HEMWATI NANDAN BAHUGUNA UTTARAKHAND MEDICAL EDUCATION UNIVERSITY, DEHRADUN

REGULATIONS & SYLLABUS FOR

BACHELOR OF MEDICAL LAB TECHNOLOGY (BMLT)

(w.e.f. Academic Session 2016-17)

B.Sc. MLT FIRST YEAR

PAPER I :

HUMAN ANATOMY & PHYSIOLOGY

Unit.I

Introduction to Medical Sciences.
Organization of human body and integrated physiology.
Cell organizations, fundamental tissues of body and organ systems.
Primary defense mechanism of human body against pathogenic microbes
Gross anatomy and histology of organs or respiratory system organs of respiration, Mechanism of respiration and factors controlling it.
Gross anatomy and histology of organs of alimentary system, organs of digestive system, various glands associated with the digestive system mechanism and physiology of digestion and absorption

Unit.II

Cells and organs of immune system : Morphology and their distribution
Gross anatomy and physiology of reticulo – endothelial system.
Secondary immune response of human body to external stimuli
Physiology of various body fluids: CSF, peritoneal Pericardial Pleural and synovial fluids.
Gross anatomy, history & physiology of excretory system.
Gross anatomy and histology of organs of cardiovascular system organs of the system. mechanism and physiology of blood flow through the cardiovascular system.

Unit.III

Gross anatomy and histology of musculo - skeletal system, classification & functions of bones and muscles. Physiology of muscular contraction and controlling them Various types of Joints and their physiology.
Gross anatomy and histology of organs of nervous system, division of nervous system and mechanism of nerve impulse transmission & reflex arc, and motor system sensory & motor systems special sense organs.
Gross Anatomy and histology of organs of reproductive system mechanism reproduction and factors controlling it.
Gross anatomy & histology of organs of endocrine system, different glands of systems and their distribution, mechanism of hormones production, factor controlling it and their mechanism of action.

B.Sc. MLT FIRST YEAR
PAPER- II
BASIC PATHOLOGY

Unit I

Introduction to Hematology . Laboratory organization & Safety measures Formation, composition and functions of blood.
Anticoagulants, mode of action of anticoagulants and their merits and demerits.
Collection, preservation, transport and handling and disposal of blood samples.
Basic hematology and estimation of haematiocrit values, physiological variations, normal and absolute values and quality assurance in hematology.

Unit II

Romanowsky dyes, preparation and staining procedures of blood smears. Morphology of blood cells and their identifications.
Haemo-globinometery : Various methods, errors involved and standardization of instruments.
Haemo-cytometry: procedure of cell count, visual as well as electronic, red cell, leukocyte and platelet count.Errors involved and means to minimize such errors.
Determinations of innate immunity and its mechanism, phagocytosis the compliment system, gross structure and development of cells concerned with antibody production, cellular processes involved in antibody formation .

Unit III

Pathology of Inflammation in response to microbial invasion . Pathology of localized and systemic infections . Various routes of transport of Microbes to human body and methods of defense Invasive techniques for diagnosis of acute and chronic microbial infections .
Pathology of specific chronic infective disorders : Tuberculosis, Leprosy , Syphilis , SABE (subacute bacterial endocarditis) and rheumatological disorders .
Study of microbes responsible for pathogensis of tumors and their oncogenesis .
Immuno- histopathology & Immuno – histochemistry (Basic Principles procedures and applications)
Introduction to blood banking technology.

B.Sc. MLT FIRST YEAR
PAPER- III
CLINICAL BIOCHEMISSTY

Unit I

Introduction to Clinical Biochemistry and role of Medical Lab Technologist, ethics, responsibility, safely measure and hazards in clinical biochemistry lab and first aid in laboratory accidents.

Basic awareness of laboratory in respect to equipments & glasswares (Unit of Measurements , and calibration of volumetric apparatus . Colorimetry , spectrophotometery , flame – photometry , analytical balance etc, (principles instrumentations & applications)

Preparation and storage of reagents standard solutions , buffer solutions and pH determination. Biophysics, techniques- osmosis , dialysis , surface tension , sedimentation and viscosity – principles & applicatons.

Sterilization and disinfection: Study of various's methods of sterilization – dry and moist heat radiation filtration autoclaving and chemical disinfection .

Henderson – Hassalbach equation and it's clinical applications. Acid base disturbances and their clinical significance Acid –base –buffer and pH-simple calculations. Concept of clinical sensitivity and specificity and factors affecting the clinical results.

Collection of blood specimens avoiding Haemolysis , de- proteinization & separation of serum/plasms. Physical and biochemical examination of urine samples : Qualitative tests of inorganic urinary ingredients : Chlorides, phosphate, sulphur compounds, sodium potassium calcium and magnesium and their clinical significance.

Qualitative tests for glycosuria , pentosuria , galactosuria, proteinuria microalbuminuria and Bence Jones proteinuria and their clinical significance Qualitative test of urine for uric acid urea and creatinine . Quantitative estimation of 2 hours urine for albumin and 17 ketosteroids and their clinical significance .

Physiological variation of biometabolytes in various body fluids and their clinical significance. Pathological changes in composition of body fluids and their clinical correlation. Qualitative test of urine for Ketone bodies, bile- pigments and urobilinogen and their clinical significance.

Unit II

1. Carbohydrates: Structure Classification and their function in biological system.
2. Lipids: General strucrure of Fatty Acids and classification of Liqids.
3. Proteins: Classification, structural organization and function of protein
4. Enzymes: Definition classification of Enzyme Concept of active sites and general mode of action of Enzymes.
5. Nucleic acids : Structure function and types of DNA and RNA. Nucleotides, Nucleosides Nitrogenbases and role of Nucleic Acid .

B.Sc. MLT FIRST YEAR

PAPER- IV

PREVENTIVE MEDICINE AND HEALTH CARE

Unit I

Water air and noise pollution : Removal of water hardness purification of water and standards of water quality . Air and noise pollution and their prevention . Housing and air conditioning .

Hygiene and sanitation: Sanitation barriers , excreta disposal and disposal of hospital waste . Incineration and disinfection .

Infections and control : Microbial pathogenicity, source and spread of infections in community, pathogenesis , toxigenicity, invasiveness , variations and virulence . Host factors controlling infections to men, mode of spread and their control by physical & Chemical agents.

Unit II

Epidemiology : Epidemiology, surveillance and control of community infections. Infections. Role of laboratory in community and hospital infections. Emergence of drug resistance . Methods of prevention & control – isolation of patients, quarantine & incubation periods of various infectious diseases. Management of patients infectious diseases hospital (IDH).

Prophylactic immunization : Rationale of immunization , immune response and duration of immunity . controlled studies of prophylactic vaccines and hazards immunization . various national immunization programs and vaccine schedules .

Reproductive , Family Planning & Child health Care programs .

Unit III

Bacteriology of water , milk, food and air : Bacteriological examination of water – collection of specimens, presumptive coliform count , cloakroom test, colony count and interpretation of results. Bacterial examination of sewage and sewage effluents. Bacteriological examination and control of swimming bath, membrane filter technique and isolation of pathogens,

Bacteriological examination milk , bacterial standards and various tests for pasterurized milk. Bacterial examination of ice- cream, shellfish and canned foods,milk bottles, crockery and cutlery. Examination of food stuff in cases of out break of food poisoning Bacteriological examination of air and environment dust.

Health care by balance diet and yoga : Normal constituents of diet, various diet programs. Balance diet and factors responsible for etiology of various nutritional disorders, Carcinogens in food. Role of regular exercise & yoga in prevention & management of various diseases.

Health planning & Management : Health planning. Planning Cycle, Malaria eradication & Various other Notional Health policy & Programs.

B.Sc. MLT FIRST YEAR
PAPER- V:
MICROBIAL BIOLOGY

Unit –I

Microbiology & Medicine : Introduction to Medical Microbiology, Discovery of microorganisms. Contribution of Robert Koch, Anatomy Van Leeuwen Hook, louis Pasteur, Bordet. Paul Ehrlich, Alexander Fleming, Matchnikoff , Needham, Tyndall Jensson, Joseph lister, Karls Landsteiner etc. Scope & relevance and Safety measures of Medical Microbiology. Role of medical microbiology in identification and management of various infectious diseases.

Morphology & Nature of bacteria : Anatomy of bacterial cell, intracellular components and their functions bacterial reproduction, morphological study of bacteria and its appendages- flagella, fimbriae, pili, capsule, spore and cysts.

Classification and identification of bacteria : Biological groups, morphological and biological classification DNA composition as a basis of classification system of identification – morphology, staining reactions, cultural characters, biochemical reactions & antigenic characters etc.

Sterilization and disinfection : Various physical methods of sterilization – heat UV radiation ionizing radiation, characters affecting sterilization , auto clave control and sterilization indicators. Chemical disinfectants- phenol and its compounds, alcohol halogen heavy metals and quaternary ammonium compounds, aldehyde, gaseous compound . Use and abuse of disinfectants.

Unit II

Cultural Media : Liquid and solid media, container for medias distribution of media in tubes, bottles and Petridishes. Common ingredients of cultural medias, Synthetic media peptone water, nutrient agar and broth, chocolate and blood agar, meat extract broth milk agar etc. Special medias for Neisseria, Corrynebacterium.Mycobacterium & Enterobacteriacae group etc.

Cultivation of bacteria : Instruments used, inoculation hood, laminar flow, culture procedure, incubation (Aerobic and Anaerobic). Isolation of pure culture and its preservation. Suspending media for freeze drying of bacteria Blood culture.

Pure cultures : Maintenance & preservation of pure cultures. Collection, transport processing & storage of clinical samples for Microbiological Analysis

Growth and Nutrition of Bacteria : Typical growth curve, various phases of growth physiology of bacteria- catabolism and anabolism. Nutrition of microbes and physical condition required for growth. Effect of Carbon, Nitrogen. Growth factors, Vitamins, Temperature. pH, Osmotic pressure. Oxygen and Carbon Di Oxide on microbial growth.

Unit III

Lab. Organisation. Managerment, Recording of Results and Quality in Medical Microbiology.

Principles of Staining Techniques , Preparation of Stains and their storage.

Introduction to Virology , Mycology & Parasitology : (characterstic, morphology classification nomenclature, pathogenesis)

Antimicrobial agents and antibiotic : Disinfectants antiseptics chemotherapeutic agents chemotherapeutic index, development of chemotherapy, antibiotics and effect of antibiotics on protein & nucleic acid synthesis and cytoplasmic membrane. Future development of chemotherapy.

B.Sc. MLT FIRST YEAR
PAPER- VI :
TECHNICAL METHODS IN MICROBIAL BIOLOGY

Unit I

Microscopy : Study of compound microscope – magnification, numerical aperture, resolution and components of microscope. Dark ground illumination care of microscope and common difficulties. Micrometry. Study of phase contrast, interference. Fluorescent an electron microscope. Preparation of smear for electron microscope.
Study of pH in Microbiology : Methods for measurements pH meter. Preparation, dilution and chemistry of suspension fluids. Oxidation – reduction (redox) potential.

Preparation of stains : Making of films. Staining methods, mounting media. Gram's stain – preparation of stain and staining methods. Special stains for AFB, Diptheria, spores, capsule, intracytoplasmic lipids, polysaccharides. Nuclear material, Field's stain, stain for amoebae, fungi and rickettssiae.

Unit II

Study of instruments used in Medical Microbiology –

1. **Genral Instruments :** Distillation plant , Certrifuge Mechine, Analytical Balance, Hotplate, Magnetic Stirrer, Water Bath, Automatic dispensers and diluters ,De idonizer etc.
2. **Microbiological Instruments :** Autoclave Incubator, Hot air oven, Laminar Air flow, Colony Counter, Muffle furnace. Refrigerator, Inoculator , Mac – Intos intos field – jar etc.
3. **Instruments used in immunology :** Electrophoresis, Immunodiffusion. Starplate, chromatography, ELISA reader, automatic washer and RIA equipments etc.
4. **Care and management of experimental animals:** General directions for the care of animals, material inoculated, necropsy, common diseases and experimental procedures. Various experimental animals – rabbits, guineapigs, mice, rats, hamsters, fowls and monkeys- their data, cages, feeding and handling.
5. **Safety measures in Microbiology Laboratory:** Occurrence of lab infections, route of infection in laboratory, safety measure precaution in use of pathogens in teaching. Lab organization management recording of results and quality control in Medical Microbiology Lab.
6. **Culture and Drug sensitivity tests :** Culture, isolation and identification of pathogens from urine, pus and sputum and recording of their results.

B.Sc. MLT SECOND YEAR
PAPER:- 1
CLINICAL BIOCHEMISTRY -1
(SEPARATIVE AND INSTRUMENTAL TECHNIQUES)

UNIT I

Chromatography : Thin layer Chromatography. Liquid Chromatography.
Electrophoresis – paper and gel electrophoresis for hemoglobin urinary proteins, serum, CSF & LDH.
Colorimetry, flame photometry, Atomic absorption spectroscopy.

Unit II

Immunochemical Immunoprecipitation, Immunofixation and radial Immunidiffusion tests.
Osmometry : Principle procedures and applications.
Semi auto-analyzer auto-analyzer, diluters & dry chemistry analyzer : Principal procedure and applications.

Unit III

Principal Procedure And Application OF:

Coulter counters,
Enyme Linked Immunobsorvent Assay (ELISA) Reader.
Radio- immunoassay. (RIA)
Polymerase chain reaction (PCR)

B.Sc. MLT SECOND YEAR
Paper II
CLINICAL BIOCHEMISTRY-II
(METABOLIC AND BLOOD CHEMISTRY)

Unit I

Carbohydrate metabolism, glycolysis, TCA and their clinical importance, Glucose tolerance test (GTT)
Protein metabolism-urea cycle and its biomedical significance.
Lipid metabolism, Beta-oxidation of fatty acids, ketonebodies, metabolic changes in liver and adipose tissues during starvation, lipid profile.

Unit II

Principle, assay procedures and clinical significance of following; Glucose, proteins,A/G, urea, BUN, uric acid, creatinin cholesterol, Billirubin (Direct & Indircet)
Electroytes: Quantitative estimation of sodium, potassium, calcium, chloride, lithium, phosophorus, magnesium and their clinical significance.

UnitIII

Acid base balance test, Xylose Absorption test and insulin tolerance test, Urea and creatinin clearance tests and their significance. Renal function tests and their clinical interpretation.
Glycosylated Hb& Liver function tests. Principle technique and clinical significance.

B.Sc. MLT SECOND YEAR
Paper III
MEDICAL MICROBILOGY-I
(BACTERIAL PATHOGENS & ASSOCIATED DISEASES)

Unit I

Normal microflora of human body: Skin, Respiratory system, and Genitourinary tracts. Source of infection, mode of spread and portals of entry.
Description. Pathogenecity, mode of infection, incubation period and toxigencity of :-

Staphylococcus.	*Neisseria*
Streptococcus.	*Bordetella*
Pneumococcus	*Haemophilus*

Unit II

Host Parasite interaction in bacterial infections pathogenic properties of bacteria (colonization) of surfaces, invasion of tissue, production of exo and indo toxins). Anti bacterial defence of the host.
Description, pathogenecity, mode of infection, incubation period and toxigenecity of :-

1- Corynebacteria, Erysipelothris, Listeria.
2- Mycobacteria
3- Atypical Mycobacteria
4- Anthrax bacillus
5- Brucella
6- Yersenia, pasteurella & Francisell

Unit III

Physiololgy & Biochemistry of bacteria: Protein, carbohydrate, lipids and nucleic acid as antigens.
Description, Pathgenecity, mode of infection, incubation period and toxigenecity of :

1- *Salmonella.*
2- *Shigella*
3- *Proteus.*
4- *Pseudomonas, Loeffleralla*
5- *Vibrio*
6- *Escherichia coli.*
7- *Clostridia.*

B.Sc. MLT SECOND YEAR

Paper IV:

MEDICAL MICROBIOLOGY-II

(TECHNICAL METHODS IN MEDICAL MICROBIOLOGY)

Unit I

The role of laboratory in the diagnosis and control of infections : Management and quality control of medical microbiology laboratory.

a) Specimen collection from patients, clinics and hospitals.
b) Specimen collection for epidemiological investigations.
c) Training of medical microbiologist to handle epidemics.

Morphology, Staining, cultural Character of Bacteria, selective cultural media, identification by special tests, biochemical reactions and sero-typing of :-

a) Grams positive cocci:- Cluster forming,chain forming and diplo cocci.
b) Neisseria, Bordetella and haemophilus.

Phthogenesis and pathology of infections caused by 2(a) and 2 (b).

Unit II

Isolation of pure culture and its preservation.

Morphology, Staining, Cultural Character, selective cultural media, identification by special tests, biochemistry reaction and serotyping of;-

1- Corynebacterium
2- Mycobacterium
3- Atypical Mycobacterium
4- Anthrax bacillus.
5- Brucella.
6- Yersenia and Pasteurella.

Pathogenesis and Pathology of infections caused by 2 (1 to 6).

Unit III

Microbial drug sensitivity test's its clinical interpretation Morphology, Staining, Cultural character, Selective cultural media, identification by special tests, biochemical reactions and serotyping of:-

1- Salmonella.
2- Shigella
3- Proteus.
4- Pseudomonas.
5- Vibrio
6- Escherichia coli.
7- Clostridia.

Pathogenesis and pathology of infections caused by 2(1 to 7)

B.Sc. MLT SECOND YEAR
Paper V:
PATHOLOGY AND ALLIED SUBJECTS-I
(HAEMATOLOGY & CLINICAL PATHOLOGY)

Unit I

Coagulation: Mechanism of coagulation, coagulation regulation, hyper coagulable states, coagulation disorders.
Bleeding disorders : Various types, vascular abnormalities, role of platelets in haemostasis, platelet disorders, thrombosis and thrombohaemorrhagic disorders.
Anaemias: Definition, various types of anaemia, causes of anaemia, changes in the blood morphology due to anaemia.

Unit II

Leucocytosis, neutropenia & pancytopenia their causes & significance Infectious mononucleosis
Hematological malignancies : Various types of malignancies such as Leukemia Lymphomas including multiple myeloma. Their identification & clinical features.
Lab investigations in haematological malignancies.

Unit III

Haematological changes in systemic disorders. Their microscopic picture with identification and clinical features. Hematological aspects of Pediatric and Geriatric age groups, hematological disorders in pregnancy and their blood picture. Hematological changes in AIDS.
Various Parasites in blood their clinical significance. Lab investigations and methods of identification .
Organization, planning and management of blood bank. Donor selection and its various aspects. Selection of blood and the guidelines for transfusion practice Quality control and safety and basic management of blood bank.

B.Sc. MLT SECOND YEAR
PAPER VI:
PATHO;OGY AND ALLIED SUBJECTS-II
(HISTOPATHOLOGY & CYTOLOGY TECHNIQUES)

Unit I

Reception recording and labeling of histology specimens.
Fixation and various fixatives.
Processing of histological tissues for paraffin embedding.
Embedding and embedding media.
Decalcification – various methods
Microtomes: Various types their working principle and maintenance

Unit II

Section cutting- faults and remedies.
Microtome knives and knife sharpening. Dye chemistry theory and practice of staining.
Routine stanining procedures H and E mounting and mounting media. Solvents mordents accelerators and accentuators.

Unit III

Uses of controls in various staining procedures.
Special staining procedures for connective tissues carbohydrates Amyloids and pigments.
Meta chromasia and meta chromatic dyes .
Museum techniques.

B.Sc. MLT THIRD YEAR
Paper I :
CLINICAL BIOCHEMISTRY-I
(BIOSTATICS, AUTOMATION & ENDOCRINOLOGY)

Unit I

Basic bio-statics for clinical quality control. Standard deviation, standard error, coefficient of variation, normal distribution, t-test and chi-square test.
Establishment and maintenance of quality control for laboratory tests based upon medical usefulness.
Terminology of quality control and quality control charts,

Unit II

Normal ranges of various bio-metabolites and their confidence limits.
Automation: Handling of automatic analyzers, organization and management of hospital laboratory.

Unit III

Toxicology: Alcohol, heavy metals (Zinc. Hg etc.) salicylates, drug abuse, screening and drug interference with laboratory findings.
Endocrinology: Estimation of growth hormone, ACTH, sex hormone binding globulin, eldosterone, parathormon, cortisol and 17- hydroxyprogesteron and their clinical significance.

B.Sc. MLT THIRD YEAR
PAPER II :
CLINICAL BIOCHEMISTRY –II
(DIAGNOSTIC ENZYMOLOGY)
(Principle of assay, procedures and clinical significance)

Unit I

1. Principles of enzyme activity determination. Units for expressing enzyme activity. Factors affecting enzyme activity. Mechanisms responsible for abnormal enzyme levels.
2. Isoenzymes – Serum CPK, CK-MB, LDH, SGOT (AST), SGPT (ALT), Cholinesterase HBDH, amylase, alpha amylase, lipase, aldolase and myoglobin.

Unit II

1. Serum leucine, amino peptidase, alkaline and acid phosphatases.
2. Fructosamine test in semen.
3. Analysis of renal biliary and prostatic stones. Tests foetal well being by amniotic fluid. Analysis for alpha – foetoprotein and their clinical significance.

Unit III

1. Gastric analysis, free and total acidity, pentagastrin test, histamine and caffeine stimulation tests.

2. **Thyroid function test:** T3,T4, TSH Free T3, Free T4, protein bound iodine (PBI) thyroglobulin and LATES.
3. **Infertility profile :** TSH, FSH, LH, Testosterone, estrogen, prolactin and DHEA sulphate.

B.Sc. MLT THIRD YEAR
PAPER III :
MEDICAL MICROBIOLOGY – 1
(PATHOGENIC VIRUSES AND MISC. MICROBES)

Unit I

1. **Misc, microbes :** Actinomyces, Nocardia, Donovania, Treponema, Chlamydia, Rekettsiae, Mycoplasma and pathogenic fungi. Pathogenesis, pathology and lab diagnosis,
2. **Pox-viruses :** Smallpox Vaccinia, Molluscum contagiosm.
3. **Herpes Virus :** H Simplex. Chickenpox – Zoster, CMV,IMN, and **B**urkitt's Lymphomas.
4. **Adenoviruses :** Pharyngeal infections Respiratory infections and conjuctival infections.

Unit II

1. Orthomixoviruses (Influenza Types A,B,C, etc.) : Influenza.
2. **Paramyxovirus :** Respiratory infections mumps and measles .
3. **Miscellaneous Viruses :** Rubella, corona arena viruses : Rubella common cold lymphocytic choriomeningitis.
4. **Picorna Viruses:** Entero viruses Poliomyelitis Aseptic meningitis and Epidemic Myalgia Rhinoviruses – Common Cold.

Unit III

1. **Hepatitis Viruses :** Infectious and Serum Hepatitis.
2. **Arbo Viruses :** Encephalitis Yellow fever, Dengue fever.
3. **Rhabdo Viruses :** Rabies.
4. **Slow and oncogenic Viruses :** Scrapie Kuru and animal virus tumors.
5. Cell culture and observation of effect of viruses on cell : Technique, procedure and interpretation of results.

B.Sc. MLT THIRD YEAR
PAPER IV :
MEDICAL MICROBIOLOGY – II
(APPLIED MICROBIOLGY ADVANCED TECH.)

Unit I

1. Preparation of container and swabs for collections of specimens for microbial examinations.
2. Portal regulation and transport of specimen.
3. Flowchart of lab diagnostic procedures.
4. Documentation of specimen in laboratory.
5. **Preservation of Micro-organisms :** Periodic subculture method, cold storage, freezing, deep freezing, lypholization methods. Total and viable counts of bacteria.

Unit II

1. **Human parasitology :** Protozoa, rhizopoda and helminths.
2. Immunology and sero-diagonsis.
3. Prophylactic mass immunizatin.
4. Nosocomial infection and sterility testing of I.V. fluids and processing of various samples for various hospital infections.

Unit III

1. Pathology, lab –diagnosis and control of common infections and infestations.
2. Cell, tissue and organ culture.
3. Specific serological methods of diagnosis.
4. Test for bacterial sensitivity to antimicrobial agents and their interpretation.

5. Specific culture and drug sensitivity methods.
6. Advanced diagnostic techniques in Medical Microbiology : Torch profile, myco, dot, lgG, lgA, lgM and lgE testing, Australia Ag (HBsAg)etc.

B.Sc. MLT THIRD YEAR
PAPER V : PATHOLOGY & ALLIED – I
(IMMUNOPATHOLOGY & TRANSFUSION MEDICINE)

Unit I

1. Introduction and antigens.
2. Cells and organs of the immune system.
3. Immunoglobulin and antibodies.
4. Humoral & Cellular immune response.
5. Detection of various allergic agents and immunopathology of allergy.
6. Rheumatological diseases : Pathogenesis and Lab diagnosis.

Unit II

1. Infection inflammation and the immune system.
2. Cancer immunology & Tumor markers.
3. Tissue typing for Kidney transplant & bone marrow transplant,
4. Laboratory tests for demonstration of antigen, antigen – antibody reaction and cell mediated immunity.
5. Laboratory investigations in megaloblastic anaemias (lron deficiency, megaloblastic, haemolytic)

Unit III

1. Pathogenesis and laboratory investigations in Leukemia's
2. Laboratory investigations in coagulations disorder bleeding disorder, disseminated intravascular coagulation (DIC) Platelet functions tests.
3. Cytogenetics in hematology .
4. Radioisotopes and their applications.
5.

B.Sc. MLT THIRD YEAR
PAPER VI
PATHOLOGY AND ALLIED SUBJECTS – II
(HISTOPATHOLOGY & CYTOLOGY)

Unit I

1. Types of tissue seen in histopathology i.e. Connective tissue. Epithelial tissue, Glandular, Begin malignant Tumor tissue, Bone tissue etc.
2. Handling of fresh histological specimen (Tissues) cryo/frozen sections of fresh and fixed tissues, Freeze drying.
3. Lipids identifications and demonstration.
4. Micro- organisms in the tissue – various staining techniques for their demonstration and identifications.
5. Nucleic acids, DNA and RNA special stains and procedures.

Unit II

1. Cytoplasmic constituents and their demonstration.
2. Tissues requiring special treatment i.e. eye B.M. biopsy, undercalcified bones.
3. Neuropathological techniques.
4. Enzyme histochemistry demonstration of phosphatases, dehydrogenases, oxidase and peroxidases etc.
5. Electron microscope, working principles, components and allied techniques for electron microscopy, ultra – microtomy.

Unit III

1. Immunohistochemistry.
2. Cervical cytology – basis of detection of malignant and pre – malignant lesions.
3. Hormonal assessment of sex chromatin.

4. Demonstration of sex chromatin
5. Aspiration cytology principles indication and utility of the techniques with special emphasis on role of cytotechnologist in FNAC clinics.