

SUMANDEEP VIDYAPEETH

(Declared as Deemed to be University under Section 3 of the UGC Act 1956)

Accredited by NAAC with a CGPA of 3.53 out of four-point scale at 'A' Grade

Category – I deemed to be university under UGC Act - 2018

At & Post Piparia, Tal: Waghodia 391760 (Gujarat) India.

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CURRICULUM Master of Science (M.Sc) MEDICAL LABORATORY TECHNOLOGY

Attested CTC

Charaney
15/2/2021

Vice-Chancellor
Sumandeep Vidyapeeth
An Institution Deemed to be University
Vill. Piparia, Taluka: Waghodia.
Dist. Vadodara-391 760. (Gujarat)

Chavhan



Chandrasekhar



AMENDED UP TO DECEMBER -2020

INTRODUCTION

Scope

The quality of paramedical care has improved tremendously in the last few decades due to the advances in technology, thus creating fresh challenges in the field of healthcare. It is now widely recognized that health service delivery is a team effort involving both clinicians and non-clinicians, and is not the sole duty of physicians and nurses. Professionals that can competently handle sophisticated machinery and advanced protocols are now in high demand. In fact, diagnosis is now so dependent on technology, that paramedical and healthcare professionals are vital to successful treatment delivery.

Effective delivery of healthcare services depends largely on the nature of education, training and appropriate orientation towards community health of all categories of health personnel, and their capacity to function as an integrated team, with a range of skills and expertise, play key roles within the National Health Service, working autonomously, in multi-professional teams in various settings. All of them are first-contact practitioners and work across a wide range of locations and sectors within acute, primary and community care.

Learning goals and objectives for paramedical healthcare professionals

The learning goals and objectives of the undergraduate and graduate education program will be based on the performance expectations. They will be articulated as learning goals (why we teach this) and learning objectives (what the students will learn). Using the framework, students will learn to integrate their knowledge, skills and abilities in a hands-on manner in a professional healthcare setting.

Program outcomes

- The objective is to train a candidate so as to ensure higher competence in both general and special.
- Area of interest and prepare him/her for a career in teaching, research and specialty practice.
- Candidate must achieve a high degree of professional proficiency in the subject matter and develop competence in research and its methodology as related to the field concerned.

Commitment to professional excellence

The student will execute professionalism to reflect in his/her thought and action a range of attributes and characteristics that include technical competence, appearance, image, confidence level, empathy, compassion, understanding, patience, manners, verbal and non-verbal communication, an anti-discriminatory and non-judgmental attitude, and appropriate physical contact to ensure safe, effective and expected delivery of healthcare.

Duration of the course:

Duration of the course is two years

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Eligibility criteria: Bachelors in Medical Laboratory Technology


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Attendance:

A candidate has to secure minimum 80% attendance in overall with at least-

1. 75% attendance in theoretical
2. 80% in Skills training (practical) for qualifying to appear for the final examination.

No relaxation, whatsoever, will be permissible to this rule under any ground including indisposition etc.

Medium of instruction:

English shall be the medium of instructions for all the subjects of study and for examination of the course.

Assessment:

Assessments should be completed by the academic staff, based on the compilation of the student's theoretical & clinical performance throughout the training program me. To achieve this, all assessment forms and feedback should be included and evaluated. Student must attain at least 50% marks in each Theory, Internal assessment and Practical independently / separately for each individual subject.

Course of Instruction:

Course Name	Course Code	Theory (In hrs.) (Class and lab)	Practical (In hrs.) (Clinical)
FIRST YEAR - Total Hours 730			
Basics of Clinical Pathology and Haematology	MMLT101	80	100
General biochemistry	MMLT102	150	250
Microbiology	MMLT103	50	100
		280	450
SECOND YEAR- Total Hours 1220			
Clinical Haematology, Histopathology & Cytology	MMLT201	80	100
Clinical Pathology (applied) & Blood Banking	MMLT202	80	100
Metabolism and Applied biochemistry	MMLT203	80	100
Systemic & Clinical Microbiology	MMLT204	80	100
		320	400
Dissertation	MMLT205	-	500

Scheme of Examination:

Course	Subject Code	Assessment			
		Hours	Internal	External	Total
FIRST YEAR					
Basics of Clinical Pathology and Haematology	MMLT101	3	20	80	100
General biochemistry	MMLT102	3	20	80	100
Microbiology	MMLT103	3	20	80	100
		60	240	300	
SECOND YEAR					
Clinical Haematology, Histopathology & Cytology	MMLT201	3	20	80	100

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Clinical Pathology (applied) & Blood Banking	MMLT202	3	20	80	100
Metabolism and biochemistry Applied	MMLT203	3	20	80	100
Systemic & Clinical Microbiology	MMLT204	3	20	80	100
Total			80	320	400

FIRST YEAR M. SC MEDICAL LABORATORY TECHNOLOGY

MMLT101 - BASICS OF CLINICAL PATHOLOGY AND HAEMATOLOGY (80 HOURS)

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 haemostasis
- Mechanism and stages of coagulation
- Immunohematology: Blood grouping system, natural & immune antibodies

Unit 4 - Haemoglobin and blood cells

- Erythropoiesis
- Red cell membrane
- Globin
- Heme
- Destruction of Red blood cells
- Leucopoiesis
- Granulocytes, Agranulocytes, Platelets
- Anticoagulants
- Diluting haematological fluids
- Haematological stains

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PRACTICAL:**(100 HOURS)**

- Microscopy
- Collection of Blood
- Bulbs for collection
- Blood cell counter
- Estimation of Haemoglobin
- RBC count
- PCV & RBC indices
- Platelet count
- Total WBC count
- Differential count
- Peripheral smear
- Reticulocyte count
- ESR
- Sickling tests
- Bleeding time & Clotting time
- Hb Electrophoresis
- Bone marrow examination
- Foetal Estimation
- Absolute eosinophil count
- Osmotic fragility tests
- PT
- APTT
- D-Dimer test

MMLT102 - GENERAL BIOCHEMISTRY**(150 HOURS)****Unit 1 - General Introduction**

- Introduction to Clinical Biochemistry, Study of weights, volumes and Units, Measurements, Preparation of solution, Normal range, Different anticoagulants used in Clinical Biochemistry, Biochemical Hazards.

Unit 2- Biophysical chemistry

- Cell, the cell organelles, membrane, structure of bio membrane, transport across bio membranes, the fluid mosaic model of bio membranes, surface tension, viscosity, *Donnan* membrane equilibrium, osmosis, diffusion, osmotic pressure, oncotic pressure.

Unit 3 - Chemistry of Carbohydrates**Attested CTC**

- Biological significance, Definition, classification, Structural properties of Monosaccharides, Oligosaccharides, Polysaccharides and their derived sugar.

Unit 4 - Chemistry of Lipids**Vice-Chancellor****Sumandeep Vidyapeeth**

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- Definition, Function, properties and Classification of Lipids Fatty acids types and uses, Glycerides, Phospholipids, Glycolipids, Ecosan ides, Steroids, Cholesterol, Lipoproteins.

Unit 5 - Chemistry of Amino acids and proteins

- Definition of amino acids, Classification based on structure, requirement, metabolic fate, solubility, Physical properties of Amino acids, Chemical properties of amino acids. Isoelectric pH

Unit 6 - Proteins

- Definition, Structure, structural classification, Functional classification. Peptide bonds structural Motifs in protein such as Helix, B pleated sheets. Reactions of proteins such as denaturation, heat coagulation, precipitations and colour reaction.

Unit 7 - Nucleotides and nucleic acids

- Nucleotides, Purines and Pyrimidines. Sugars in nucleotides, DNA structure, Genes and chromosomes. Structure, function and types of RNA.

Unit 8 - Enzymology

- General characteristics, nomenclature, IUB classification, definitions with examples of holoenzyme, Apo enzyme, coenzymes, prosthetic groups, cofactors, activators, inhibitors, active site, metalloenzymes, monomeric enzymes, oligomeric enzymes and multienzyme complexes. Mechanism of Enzyme Catalysis, Factor affecting enzyme activity, Michalis Menten kinetic theory of enzyme action, Enzyme inhibition and Regulation of Enzyme.

Unit 9 - Vitamins

- Fat soluble and water-soluble vitamins, Sources, RDA and Deficiency

Unit 10 - Nutrition

- Diet, calculation of balanced diet, disorders of protein energy malnutrition.

Unit 11 - Water and electrolytes, Acid Base balance

- ECF, ICF, Intra cellular and extra cellular electrolytes. Dehydration, Acidosis, alkalosis, Buffers, means of maintaining pH

Unit 12 – Endocrinology

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- Definition, Classification, mechanism of hormone action and regulation of hormone secretion.

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- Chemistry, metabolism, biological functions and disorders of-Hypothalamus & Pituitary hormones, Thyroid hormones, Parathyroid hormones, Pancreatic hormones, Adrenal hormones and Gonadal hormones.

Unit 13 – Instrumentation

- Colorimetry, Spectrophotometry, Fluorimetry, Flame photometry Chromatography, Electrophoresis, RIA , ELISA , Chemiluminescent, electrolyte analyser analyser, Dry chemistry Analyzer Automation in Clinical Biochemistry Laboratory.

PRACTICALS:

(250 HOURS)

- 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 analysers
- Electrolyte analyser
- Arterial blood gas analyser
- chemiluminescence equipment
- Spectrophotometer
- Estimation of iron and TIBC
- Chromatography

MMLT103 -MICROBIOLOGY

(50 HOURS)

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)

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Unit 2 - Microscopy

- Microscopy, Stained preparation, Size & Shape
- Morphology of bacteria: Structures of a bacterial cell and their functions

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- Physiology of Bacteria: Nutrition, Gaseous requirement, temperature requirement
- and other growth requirements

Unit 3: Sterilization

- 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 - Bacteriology

- Normal flora of human body,
- Bacteriology of Air, Water and Milk
- Antimicrobial agents: Mechanism of actions
- Bacterial metabolism: Oxidation, Fermentation

Unit 6 - Infection

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

Unit 7 - Immune System

- 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
- Immunochromatography

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

Unit 11 - Parasitology

- Morphology, life cycle, laboratory diagnosis of following parasites
- *Entamoeba*, *Giardia*, *Trichomonas*,
- *Leishmania*, *Trypanosoma*,
- *Plasmodium*,
- *Toxoplasma*, *Cryptosporidium*.
- Helminthology
- *Taenia*, *Echinococcus*, *Hymenolepis*,
- *Schistosomes*,
- *Trichuris*, *Strongyloides*, *Ancylostoma*,
- *Ascaris*, *Enterobius*, *Wuchereriabancrofti*
- *Sarcocystis*, *Babesia*, *Balantidium*, *Dipylidium*, *Multiceps*,
- *Gastrodiscoides*, *Parazonium's*, *Opisthorchis*, *Necator*, *Toxocara*, *Dracunculus*
- Ectoparasites: Common arthropods and other vectors viz. Mosquito, Sand fly,
- Ticks, Mite, Cyclops

Unit 12 - Mycology:

- The morphology and reproduction in fungi.
- Classification of fungi
- Morphology, diseases caused and lab diagnosis of:-
- Opportunistic fungi - Cryptococcus, Candidiasis, Aspergillus, Zygomycetes.
- Fungi causing superficial mycoses - Dermatophytes
- Subcutaneous mycoses - Mycetozoa

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Anarav
15/1/2021

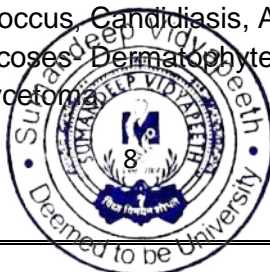
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- Fungi causing superficial mycoses- Ptyriasisversicolor, TineaNigra, Piedra
- Subcutaneous mycoses- Rhinosporidium, Sporothrix, Dematiaceous fungi
- Anti-mycotic agents
- Systemic infections-Blastomyces, Coccidioides, Paracoccidioides, Histoplasma

PRACTICALS:

(100 HOURS)

Immunology

- Collection of blood by veni puncture, separation of serum and preservation of serum for short and long periods.
- Performance of serological tests viz. Widal, VDRL/RPR
- Enzyme linked immunosorbent assay: HIV, HBsAg, HCV
- Latex agglutination tests: RA, CRP,
- Rapid tests (Immunochromatography or Flow through type) HIV.
- Performance of serological tests viz. Brucella tube agglutination, Weil-Felix, cold agglutination, indirect haem agglutination, Paul-Bunnell, Rose-Waaler, IFA.
- Immunodiffusion in gels (Ouchterlony), counter immunoelectrophoretic.
- Staphylococcal co-agglutination tests.

Mycology

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

Parasitology

- 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.
- 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.
- Serological tests – ELISA for HIV, HBsAg, HCV

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SECOND YEAR M. SC MEDICAL LABORATORY TECHNOLOGY

Each student shall undergo training in Skill Simulation Laboratory for learning certain basic clinical skills like IV/IM injection, setting IV-line, Cardio-pulmonary resuscitation (CPR), and Life support skills in the beginning of second year, for duration of continuous four days. (Board of Studies letter No.: FPMS/SV/BOS-MIN/0006/2016-17, dated 19/04/2017, and vide notification of Board of Management resolution Ref.: No. SVDU/R/2017-18/5056, dated 09/01/2018).

MMLT201- CLINICAL HAEMATOLOGY, HISTOPATHOLOGY & CYTOLOGY (80 HOURS)

Unit 1 - Clinical Haematology

- Haemoglobin and blood cells
- PCV & blood indices and classification of anaemia
- 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 leukaemia's
- Lab. diagnosis of anaemias and leukaemia
- Quality control in Haematology

Unit 2 - Blood coagulation disorders

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

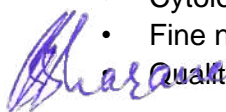
Unit 3 - Histopathology

- 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
- Effusive cytology
- Cytology of body cavity fluids (Effusions)
- Fine needle aspiration cytology (FNAC)
- Quality control in Cytopathology

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PRACTICAL:**(100 HOURS)**

- Preparation of fixatives
- Haematoxylin and eosin
- Logging of tissue processing
- Paraffin embedding
- Section cutting
- Staining
- Mounting
- Pap Stain

MMLT202 - Clinical Pathology (applied) & Blood Banking**(80 HOURS)****Unit 1 - Urine & Stool**

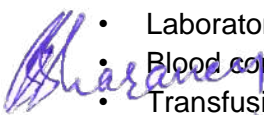
- Correlation of urine and stool abnormalities with various pathological conditions

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

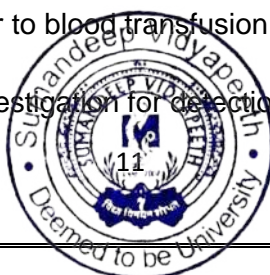
Unit 3 - Immuno Haematology

- 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
- Haemolytic disease of new born -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.

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- Apheresis
- Quality control in Blood Banking

PRACTICAL:

(100 HOURS)

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

MMLT203 - METABOLISM AND APPLIED BIOCHEMISTRY

(80 HOURS)

Unit 1 - Overview of Cells and Bioenergetics:

- Concept of metabolism, ETC and Oxidative phosphorylation: Sequence of electron carriers, sites of ATP production, inhibitors of ETC, mechanism and regulation of mitochondrial oxidative phosphorylation, ATP synthase, uncouplers of oxidative phosphorylation.

Unit 2 - Carbohydrate Metabolism

- Digestion and absorption of carbohydrates Reactions, energetics and Regulation of glycolysis, TCA cycle, gluconeogenesis, glycogenesis and glycogenolysis. Reactions and physiological significance of HMP shunt with its regulation. Regulation of Blood Glucose Level, Diabetes, Glucosaemia, Oral Glucose tolerance test (OGTT), Glycated Haemoglobin.

Unit 3 - Metabolism of Lipids

- Digestion and absorption of lipids Transport and mobilization of lipids, oxidation of saturated fatty acids , oxidation of unsaturated and odd-chain fatty acids, role of carnitine in transport of fatty acid, energetics of -oxidation scheme, metabolism of ketone bodies and its biological significance, Metabolism of lipoproteins, Lipoproteins, Fatty liver and lipotropic factors, Atherosclerosis

Unit 4 - Metabolism of Proteins

- Digestion and Absorption of Proteins, Trans- amination and De- amination, Formation and detoxification of ammonia Urea cycle One carbon metabolism, Phenylketonuria, Alkaptonuria, Albinism, Maple syrup urine disease.

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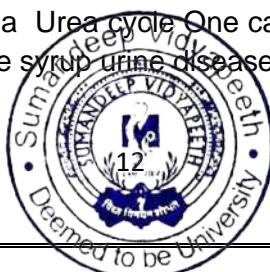
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Unit 5 - Haemoglobin Metabolism

- Structure and Functions of Haemoglobin, Abnormal Haemoglobin, Hem synthesis, Porphyria's, Bilirubin metabolism, Jaundice

Unit 6 - Nucleic acid Metabolism

- Biosynthesis and degradation of purines and pyrimidines, regulation of Purine pyrimidine biosynthesis, De-novo synthesis of Nucleic acid Gout, Leschi Nyman's syndrome

Unit 7 - Integration of metabolism and starvation metabolism

- Feed Cycle (Metabolic changes), Fast Cycle (Metabolic Changes during Starvation)

Unit 8 - Mineral and trace elements

- Iron Metabolism, Ca metabolism, Trace elements metabolism

Unit 9 - Acid base balance

- Metabolic acidosis, Metabolic alkalosis, Buffer system (Blood, Kidney etc...)

Unit 10 - Molecular biology

- DNA replication, Transcription, Translation, Protein Targeting and folding, DNA recombinant Technology, Gene Expression, Gene therapy, Gene Library, PCR, Blot techniques , RFLP, DNA sequencing, Human genome project.

Unit 11 - Organ Function Test

- Liver function tests, Renal function tests, Pancreatic function tests, Thyroid function tests, Gastric function test, Cardiac function test

Unit 12 - Free radicals in Health and diseases

- Generation of Reactive oxygen species (ROS), etiology in diseases and Free radical Scavenger System

Unit 13 - Cancer

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- Distinctive feature and etiology of Cancer. Oncogenes, proto-oncogenes and Tumour Markers

Unit 14 - Detoxification

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- Free radicals and antioxidants, Metabolism of xenobiotics (Conjugation Rxn.), Mechanism for Regulation of Water Electrolyte

Unit 15 - Quality Control

- External and Internal Quality Control in Biochemistry Laboratory.

MMLT204 - SYSTEMIC & CLINICAL MICROBIOLOGY

(80 HOURS)

Unit 1 - Bacteriology

- Morphology, Cultural Characteristics, Antigenic structures, Pathogenesis (in brief)
- Laboratory Diagnosis of following bacteria:
- *Staphylococcus*, *Streptococcus* including *Pneumococcus*, *Neisseria*,
- *Bacillus*, *Corynebacterium*, *Clostridium*,
- *Enterobacteriaceae*,
- *Mycobacteria*,
- *Vibrio*, *Campylobacter*, *Pseudomonas*,
- *Actinomycetes*, *Nocardia*, *Listeria*, *Haemophilus*,
- *Bordetella*, *Brucella*,
- *Spirochaetes*, *Chlamydiae*, *Rickettsia*, *Mycoplasma*.
- *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

- 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,
- Epidemiology of viral infections
- Pox viruses,
- Echo and Coxsackie viruses,

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- Enteric viruses other than Polio virus
- Rhinoviruses,
- Adenoviruses and Corona viruses,

Unit 3 - Clinical Microbiology applied to Tropical Medicine and Recent Advances

- Aetiology and Laboratory diagnosis of Respiratory infections, Urinary tract infections, Pyrexia of unknown origin, Meningitis, Sepsis, Septicaemia, 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.
- Epidemiology common infectious diseases
- Newer vaccines
- Bio-terrorism
- Microbiology lab waste management: Contaminated broken glass ware is packed in autoclavable plastic bags and sterilized. These bags are transferred to waste container which is disposed of either by incinerating them or via municipal trash

PRACTICALS:

(100 HOURS)

Microbiology

- Aseptic practices in laboratory and safety precautions
- Preparation and pouring of media – Nutrient agar, Blood agar, Mac Cockney agar, Sugars, Serum sugars, TSI, Robertson's cooked meat, Lowenstein Jensen, Sabouraud
- Dextrose
- Operation of autoclave, hot air oven, distillation plant, filters like Seitz 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 equipment's like water bath, centrifuge, refrigerators, incubators, etc.
- Preparation of antibiotic discs; performance of antimicrobial susceptibility testing e.g. Kirby-Bauer, Estimation of Minimal Inhibitory/Bactericidal concentrations 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 up to 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.

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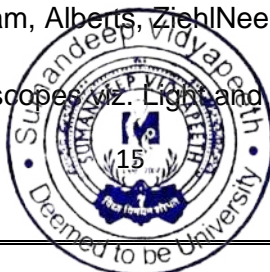
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- Preparation, examination, and interpretation of direct smears from clinical specimens, viz. Sputum for AFB: ZN, Slit smears for *M. leprae* by modified ZN staining,
- Quantitative analysis of urine by pour plate method and semi-quantitative analysis by standard loop test for finding significant bacteriuria.
- 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.
- 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 CO₂ and H₂.
- 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 Chlamydia by Giemsa/ Iodine.
- Tests for craig’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 hemolysis, niacin and catalase tests for mycobacterium, satellitism, CAMP test, catalase, slide
- Agglutination tests.

MMLT205 - Dissertation/Research project

(500 HOURS)

Each candidate pursuing M.Sc. Medical Laboratory Technology course is required to carry out work on selected research project under the guidance of a recognized post graduate teacher. The results of such a work shall be submitted in the form of dissertation/ research project. The dissertation/ research project is aimed to train a graduate student in research methods and techniques. It includes identification of problem, formulation of a hypothesis, search and review of literature, getting acquainted with recent advances, designing of a research study, collection of data, critical analysis, and interpretation of results and drawing conclusions.

Every candidate shall submit to the Registrar (Academic) of the University in the prescribed Performa, a synopsis containing particulars of proposed dissertation/ research project work within six months from the date of commencement of the course on or before the date notified by the University. The synopsis shall be sent through the proper channel. Such synopsis will be reviewed and the University will register the dissertation/ research project topic. No change in the dissertation topic/ research project or guide shall be made without prior approval of the University.

The dissertation/ research project should be written under the following headings:

- Introduction
- Aims or objectives of study
- Review of literature
- Material and methods
- Results
- Discussion
- Conclusion
- Summary

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15/2/2021

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References
Tables
Annexure

The written text of dissertation/ research project shall not be less than 50 pages and shall not exceed 100 pages excluding references, tables, questionnaires and other annexure. It should be neatly typed in double line spacing on one side of paper (A4 size, 8.27" x 11.69") and bound properly. Spiral binding should be avoided. A declaration by the candidate for having done the work should also be included, and the guide, head of the department and head of the institution shall certify the dissertation/ research project.

Four copies of Dissertation/ research project shall be submitted to the university, through proper channel, along with a soft copy (CD), 6 months before the final examination.

It shall be assessed by two examiners appointed by the university, one internal and one external. No marks shall be awarded for Dissertation/ research project. Acceptance of the dissertation/ research project is a pre-requisite for a candidate to be permitted to appear for final examination. If there are corrections in the dissertation / research project suggested by the examiner(s), the candidate may make such corrections and may be allowed to re-submit in time and if approved can appear for the examination.

Professional ethics

The ethical issues of microbiological characterization techniques in controlling the infectious diseases and avoiding the spreading include both individuals and public at large. Professional ethics is the moral bond that links a profession, the people it serves, and society

Ethics and accountability

Students will understand core concepts of clinical ethics and law so that they may apply these to their practice as healthcare service providers. Program objectives should enable the students to:

- Describe and apply the basic concepts of clinical ethics to actual cases and situations
- Recognize the need to make health care resources available to patients fairly, equitably and without bias, discrimination or undue influence
- Demonstrate an understanding and application of basic legal concepts to the practice employ professional accountability for the initiation, maintenance and termination of patient-provider relationships
- Demonstrate respect for each patient's individual rights of autonomy, privacy, and confidentiality.

CODE OF PROFESSIONAL CONDUCT

INTRODUCTION

The Code of Professional Conduct is designed and set out as guidance for the Cardiac Physiotherapist functioning as a clinical practitioner within the relationship that exists with every patient receiving health care.

Essential to that relationship is the patient's trust in the practitioner. This trust hangs upon the patient's assurance of being the practitioner's first concern during their clinical

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encounter, and upon the patient's confidence that the care received will be competent, whether in diagnosis, therapy or counseling.

STANDARD OF PRACTICE AND CARE

Patients are entitled to the highest standard of practice and care. The essential elements of this are professional competence, good relationships with patients and colleagues and observance of professional ethical obligations.

In providing care you must therefore:

- Recognize the limits of your professional competence.
- be willing to consult colleagues
- Keep clear, accurate and contemporaneous patient records which report the relevant findings.
- Keep colleagues informed.
- Pay due regard to the efficacy and the prudent use of resources.
- be competent, truthful, and accurate, when reporting on investigations.
- be competent when giving or arranging treatment.

KEEPING UP TO DATE

You must maintain the standard of your performance by keeping your knowledge and skills up to date throughout your working life. In particular, you should take part regularly in educational activities which relate to the clinical application of cardiovascular science and technology.

You must work with colleagues to monitor and improve the quality of the service which is provided.

Some parts of clinical and technical practice are governed by law. You must observe and keep up to date with the laws which affect your practice.

TEACHING

The Society for Cardio logical Science and Technology encourages you to contribute to the education and training of colleagues.

All competent practitioners should be prepared to supervise less experienced colleagues.

If you have special responsibilities for teaching you should develop the skills of a competent teacher. If you are responsible for training junior colleagues you must make sure they are properly supervised.

Patients' Rights

- Listen to patients and respect their views.
- Treat patients politely and considerately.
- Respect patients' privacy and dignity.
- Give information to patients in a way they can understand.

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- Respect the right of patients to be fully involved in decisions about their care.
- Respect the right of patients to refuse treatment or to take part in teaching or research, reporting the refusal to the person requesting the procedure.
- Respond to complaints promptly and constructively.
- Ensure that your views about a patient's life style, culture, beliefs, race, color, sex, sexuality, age, social status, or perceived economic worth, do not prejudice the service you give.

CONFIDENTIALITY

Patients have a right to expect that you will not pass on any personal information which you learn in the course of your professional duties, unless they agree.

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15/2/2021

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