EXAMINATION

I term- 1st term ending: After 120 teaching days (Theory and Practicals)

II term- 2nd term ending: At the end of the 2nd term (Theory and Practicals)

III term-

Prelims examination on the basis of University pattern -Theory, Practicals and Viva
(Minimum 4 weeks gap mandatory between Preliminary and University examinations)

For the terminal theory examination for I and II Term students will be evaluated by a combination of 10 MCQs (each worth ½ mark), 3 SAQs (each of 5 marks with an option of 3 out of 5) and 1 LAQ (option of 1 out of 2 worth 10 marks, each LAQ will be split into part a and part b of 5 marks each). The total time allotted for this 30 marks paper will be 2 hour.

III term or Prelim pattern will be as per the University exam i.e. 20 MCQ (1/2 mark each) to be attempted in 30 minutes, 6 SAQ (5 marks each with option of 6 out of 7; 3 questions from Toxicology must) and 2 LAQ (10 marks each LAQ with option of 2 out of 3; each question will have 5 marks part a from Forensic Medicine and 5 marks part b from Toxicology). Total time allotted for the 60 marks theory paper is 3 hours.

This will be followed by practicals (total time 1½ hours). The marks for the I term and II term practicals will be 20 each. To familiarize the students with the 'viva-vocé', for the I term and II



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term the marks for the practicals exercises' may be kept as 15 (5 spots of 1 mark each and two reports of 5 marks each), while 05 marks be reserved for viva on theory topics (total 20 marks).

Standard of Passing (Theory/Practical/Internal Assessment)

The student must secure 50% marks in Internal Assessment also. However, even if the student secures minimum 35% marks, he/she will be allowed to appear for University Examination subject to compensating 15% marks more than minimum 50% in the concerned subject.

In University Exam the division of marks would be as follows-

Subject Name	Maximum Marks	Minimum Marks
Forensic Medicine & Toxicology		
Theory	60	-
Oral Viva	20	-
Theory + Oral viva	80	40
Int-Theory	10	-
Int-Practical	10	-
Internal Assessment	20	7/20
Practical Exam	20	10