Curriculum of

M.Sc. - Medical Technology

in

Clinical Laboratory Technology

M.Sc – MT (CLT)

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Revised: June 2011

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Board of Studies (Paraclinical)
Faculty of Medicine

SARDAR PATEL UNIVERSITY
Vallabh Vidyanagar 388120 (Gujarat)

SARDAR PATEL UNIVERSITY

Degree of
M.Sc. - Medical Technology in
Clinical Laboratory Technology

R. M.Sc. CLT. 1: A candidate for the admission to M.Sc.(MLT) must have passed the B.Sc. degree Examination of the Sardar Patel University with Medical Laboratory Technology (MLT) / Microbiology / Biochemistry / Zoology / Botany / Bio Technology / Environmental Science / Genetics / Industrial Microbiology/ Life Sciences/ Bioinformatics **OR** an examination in any other university with 10+2+3 system recognized as equivalent to any of the above courses.

The degree of Master of Science, a two-year course, would be through papers, practicals and dissertation work, wherever prescribed.

R. M.Sc. CLT. 2: The final examination for SEVEN theory papers would be conducted in two parts:
M.Sc. Part I: Three papers at the end of the first academic year
M.Sc. Part II: Four papers at the end of second academic year
However, practicals and grand viva, including viva for the dissertation work, will be held by the University at the end of two academic years.

R. M.Sc. CLT. 3: **(a)** Candidate will be examined in theory papers and practicals including viva for the dissertation work wherever prescribed to make the total of 1050.
(b) For deciding the result of M.Sc. (MLT) examination, the ratio of Internal and External assessment will be 20:80.
(c) For the purpose of internal assessment, the concerned department/s would conduct theory exam of respective papers of Part I & II and practical examinations at the end of each term.
(d) The ***"must know"*** topics, identified in the curriculum, should get at least 90% weightage in the final University examination- theory paper and Viva voce. However, all exercises in the practical exam should be from "must acquire" list of practicals/skills only.

R. M.Sc. CLT. 4: Candidate shall be required to attend at least 75% of the Lectures and Practicals separately in each year.

R. M.Sc. CLT. 5: Every candidate shall maintain a regular record of his practical work / Journal, which will be checked by the teacher from time to time and duly certified by the head of department at the end of the course. This Practical record / Journal will be given at least 10% weightage in the Viva voce of Internal as well as external exam.

R. M.Sc. CLT. 6: **(a)** Every candidate shall carry out a dissertation work on the topic assigned to him/her by the head of the department under the guidance of a recognized Post Graduate teacher of the concerned specialty. Selection of the subject for dissertation will be in consultation with respective guide and HOD.

(b) The head of the department will monitor the distribution of the subjects among candidates in such a manner that different specialties of MLT such as clinical pathology, Hematology, Blood banking. Biochemistry, Microbiology etc. receive due consideration.

(c) A candidate shall be considered eligible for the final Examination only if he/she submits the dissertation thesis. The candidate shall submit Five Copies of the dissertation thesis, duly signed and certified by the Guide/HOD, **at least three months** before the final examination, to the concerned Department. One copy to be retained by each; HOD, Guide, Institutional/Departmental library (after the candidate is declared pass) and two for the review by external examiners in order to conduct a dissertation viva jointly by all examiners at the final examination. External examiners' copies will be submitted to the University after examination.

R. M.Sc. CLT. 7: A candidate shall be deputed for a total of a minimum 3 weeks (to maximum 5 weeks) during the entire course, either at a stretch or in parts, to one or more such reputed Institute, where they can get exposure to the sophisticated equipment or advanced techniques. This includes days of his attending at least one state level and one national conference of related specialty. The concerned department/Institute does not have any financial obligation, as such, for the deputation of candidate. All expenses will be born by the candidate.

R. M.Sc. CLT. 8: A candidate desirous for appearing in the University examination of any/all theory papers and/or practical must forward his/her application in the prescribed form from the respective college to the University on or before the date prescribed for the purpose under the relevant ordinance.

R. M.Sc. CLT. 9: Standard of passing:

The standard of passing the M.Sc. degree examination will be as under:

(a) To pass the M.Sc. Degree examination, a candidate must obtain at least **45% marks** (aggregate of external and internal) in each of the SEVEN theory papers of Part I and part II as well as in practical **separately.**

(b) Award of class will be as per the other degree examinations of faculty of Medicine, S.P. University.

R. M.Sc. CLT. 10:

(a) A candidate, who fails in **any one or more** of the theory papers or in practical examination, will be allowed to appear **in those paper/s or practical**, as the case may be, during the subsequent University examination.(part examination).

(b) A candidate who fails in one or more of the Part I theory papers, will be allowed to appear in those paper/s during the subsequent University examination held in Oct-Nov or in April-May; along with his/her Part II examination.

(c) A candidate, who fails in any one or more of the theory papers or in practical examination, however, may opt to appear in the whole examination, including all papers and practical in the subsequent University exam. In this case, result of his/her previous examination will be treated as cancelled.

(d) In case of repeat exam, in part or whole, original internal marks, calculated on the basis of multiple internal examinations during four terms, **will only be considered**.

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Examination System and Mark distribution: Theory and Practical

Course code	Name of Paper	Marks		Total	Exam Duration
		Internal	External		
M.Sc Part I (at the end of First Year)					
PME01MLT01	Basics of Clinical pathology and Haematology	20	80	100	3 hours
PME01MLT02	General Biochemistry	20	80	100	3 hours
PME01MLT03	Microbiology - Basic	20	80	100	3 hours
M.Sc Part II (at the end of Second Year)					
PME02MLT01	Clinical Hematology, Histopathology & Cytology	20	80	100	3 hours
PME02MLT02	Clinical Pathology (applied) & Blood Banking	20	80	100	3 hours
PME02MLT03	Clinical Biochemistry	20	80	10	3 hours
PME02MLT04	Systemic & Clinical Microbiology	20	80	100	3 hours
PME02MLT05	**PRACTICAL EXAMINATION**	**60***	**240***	**300**	4 Days**
PME02MLT06	**DISSERTATION VIVA**	**--**	**50**	**50**	**During practical exam**
	THEORY TOTAL	**140**	**560**	**700**	**--**
	GRAND TOTAL	**200**	**950**	**1050**	--

* Internal : 20 marks and External: 80 marks for each of Pathology, Microbiology and Biochemistry Practical

**2 days: Microbiology, 1 day: Pathology and 1 day: Biochemistry per batch

Detailed Syllabus:

As per the rule R. M.Sc. MLT. 3(d), the *"must know"* topics, identified in the curriculum, should get at least 90% weightage in the final University examination- theory paper and Viva voce. However, all exercises in the practical exam should be from "must acquire" list of practicals/skills only.

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M.Sc.(MLT) Part I- first year

PME01MLT01: Basics of Clinical Pathology and Haematology ***Must know :***

Unit 1 : Urine & Stool

- Anatomy physiology of urinary tract
- Formation of urine
- Anatomy , physiology of intestinal tract
- Physical, chemical & microscopic examination of urine & stool samples

Unit 2 : Body fluids

- CSF - Anatomy, Physiology of meninges,
- Other body fluids: Anatomy, physiology and formation Pleural, Pericardial and Peritoneal fluid ,Synovial & seminal fluid,Gastric fluid

Unit 3 : Blood

- Instruments in Haematology
- Composition and function of blood
- Physiology of blood: formation and destruction
- Physiology of cardio-vascular system
- Role of bone marrow, liver , spleen and R. E. system
- Plasma coagulation factors
- Mechanism of normal hemostasis
- Mechanism and stages of coagulation
- Immunohematology: Blood groping system, natural & immune antibodies

Unit 4 : Hemoglobin and blood cells

- Erythropoesis
- Red cell membrane
- Globin
- Heme
- Destruction of Red blood cells
- Leucopoiesis
- Granulocytes, Agranulocytes, Platelets
- Anticoagulants
- Diluting hematological fluids
- Hematological stains

PME01MLT02: General Biochemistry

Must know :

Unit 1 Introduction & General aspects

- Introduction to Clinical Biochemistry
- Study of weights, volumes and Units, Inter-conversion of units, Measurements, Preparation of solution,Normal range
- Different anticoagulants used in Clinical Biochemistry, its application and Mechanism of action.
- Hazards in the Laboratory.

Unit 2: General Biochemistry of Carbohydrates

- Digestion and absorption
- Types, functions & Importance

Unit 3: General Biochemistry of proteins

- Digestion and absorption
- Amino acids, Peptides, Protein, Hemoglobin, hemoglobinopathies, Plasma Proteins, abnormalities, Collagen, disorders of collagen, Immunoglobulins.

Unit 4: General Biochemistry of lipids

- Digestion and absorption
- Classification ,types, function, TAG, Phospholipids other compound lipids Cholesterol, Prostaglandins, Fatty Acids

Unit 5: Biophysics :

- pH Blood buffers maintenance of body pH, Disorders of acid base balance, Viscosity, Surface tension, colloids, Donnan membrane equilibrium

Unit 6: Nucleic acids :

- Nuleobases, nucleosides, nucleotides, Nucleic acids, DNA and RNAs

Unit 7: Enzymology

- Definition characteristics, Factors affecting enzyme action, Enzyme inhibition, Isoenzymes

Unit 8: Nutrition

- Principles of nutrition, Balanceed diet, BMR, kwashiorkor and marasmus
- Vitamins : water and fat soluble Minerals: Calcium, iron, trace elements

Unit 9: Instrumentation

- Automation in Clinical Biochemistry Laboratory
- Colorimetry , Spectrophotometery , Chromatography, Flame photometry, Fluorimetry, Electrophoresis
- Autoanalysers, electrolyte analyzer,Gas analyzer
- RIA , ELISA , Chemiluminance.

PME01MLT03: MICROBIOLOGY - BASIC

General Microbiology:

Must Know:

Unit 1:

- History and Pioneers in Microbiology: Contributions of Antony Van Leeuwenhoek, Louis Pasteur, Joseph Lister, Robert Koch (Koch's Postulates),
- Bacterial Taxonomy: Nomenclature and classification of microbes (in brief)

Unit 2:

- Microscopy, Stained preparation, Size & Shape
- Morphology of bacteria: Structures of a bacterial cell and their functions
- Physiology of Bacteria: Nutrition, Gaseous requirement, temperature requirement and other growth requirements

Unit 3:

- Sterilization and disinfection
- Culture media
- Culture methods
- Identification of Bacteria
- Antibiotic sensitivity testing

Unit 4:

- Bacterial genetics: Basic principles of molecular biology, Mutation, Gene transfer,
- Molecular genetics as applicable to Medical Microbiology: (In brief) Genetic engineering, DNA probe, Blotting technique, Polymerase chain reaction, Genetic mapping.

Unit 5:

- Normal flora of human body,
- Bacteriology of Air, Water and Milk

Nice to know:

- Antimicrobial agents: Mechanism of actions
- Bacterial metabolism: Oxidation, Fermentation

Immunology:

Must Know:

Unit 6: Infection

- Sources of infection
- Modes of transmission
- Factors predisposing to microbial pathogenicity
- Types of infectious diseases

Unit 7:

- Antigens
- Immunoglobulins
- Immunity
- Complement system

Unit 8: Antigen and antibody reactions

- General Features of antigen-antibody reaction
- Precipitation, Agglutination
- Complement Fixation Test
- Neutralisation, Opsonisation
- Immunofluorescence, RIA, EIA
- Western Blot
- Immunochromatograghy

Unit 9:

- Structure and function of Immune system: Organ and cells of immune system (In brief), Major Histocompatibility Complex
- Immune Response:
- Humoral Immune response, Primary & secondary immune response, Fate of antigen in tissue, Production of antibodies
- Cellular Immune Response: Scope of CMI, Induction of CMI, Cytokines,
- Immunological tolerance
- Theories of Immune responses

Unit 10:

- Hypersensitivity: Classification and Immunological basis
- Auto-immunity: Mechanisms and classification of auto immune disorders

Nice to know:

- Immunodeficiency Diseases: Immunological basis of Primary and secondary Immunodeficiency Diseases
- Transplantation immunology: Classification of transplants, Allograft reaction, Factors favouring allograft survival, Graft-vs-host reaction
- Tumor immunology: Immune response in malignancy, Tumor antigens Immunological surveillance.
- Measurement of immunity

Unit 11: Parasitology:

Morphology, life cycle, laboratory diagnosis of following parasites

Must know :

Protozoa:

- *Entamoeba, Giardia, Trichomonas,*
- *Leishmania, Trypanosoma,*
- *Plasmodium,*
- *Toxoplasma, Cryptosporidium.*

Helminthology

- *Taenia, Echinococcus, Hymenolepis,*
- *Schistosomes,*
- *Trichuris, Strongyloides, Ancylostoma,*
- *Ascaris, Enterobius, Wuchereria bancrofti*

Nice to know:

- *Sarcocytis, Babesia, Balantidium, Dipyllidium, Multiceps,*
- *Gastrodiscoides, Paragonimus, Opisthorchis, Necator,Toxocara, Dracunculus*

- λ Ectoparasites : Common arthropods and other vectors viz. Mosquito, Sand fly , Ticks, Mite, Cyclops

Unit 12: Mycology:

Must know :

- λ The morphology and reproduction in fungi.
- λ Classification of fungi
- λ Morphology, diseases caused and lab diagnosis of:-

1. Opportunistic fungi - Cryptococcus, Candidiasis, Aspergillus, Zygomycetes.
2. Fungi causing superficial mycoses- Dermatophytes
3. Subcutaneous mycoses - Mycetoma,

***Nice to know*::**

Fungi causing superficial mycoses- Ptyriasis versicolor, Tinea Nigra, Piedra
Subcutaneous mycoses- Rhinosporidium, Sporothrix, Dematiaceous fungi
Anti-mycotic agents
Systemic infections-Blastomyces,Coccidioides, Paracoccidioides, Histoplasma

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M.Sc.(MLT) Part II- Second year

PME02MLT01: Clinical Hematology, Histopathology & Cytology

Must know:

Unit 1 : Clinical Hematology

- Hemoglobin and blood cells
- PCV & blood indices and classification of anemia
- Making of thin and thick peripheral smear
- Peripheral smear examination , RBC
- Peripheral smear, WBC , platelets parasites
- Bone marrow examination
- Automated Blood cell counters
- Anaemias and leukemias
- Lab. diagnosis of anaemias and leukemia
- Quality control in Hematology

Unit 2: Blood coagulation disorders

- Disorders of hemostasis and coagulation
- Laboratory tests to detect coagulation defect.

Unit 3 : Histopathology

Instruments and reagents in Histopathology
Histopathology techniques- fixatives and stains used
Frozen section
Quality control in Histopathology

Unit 4 : Cytology

Instruments, techniques and Stains in cytology
Exfoliative cytology
Cytology of body cavity fluids (Effusions)
Fine needle aspiration cytology (FNAC)
Quality control in Cytopathology

PME02MLT02 : Clinical Pathology (applied) & Blood Banking

Must Know:

Unit 1 : Urine & Stool

- Correlation of urine and stool abnormalities with various pathological conditions

Unit 2: Body fluids

- CSF - Collection preservation of sample, physical chemical microscopic examination of CSF, abnormal CSF findings in various diseases.
- Pleural pericardial and peritoneal fluid examination: Collection of samples , physical , chemical microscopic examination with clinical correlation of abnormal findings
- Synovial & seminal fluid examination: Collection of samples, physical, chemical microscopic examination with clinical correlation of abnormal findings
- Quality control in Clinical Pathology

Unit 3: Immuno Hematology

- Instruments in blood banking
- Blood group - Genetics
- Techniques of blood typing and cross matching
- Coomb's tests - techniques and application of Coomb's test
- Du tests
- Hemolytic disease of newborn -causes and laboratory investigation
- Donor selection and deferrals
- Tapping of a donor
- Blood storage
- Screening of donor
- Diseases transmitted through Blood
- Laboratory investigation prior to blood transfusion
- Blood component therapy
- Transfusion reaction and investigation for detection of T.R.
- Apheresis
- Quality control in Blood Banking

PME02MLT03 : Clinical Biochemistry

Must Know:

Unit 1: Metabolism of carbohydrates

- Major metabolic pathways, importance
- Blood sugar regulation (Hormonal)
- Abnormalities , Diabetes mellitus, GTT
- Glycated-Hemoglobin

Unit 2: Metabolism of Lipids

- Beta oxidation, Ketogenesis, Ketosis
- Adipose tissue
- Lipoprotein metabolism in health and disease , Chylomicrons, VLDL, IDL, LDL and HDL
- Atherosclerosis and cholesterol metabolism
- Fatty liver, Fatty acid synthesis

Unit 3: Metabolism of proteins

- Deamination, Transamination , Decarboxylation of amino acids.
- Formation of ammonia , Detoxification of ammonia
- Urea cycle disorders
- In born errors of amino acid metabolism
- Special products formed from amino acids

Unit 4:

- Hb Synthesis, Porphyrias, Heme breakdown ,Jaundice ,Van den bergh test
- Bilirubin metabolism

Unit 5:

- Purine catabolism and gout
- Diagnostic use of enzyme and Isoenzymes

Unit 6:

- Liver function tests
- Renal function tests
- Pancreatic function tests
- Thyroid function tests
- Cardiac function test
- Internal & External Quality control.

Unit 7: Molecular Biology

- DNA replication, Transcription, Translation
- Protein Targeting and folding
- DNA recombinant Technology
- Gene therapy, PCR , Blot techniques , RFLP, VNTR, Gene Library

Unit 8:

- Free radicals and antioxidants
- Cancer and cancer markers - Biochemical aspects

PME02MLT04 : Systemic & Clinical Microbiology

Unit 1: Bacteriology:

Morphology, Cultural Characteristics, Antigenic structures, Pathogenesis (in brief)
Laboratory Diagnosis of following bacteria:

Must know:

- *Staphylococcus, Streptococcus including Pneumococcus, Neisseria,*
- *Bacillus, Corynebacterium, Clostridium,*
- *Enterobacteriaceae ,*
- *Mycobacteria,*
- *Vibrios, Campylobacter, Pseudomonas,*
- *Actinomycets, Nocardia, Listeria, Haemophilus,*
- *Bordetella, Brucella,*
- *Spirochaetes, Chlamydiae, Rickettsiae, Mycoplasma.*

Nice to know:

Lactobacillus, Micrococcus,
Branhamella & Moraxella,
Coryneform organisms other than Corynebacterium,
Bacteroides, Fusobacterium and Leptotrichia,
Aeromons, Plesiomonas, Spirillum, Actinobacillus,
Erysipelothrix,Pasteurella,Francisella, Ureaplasma and Acholeplasma

Unit 2: Virology:

Must know :

- The Nature and classification of viruses,
- Morphology : virus structure and Virus replication,
- The genetics of viruses, The pathogenicity of viruses
- Bacteriophage,
- General properties, diseases caused, lab diagnosis and prevention of
  - Herpes viruses,
  - Rubella virus,
  - Influenza viruses,
  - Paramyxoviridae,
  - Polio,
  - Hepatitis viruses,
  - Rabies virus,
  - Human immunodeficiency viruses,
  - Oncogenic viruses,

Nice to know:

- Epidemiology of viral infections
- Pox viruses,
- Echo and Coxsackie viruses,
- Enteric viruses other than Polio virus
- Rhinoviruses,
- Adenoviruses and Corona viruses,

Unit 5: Clinical Microbiology applied to Tropical Medicine and Recent advances;

***Must know* :**

- Aetiology and Laboratory diagnosis of Respiratory infections, Urinary tract infections, Pyrexia of unknown origin, Meningitis, Sepsis, Septicemia, Diarrhoeal diseases & food poisoning.
- Prevention and Control of Hospital acquired infections
- Immunoprophylaxis: Types of vaccines and schedule of vaccination.
- Principal and Practice of Hospital waste disposal
- Recent advances in diagnostic microbiology: Automation, Nucleic acid based detection methods.

***Nice to know*:**

- Epidemiology common infectious diseases
- Newer vaccines
- Bio-terrorism

List of Practials/skills

1. Pathology:

Students should be able to perform:

Haematology :

Must acquire

Microscopy
Collection of Blood
Bulbs for collection
Blood cell counter
Estimation of Hemoglobin
RBC count
PCV & RBC indices
Platelet count
Total WBC count
Differential count
Peripheral smear
Reticulocyte count
ESR
Sickling tests
Bleeding time & Clotting time

Nice to acquire:

Hb Electrophoresis
Bone marrow examination
Foetal Hb Estimation
Absolute eosinophil count
Osmotic fragility tests
PT
APTT
D-Dimer test

Clinical Pathology :

Urine Exam. R & M
Stool R & M
Semen examination R & M
CSF Exam. R & M

Blood Banking

Blood Group
CM Tests
Du Tests
Comb's Tests,
Antibody Tests

Histopathology & cytology

Must acquire

Preparation of fixatives
Haematoxylin and eosin

Nice to acquire:

Logging of tissue processing
Paraffin embedding
Section cutting
Staining
Mounting
Pap Stain.

2. Biochemistry:

Students should be able to perform:

Must acquire

Preparation of standard solution, molar solution and other reagents
analysis of normal and abnormal urine
Estimation of blood /serum glucose by various methods
GTT
Estimation of total protein and A/G ratio
Electrophoresis of plasma proteins
Electrophoresis of lipoproteins
Estimation of total cholesterol and its fractions
Estimation of calcium
Estimation of phosphorous
Estimation of Creatinine
Estimation of urea
Estimation of uric acid
Estimation of AST
Estimation of ALT
Estimation of alkaline phosphatase
Estimation of Bilirubin , direct , total
Auto analyzers
Electrolyte analyzer
Arterial blood gas analyzer
Chemiluminance equipment
Spectrophotometer

Nice to acquire:

- Estimation of iron and TIBC
- Chromatography

3. Microbiology:

Students should be able to perform:

Bacteriology

Must acquire

Aseptic practices in laboratory and safety precautions

Preparation and pouring of media – Nutrient agar, Blood agar, Mac Conkey agar, Sugars, Serum sugars, TSI, Robertsons cooked meat, Lowenstein Jensens, Sabouraud dextrose

Operation of autoclave, hot air oven, distillation plant, filters like Sietz and membrane and sterility tests.

Washing and sterilization of glassware (Plugging and packing)

Preparation of reagent – Oxidase, Kovac's, etc.

Disposal of contaminated materials like cultures.

Quality control of media, reagents etc.

Care and maintenance of common laboratory equipments like water bath, centrifuge, refrigerators, incubators, etc.

Preparation of antibiotic discs; performance of antimicrobial suceptibility testing e.g. Kirby-Bauer, Estimation of Minimal Inhibitory/Bactericidal concetrations by tube/plate dilution methods.

Collection of specimens for Microbiological investigations such as Blood, Urine, Pus (Swabs), OT specimens.

Identification of Bacteria of Medical Importance upto species level

Preparation of stains viz. Gram, Alberts, Ziehl Neelsen (ZN) etc. and performing of staining.

Care and operation of Microscopes viz. Light and Fluorescent microscopes.

Preparation, examination, and interpretation of direct smears from clinical specimens, viz. Sputum for AFB: ZN, Slit smears for *M. leprae* by modified ZN staining,

Quantitative analysis of urine by pour plate method and semi-quantitative analysis by standard loop test for finding significant bacteruria.

Plating of clinical specimens on media for isolation, purification, identification and quantitation purposes.

Methods for the preservation of bacteria, Maintenance of stock cultures.

Tests for motility: hanging drop preparation

Culture and Antimicrobial susceptibility tests for mycobacteria.

Nice to acquire:

Testing of disinfectants – phenol coefficient and "in use" tests

Collection of specimens for Microbiological investigations such as Throat swab, Rectal swab,

Techniques of anaerobiosis, anaerobic jars, evacuation and filling with CO_2 and H_2.

Preparation of stains viz., capsules, spores etc. and performing of staining.

Care and operation of Dark Ground and Phase contrast Microscopes .

Preparation, examination, and interpretation of direct smears from clinical specimens, viz. Sputum for AFB by Auramine O, Conjunctival smear for Chlamydiae by Giemsa/ Iodine.

Tests for craige's tube, dark ground examination for spirochaetes Treponema and Leptospira.

Skin tests like Mantoux, Lepromin, etc.

Special tests-Bile solubility, chick cell agglutination, sheep cell haemolysis, niacin and catalase tests for mycobacterium, satellitism, CAMP test, catalase, slide agglutination tests.

Immunology

Must acquire :

Collection of blood by venipuncture, separation of serum and preservation of serum for short and long periods.

Performance of serological tests viz. Widal, VDRL/RPR

Enzyme linked immunosorbant assay: HIV, HBsAg, HCV

Latex agglutination tests: RA, CRP,

Rapid tests (Immunochromatography or Flow through type) HIV .

Nice to acquire:

Performance of serological tests viz. Brucella tube agglutination, Weil-Felix, cold agglutination, indirect haemagglutination, Paul-Bunnel, Rose-Waaler, IFA.

Immunodiffusion in gels (Ouchterlony), counter immunoelectrophoresis.

Staphylococcal co-agglutination tests.

Mycology

Must acquire

Collection of specimens

Direct Examination of specimens by KOH, Gram, Kinyoun's, Giemsa, Lactophenol Cotton Blue stains.

Isolation and identification of common laboratory contaminants, dermatophytes and others of medical importance (Yeasts, dematiaceous fungi)

Maintenance of stock culture.

Nice to acquire:

Special techniques like Wood's Lamp examination, hair baiting, hair perforation, paraffin baiting and slide culture.

Parasitology:

Must acquire

Examination of faeces for parasitic ova and cysts etc. by direct and concentration methods (Salt flotation and Formol-Ether methods).

Examination of blood for protozoa and helminths by wet mount, thin and thick stained smears.

Examination of other specimens e.g. Urine, CSF, Bone marrow etc. for parasites.

Performance of stains – Leishman, Giemsa.

Nice to acquire:

Identification of common arthropods and other vectors viz., Mosquito, sand-fly, Ticks, Mite, Cyclops.

Collection of specimens.

Preservation of parasites-mounting, fixing, staining, etc.

Serodiagnosis of parasitic infection.

2. Virology:

Must acquire

Serological tests – ELISA for HIV, HBsAg, HCV

Nice to acquire:

RPHA for HBsAg, Haemagglutination Inhibition for Influenza, and Haemadsorbtion for parainfluenza.

Chick Embryo techniques – inoculation and harvesting.

SUGGESTED BOOKS :

1. Dr. Praful B. Godkar,Text Books of Medical Laboratory Technology
2. Anathanarayana & Panikar – A Text Book of Medical Microbiology
3. Monica Cheesbrough, District Laboratory Practice in Tropical countries –Partl & Part II
4. P. Chakraborthy- A Text Book of Microbiology
5. Vasudevan & Shreekumar : Biochemistry for Medical students
6. Dacie, Practical Haematology
7. K.Laxminarayan : Histological techniques
8. Dr. Mukherjee, Medical Laboratory Technology, Volume I , II & II
9. J G College et al, Mackie & Mc Cartney Practical Medical Microbiology, 14th Edn, 1996, London, Churchill Livingstone.
10. Silvertone : Introduction to Medical Lab. Technology
11. Manual for Clinical Pathology by Sabitry Sanyal
12. Chatterjee , KD – Parasitology
13. Bancroft, Cellular Pathology Technique
14. Harper's Biochemistry
15. Mamuel Baron, Medical Microbiology, 3rd Edn, 1991, Churchill livingstone Inc.
16. John G Holt et al, Bergey;s Manual of Determinative Bacteriology, 9th Edn, 1994, Maryland, Williams & Wilkins.
17. Albert Balows, Mannual of Clinical Microbiology, 5th Edn, 1991, Washington DC Americal Society for Microbiology
18. Ellen Jo Baron et al: Bailey & Scott's Diagnostic Microbiology, 9th Edn,1994, Missouri, Mosby
19. Bob A freeman, Burrows Textbook of Microbiology, 21st Edn, 1979, W.B. Saunders.
20. Elmer W Koneman et al, Introduction to Diagnostic Microbiology, 1994, Philadelphia, J B Lippincott company.
21. Danial Greenwood et al, Medical Microbiology, A guide to Microbial Infections, Pathogenesis, Immunity, Laboratory Diagnosis and control, 15th Edn, 1997, London, Churchill Livingstone.