COURSE STRUCTURE
DEPARTMENT OF MEDICAL LABORATORY TECHNOLOGY (BSc MLT)

Academic Year: (2026 -27)

Third Year						
S.No	**Subjects**	**Subject Code**	**Hrs/week**			**Credits**
			L	**T**	**P**	**C**
1.	Pathology – II	24HMLT31T	4	-	-	4
2.	Microbiology – II	24HMLT32T	4	-	-	4
3.	Biochemistry - II	24HMLT33T	4	-	-	4
4.	Basic Emergency care and First aid	24HMLT34T	3	-	-	3
5.	Preventive and Social Medicine	24HMLT35T	4	-	-	4
6.	Pathology – II Lab	24HMLT31L	-	-	8	4
7.	Microbiology – II Lab	24HMLT32L	-	-	8	4
8.	Biochemistry – II Lab	24HMLT33L	-	-	8	4
	Total		19	-	24	**31**

Fourth Year						
S.No	**Subjects**	**Subject Code**	**Hrs/week**			**Credits**
			L	**T**	**P**	**C**
1.	Project Work	24HMLT4PROJ	-	-	-	12
2.	Internship	24HMLT4INTS	-	-	-	16
	Total		-	-	-	28

Title of the Course : **Pathology II**

Category : Basic Medical Sciences

Year : III YEAR

Course Code : 24HMLT31T

Branch : MLT

Lecture Hours	Tutorial Hours	Practice Hours	Credits	No. of Period
4	-	-	4	**136**

Unit I: Histopathology Techniques 18 hrs

- Section cutting techniques
- Preparation and theory of Hematoxylin and Eosin (H&E) stain
- Mounting techniques and slide preparation
- Theory and methods of decalcification
- Principles and application of microscopes:
- Light microscope
- Polarizing microscope
- Phase contrast microscope
- Fluorescent microscope

Unit II: Advanced Diagnostic Techniques in Pathology 16 hrs

- Flow cytometry and imaging cytometry
- Cytogenetics – basic concepts and applications
- Immunohistochemistry – introduction, overview, and applications
- Immunocytochemistry – principles and methods
- PAP technique – principle, reagents, and procedure

Unit III: Special Staining Techniques 20hrs

- Mucicarmine stain
- Periodic Acid-Schiff (PAS) stain
- Sudan Black stain
- Oil Red O stain
- Alcian Blue stain
- Congo Red stain
- Verhoeff's stain for elastic tissue
- Mallory's Phosphotungstic Acid Hematoxylin (PTAH) stain
- Van Gieson stain
- Masson's Trichrome technique
- Acid-Fast Bacilli (AFB) staining for Tuberculosis and Leprosy

Unit IV: Cryotechniques and Hemostasis 18 hrs

- Frozen section techniques
- Freezing microtome – principle and operation
- Cryostat – types and working
- Cryostat sectioning techniques
- Hemostasis mechanisms and coagulation pathway
- Blood collection and anticoagulants
- Bleeding time and clotting time
- Coagulation tests: PT, KPTT, TGT

- Platelet count and platelet function tests

Unit V: Blood Transfusion and Immunohematology 20 hrs

- ABO blood group system
- Rh typing and variants
- Subgroups of A, B and Bombay phenotype
- Coombs' test
- Blood grouping and cross matching
- Transfusion reactions and investigations
- Donor selection and screening
- Screening for Hepatitis B (HBsAg)
- HLA antigens and significance in transfusion
- Blood preservation principles
- Blood bank administration

Unit VI: Laboratory Instrumentation and Automation 10 hrs

- Freezing microtome
- Cryostat
- Automation in pathology (cell counters)
- Computer applications in pathology

Unit VII: Hematology Techniques and Investigations 22 hrs

- Blood collection methods and anticoagulants
- Normal hematological values
- RBC, WBC, and platelet counts
- Hemoglobin estimation
- Packed cell volume (PCV)
- Absolute indices calculation
- Differential leukocyte count
- ESR and eosinophil count
- Preparation of blood smears
- Staining methods in hematology
- Morphology of RBCs, WBCs, and platelets
- Buffy coat preparation
- Reticulocyte count

Unit VIII: Advanced Hematology & Laboratory Management 12 hrs

- Deficiency anemia investigations (B12, folate, serum iron, TIBC, Schilling test)
- Hemolytic anemia investigations (osmotic fragility, sickling test, Hb-F, Hb-A2 estimation)
- Laboratory organization and quality control in hematology
- Glassware preparation techniques
- Museum techniques – specimen preservation and mounting methods
- Mounting solutions and colour preservation techniques

TEXT BOOKS

1. Tilde Kline – *Aspiration Biopsy Cytology-publisher-*. Churchill Livingstone
2. Bancroft – *Histopathology Techniques* pathology- **Elsevier**

Title of the Course : **Pathology II Lab**
Category : Basic Medical Sciences

Year : III YEAR

Course Code : 24HMLT31T

Branch : MLT

Lecture Hours	Tutorial Hours	Practice Hours	Credits	No. of Period
-	-	8	4	102

LIST OF PRACTICAL EXPERIMENTS

1. Mucicarmine stain – demonstration of mucin.
2. Periodic Acid-Schiff (PAS) stain – demonstration of carbohydrates and basement membrane.
3. Sudan Black stain – demonstration of lipids.
4. Oil Red O stain – demonstration of neutral fats.
5. Schmorl's reaction – demonstration of melanin and reducing substances.
6. DOPA reaction – demonstration of melanin pigment.
7. Alcian Blue stain – demonstration of acidic mucopolysaccharides.
8. Congo Red stain – demonstration of amyloid deposits.
9. Verhoeff's stain – demonstration of elastic fibers.
10. Mallory's Phosphotungstic Acid Hematoxylin (PTAH) stain – demonstration of muscle, fibrin, and glial fibers.
11. Van Gieson stain – differentiation of collagen and muscle fibers.
12. Masson's Trichrome technique – demonstration of connective tissue.
13. Luxol Fast Blue stain – demonstration of myelin sheath.
14. Acid-Fast Bacilli (AFB) staining for Tuberculosis in tissue sections.
15. Acid-Fast Bacilli (AFB) staining for Leprosy in tissue sections.
16. Sex chromatin (Buccal smear examination) – identification of Barr bodies.
17. LE cell preparation and identification.
18. Bleeding profile (Bleeding time and Clotting time).
19. Blood grouping and Rh typing.
20. Fever profile investigations

Title of the Course : **MICROBIOLOGY II**
Category : Basic Medical Sciences

Year : III YEAR

Course Code : 24HMLT32T

Branch : MLT

Lecture Hours	Tutorial Hours	Practice Hours	Credits	No. of Period
4	-	-	4	136

Unit 1: General Virology 12 hrs

- Definition and basic properties of viruses
- Structure of viruses
- Classification of viruses (DNA & RNA viruses overview)
- Viral replication (brief)

Unit 2: RNA Viruses – I 14 hrs

- Poliomyelitis (Poliovirus)
- Coxsackie virus
- Rhinovirus
- Influenza
- Rabies
- Arboviruses
- Measles
- Mumps
- Rubella HIV/AIDS
- Rotavirus

Unit 3 : DNA Viruses 18 hrs

- Smallpox
- Herpes simplex virus
- Varicella zoster virus
- Cytomegalovirus
- Epstein–Barr virus
- Adenovirus
- Hepatitis
- **UNIT -4 20 Hrs**
- **Laboratory Diagnosis of Viral Infections:**
- direct detection of viruses/viral antigens
- demonstration of virus-induced cytopathic effects (CPEs) in the cells

- virus isolation
- viral assays
- detection of viral proteins and other enzymes
- detection of the viral genome and
- viral serology
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Unit 5: Mycology 20 hrs

- Introduction to fungi
- Classification of fungi
- Fungi and diseases caused by them
- Superficial mycoses
- Candidiasis
- Dermatophytes
- Opportunistic fungi
- Subcutaneous mycoses
- Cryptococcosis

Unit 6: Parasitology – Protozoa 22 hrs

- Introduction and classification of parasites
- Protozoology:
    - Entamoeba histolytica
    - Trichomonas vaginalis
    - Giardia lamblia
    - Hemoflagellates (brief)
    - Malaria
    - Opportunistic protozoan infections in AIDS

Unit 7: Cestodes (Tapeworms): 14 hrs

- Diphyllobothrium latum
- Echinococcus granulosus
- Taenia saginata
- Taenia solium

- Hymenolepis nana
- Hymenolepis diminuta

Unit 8: Nematodes (Roundworms):18 hrs

- Ascaris lumbricoides
- Ancylostoma duodenale
- Necator americanus
- Strongyloides stercoralis
- Trichuris trichiura
- Enterobius vermicularis
- Dracunculus medinensis
- Wuchereria bancrofti

TEXT BOOKS:

1.Medical Mycology: Jagadish Chandra- CBS Publishers and Distributors Pvt. Ltd. 2.Parasitology S.C. Parija- All India Publishers & Distributors

Title of the Course : **MICROBIOLOGY II**
Lab Category : Basic Medical Sciences

Year : III YEAR

Course Code : 24HMLT32T

Branch : MLT

Lecture Hours	Tutorial Hours	Practice Hours	Credits	No. of Period
		8	4	**102**

LIST OF PRACTICAL EXPERIMENTS

1. Latex agglutination test – principle and demonstration for antigen detection.
2. HIV infection testing – screening and interpretation of rapid tests.
3. Hepatitis B surface antigen (HBsAg) detection – screening methods.
4. Interpretation of viral diagnostic test results (HIV, HBsAg and related serological tests).
5. Collection and processing of clinical samples (skin, hair, nail) for fungal examination.
6. Microscopic examination of skin, hair, and nail samples for fungal elements.
7. Examination of sputum samples for fungal infection.
8. Examination of vaginal and oral secretions for fungal pathogens.
9. Identification and interpretation of fungal structures in clinical specimens.
10. Microscopic examination of faecal samples for intestinal parasites.
11. Saline wet mount preparation of stool samples.
12. Iodine wet mount preparation for detection of cysts and ova.
13. Concentration techniques for faecal examination (sedimentation and flotation methods).
14. Peripheral blood smear preparation and staining for haemoflagellates.
15. Microscopic identification of malaria and filariasis parasites.

Title of the Course : BIOCHEMISTRY – II

Category : Basic Medical Sciences

Year : III YEAR

Course Code : 24HMLT33T

Branch : MLT

Lecture Hours	Tutorial Hours	Practice Hours	Credits	No. of Period
4	-	-	4	136

Unit 1: 18 hrs

Enzyme definition, classification, coenzymes, cofactors and inhibitors affecting enzyme activity, units of measurement, Isoenzymes, Normal values of different serum enzymes and their variation in diseases.

Unit 2: 16 hrs

Proteins - Chemistry, structure, plasma protein concentration and biochemical changes in disease, fractionation techniques, interpretation. Principles of Electrophoresis and Chromatography.

Unit 3: 14 hrs

Lipids - Chemistry of fatty acids, triglycerides, Cholesterol, Phospholipids, serum Lipoprotein pattern – normal and alterations in disease.

Unit 4: 12 hrs

Inorganic Ions. Concepts of inorganic ions – Bicarbonate, phosphate, calcium, sodium and potassium and trace elements.

Unit 5: 8 hrs

Sample collection, Preservation and preparation of protein free filtrates - Theoretical aspects.

Unit 6: 20 hrs

a. Liver function tests.

Introduction, Bilirubin Tests, Liver Enzymes, Cholestatic Enzymes, Protein Tests, Coagulation Test

b. Gastric Analysis. Composition of gastric juice, concepts of free and bound acid, Gastric stimulants.

Unit 7: 18 hrs

Accuracy, precision, quality control, error in laboratory tests, quality control charts. Normal values Statistics – classification of observations, frequency distribution, definition of terms – deleted. IX. Blood gases, bicarbonate buffering system. Henderson Hasselbach reaction, Blood pH, pCO_2 – calculations, normograms.

Unit 8: 30 hrs

X. Calculi formation, Automation, Micro techniques

5. Enzymes: Simple enzymatic reaction, demonstration of factors affecting enzyme action, determination of Acid and Alkaline Phosphatases, LDH., SGOT, SGPT, Amylase - Salivary and Pancreatic, determination of LDH Iso enzymes

6. Estimation of Bilirubin-total and conjugated, urobilinogen, Urobilin and Bile Acids.

7. Gastric analysis. Determination of free and total acid, gastric stimulation. Specimen collection. VIII. Accuracy, precision, and quality control. Demonstration and preparation of quality control sera. Comparison of two methods. F. Test and Bartels test. Normal values.

8. Isotope and ELISA techniques for determination of CEA, AFP, T3, T4, TSH and HCG

TEXT BOOKS:

1. Text book of Biochemistry – Debajyotidas-Academic Publishers

2. Clinical Chemistry – Kaplan-Lippincott Williams and Wilkins

Title of the Course : BIOCHEMISTRY – II Lab

Category : Basic Medical Sciences

Year : III YEAR

Course Code : 24HMLT33T

Branch : MLT

Lecture Hours	Tutorial Hours	Practice Hours	Credits	No. of Period
		8	4	102

LIST OF PRACTICAL EXPERIMENTS

1. Estimation of total protein in serum, plasma, cerebrospinal fluid (CSF), and urine.
2. Estimation of albumin, globulin, and fibrinogen.
3. Electrophoretic separation of serum proteins.
4. Estimation of serum lipids and cholesterol (including cholesterol esters).
5. Estimation of triglycerides and lipoprotein fractionation.
6. Estimation of calcium, phosphates, iron, copper, chloride, sodium, and potassium in biological fluids.
7. Collection, preservation of samples, and preparation of protein-free filtrate.
8. Demonstration of simple enzymatic reaction and factors affecting enzyme activity.
9. Estimation of acid phosphatase and alkaline phosphatase.
10. Estimation of SGOT, SGPT, and LDH.
11. Estimation of amylase (salivary and pancreatic) and LDH isoenzymes.
12. Estimation of total and conjugated bilirubin.
13. Estimation of urobilinogen, urobilin, and bile acids.
14. Gastric juice analysis – determination of free acid, total acid, gastric stimulation test, and specimen collection.
15. Accuracy, precision, and preparation of quality control sera.
16. Comparison of analytical methods (F-test and Bartels test) and interpretation of normal values.
17. ELISA and isotope techniques for estimation of Thyroid Hormones (T3, T4, TSH), Alpha-fetoprotein (AFP), Carcinoembryonic Antigen (CEA), and Human Chorionic Gonadotropin (hCG).
18. Estimation of vitamin B12 and folate.
19. Estimation of serum iron and iron-binding capacity (TIBC).
20. Demonstration of laboratory automation, micro, and ultramicro techniques in clinical biochemistry.

Title of the Course	**:** Basic Emergency care and First aid
Category	: Basic Medical Sciences
Year	: III YEAR
Course Code	: 24HMLT34T
Branch	: MLT

Lecture Hours	Tutorial Hours	Practice Hours	Credits	No. of Period
3			3	102

Unit 1 Fundamentals of First Aid and Assessment 10 hrs

- Importance of first aid in physiotherapy and healthcare
- Examination of vital signs
- Instrumentation used in first aid (first aid kit)
- Indications of Cardiopulmonary Resuscitation

Unit 2: First Aid in Medical Emergencies 14 hrs

- First aid in cardiac arrest
- First aid in respiratory failure
- First aid in hypovolemic shock
- First aid in poisoning

Unit 3: First Aid in Trauma and Environmental Emergencies 14 hrs

- First aid in burns
- First aid in electric shock
- First aid in drowning
- First aid in spinal cord injuries
- First aid in road traffic accidents (RTA)

Unit 4: Basic Life Support and Airway Management 12 hrs

- Indications, assessment, and technique of Cardiopulmonary Resuscitation
- Artificial ventilation

Unit 5: Fundamentals of Emergency Care and Assessment 10 hrs

- Basics of emergency care and life support skills
- Concept of Basic Life Support (BLS)
- Recognition of sudden cardiac arrest (SCA)
- Activation of emergency response system

- Vital signs and primary assessment

Unit 6: Basic Emergency Care and Triage 12 hrs

- Principles of first aid
- Triage and prioritization of patients
- Recognition and response to heart attack and stroke
- Managing an emergency including moving a patient

Unit 7: Airway Management and Ventilation 14 hrs

- Airway assessment and management
- Ventilation techniques including bag-valve-mask (BVM)
- Rescue breathing methods
- Management of choking

Unit 8: Cardiopulmonary Resuscitation and Defibrillation 16 hrs

- One-rescuer and two-rescuer Cardiopulmonary Resuscitation
- High-quality chest compressions
- Use of Automated External Defibrillator (AED)
- Integrated BLS protoco

TEXT BOOKS

1. First aid in emergency – St.John. Ambulance Association- **Legare Street Press**
2. First aid & management of general injuries & common ailments – Gupta & Gupta- Jaypee Brothers Medical Publishers Pvt.Ltd

Title of the Course	**:** Preventive and Social Medicine
Category	: Basic Medical Sciences
Year	: III YEAR
Course Code	: 24HMLT35T
Branch	: MLT

Lecture Hours	Tutorial Hours	Practice Hours	Credits	No. of Period
4	-	-	4	136

Unit I: Introduction to Community Medicine & Concepts of Health 14 hrs

- History and evolution of community medicine
- Systems of medicine in the world
- Origin of modern medicine and public health
- Sanitary awakening and discovery of microorganisms
- Health for all and Millennium Development Goals
- Definitions, dimensions, determinants, and indicators of health
- Concepts of well-being and standards of living

Unit II: Concepts of Health, Disease & Prevention 14 hrs

- Natural history of disease
- Concepts of control and prevention
- Modes of intervention
- Measurement of health
- Health policy and goals

Unit III: Social & Behavioral Sciences in Community Medicine 12 hrs

- Medical sociology and social factors in health
- Family structure and role in health and disease
- Social organizations and group dynamics
- Leadership, motivation, emotions, and communication
- Behaviour changes communication and counseling
- Health economics

Unit IV: Demography & Nutrition 18 hrs

- Demographic cycle and population trends
- Census and population explosion

- Family welfare planning and contraceptives
- National population policy and gender issues
- Nutrients and nutritional requirements
- Malnutrition and deficiency disorders
- National nutrition programmes and food safety

Unit V: Environmental Health 14 hrs

- Basic sanitation and potable water
- Water purification standards
- Waste disposal systems
- Air, water, and soil pollution
- Global warming and environmental hazards

Unit VI: Epidemiology & Biostatistics 24 hrs

- Concepts and methods of epidemiology
- Causation and association
- Surveillance and outbreak investigation
- Epidemiology of communicable and non-communicable diseases
- Biostatistics: central tendency, variability, probability
- Hypothesis testing, correlation, regression
- Sampling and life tables

Unit VII: Communicable & Non-Communicable Diseases 20 hrs

- Vaccine preventable diseases
- Water, vector, and air-borne diseases
- HIV/AIDS and tuberculosis
- Emerging infections (SARS, influenza, etc.)
- Non-communicable diseases: diabetes, hypertension, cancer, obesity
- Accidents and blindness

Unit VIII: MCH, Health Systems, and Health Administration 20 hrs

- Maternal and child health services
- Antenatal, intranatal, postnatal, neonatal care
- Infant and maternal mortality indicators

- National health programmes
- Occupational health and industrial diseases
- Health planning and administration
- Health care delivery system in India
- International organizations such as World Health Organization and UNICEF
- Disaster management, rehabilitation, and biomedical waste management
- Medical ethics and research methodology

TEXT BOOKS:

1. Hand Book of Preventive and Social Medicine - Vidya Ratan-**JPB**

2.. Essential of community medicine - A Practical Approach. - D A Hiremath-Jaypee Brothers Medical Publishers (P) Ltd.