Department of Paramedical Sciences

Faculty of Allied Health Sciences

SGT UNIVERSITY

Shree Guru Gobind Singh Tricentenary University

Gurgaon-122505

Syllabus

B.Sc. Medical Laboratory Technology (MLT)

Duration: 3 years (6 Semester)

W.e.f. Academic Session 2020-21

HUMAN ANATOMY-I

PAPER CODE-05270101

B. Sc. Semester I (Medical Laboratory Technology)

L	T	P	Credits		
3	-		3	Examination:	60 Marks
				Int. Assessment:	40 Marks
				Total:	100 Marks
				Duration of Examination:	3 Hours

UNIT-I

Introduction: human body as a whole

Definition of anatomy and its subdivisions

Anatomical nomenclature and terminology (planes &positions)

Surface Anatomy of main structures and vessels

Applied anatomy& Joints

Musculoskeletal system

Connective tissue & its modification, tendons, membranes, special connective tissue.

Bone structure, blood supply, growth, ossification, and classification.

Muscle classification, structure and functional aspect.

Joints classification, structures of joints, movements, range, limiting factors, stability, blood supply

Nerve supply, dislocations and applied anatomy

UNIT-II

Extremity (Lower & Upper extrimities)

Bony architecture

Joints – structure, range of movement

Muscles – origin, insertion, actions, nerve supply

Major nerves – course, branches and implications of nerve injuries Development of limb bones, muscles and anomalies

Radiographic identification of bone and joints Applied anatomy

Lower extremity

Bony architecture

Joints – structure, range of movement

Muscles – origin, insertion, actions, nerve supply

Major nerves – course, branches and implications of nerve injuries Development of limb bones, muscles and anomalies

Radiographic identification of bone and joints Applied anatomy

UNIT-III

Spine and thorax

Back muscles -Superficial layer

Deep muscles of back, their origin, insertion, action and nerve supply.

Vertebral column – Structure & Development, Structure & Joints of vertebra. Thoracic cage

Head and neck: Cranium
Facial Muscles – origin, insertion, actions, nerve supply Temporal mandibular Joints – structure, types of movement

UNIT-IV

Cardiovascular system (with relevant applied anatomy)
Heart-Size,location, chambers.
Circulation -Systemic &pulmonary
Great vessels of the heart, branches of aorta.
Overview of blood vessels of upper extremity and lower extremity
Lymphatic system- (with relevant applied anatomy)
Salient features of lymphatic organs (spleen, tonsil, thymus, lymph node)

UNIT-V

Gastro-intestinal system (with relevant applied anatomy)
Partsofthe gastrointestinal tract
Gross anatomy of Tongue, stomach, small and large intestine, liver, gall bladder Pancreas and other digestive organ& related applied anatomy

Respiratory system (with relevant applied anatomy)
Partsof respiratory system with salient gross features of lung
Brief description of intercostal muscles andPara-nasal air sinuses

HUMAN ANATOMY I-PRACTICAL

PAPER CODE-05270102

B. Sc. Semester I (MLT)

L	T	P	Credits		
-	-	1/2		**Examination:**	**30 Marks**
				Int. Assessment:	**20 Marks**
				Total:	**50 Marks**

1) Identification and description of all anatomical structures.

2) Demonstration of dissected parts (upper extremity, lower extremity, thoracic & abdominal viscera, face and brain).

3) Demonstration of skeleton-articulated and disarticulated.

4) Surface anatomy: Surface land mark-bony, muscular and ligamentous. Surface anatomy of major nerves, arteries of the limbs.

HUMAN PHYSIOLOGY-I

PAPER CODE-05270103

B. Sc. Semester I (Medical Laboratory Technology)

L	T	P	Credits		
3	-		3	Examination:	60 Marks
				Int. Assessment:	40 Marks
				Total:	100 Marks

Duration of Examination: 3 Hours

UNIT-I

General Physiology
Cell: morphology, Structure and function of cell organelles Structure of cell membrane

Transport across cell membrane Intercellular communication Homeostasis
Blood
Introduction-composition & function of blood

W.B.C., R.B.C., Platelets formation & functions, Immunity
Plasma: composition, formation & functions, Plasma Proteins: -types & functions, Blood Groups-types, significance, determination.

Hemoglobin, Haemostasis

Lymph-composition, formation, circulation & functions

UNIT-II

Cardiovascular system
Conducting system-components, impulse conduction Heart valves Cardiac cycle-definition, phases of cardiac cycle.

Cardiac output-definition, normal value, determinants.
Stroke volume and its regulation.
Heart rate and its regulation:
Arterial pulse, Blood pressure-definition, normal values, factors affecting blood pressure.

Shock-definition, classification, causes and features, Basic idea of ECG, Cardiovascular changes during exercise

UNIT-III

Respiratory System
Mechanics of respiration Lung volumes and capacities

Pulmonary circulation, transport of respiratory gases

Factors affecting respiration, Regulation of respiration-neural regulation, voluntary control and chemical regulation

Hypoxia, Hypercapnoea, Hypocapnoea,
Artificial respiration Disorders of respiration- dyspnoea, orthopnoea, hyperpnoea, hyperventilation, apnoea, Tachypnoea, Respiratory changes during exercise.

Digestive SystemDigestion & absorption of nutrients, Gastrointestinal secretions & their regulation Functions of Liver & Stomach

UNIT-IV

Nervous system
Introduction, central and peripheral nervous system, functions of nervous system

Reflexes-monosynaptic, polysynaptic, superficial, deep &withdrawal reflex Sense organ, receptors, electrical& chemical events in receptors.

Sensory pathways for touch, temperature, pain, proprioception & others.

Control of tone & posture: Integration at spinal, brain stem, cerebellar, basal ganglion levels, along with their functions.

Motor mechanism: motor cortex, motor pathway: the descending tracts -pyramidal & extrapyramidal tracts-origin, course, termination & functions. Upper motor neuron and lower
motor neuron paralysis.
Special senses-eye, ear, nose, mouth

Water excretion, concentration of urine-regulation of Na+, Cl-, K+ excretion

Nerve Muscle Physiology
Muscles-classification, structure, properties, Excitation, contraction, coupling, Motor unit, EMG, factors affecting muscle tension, Muscle tone, fatigue, exercise .

Nerve – structure and function of neurons, classification, properties Resting membrane potential & Action potential their ionic basis, All or None phenomenon Neuromuscular transmission Ionic basis of nerve conduction.

Concept of nerve injury &Wallerian degeneration Synapses.
Electrical events in postsynaptic neurons Inhibition & facilitation at synapses .

Chemical transmission of synaptic activity Principal neurotransmitters. Chemical transmission of synaptic activity Principal neurotransmitters.

HUMAN PHYSIOLOGY I-PRACTICAL

PAPER CODE-05270104

B. Sc. Semester I (MLT)

L	T	P	Credits		
-	-	1/2		**Examination:**	**30 Marks**
				Int. Assessment:	**20 Marks**
				Total:	**50 Marks**

1. Haemoglobinometry
2. WhiteBloodCellcount
3. RedBloodCellcount
4. DeterminationofBloodGroups
5. Leishman'sstainingandDifferentialWBCcount
6. DeterminationofpackedcellVolume
7. Erythrocytesedimentationrate[ESR]
8. CalculationofBloodindices
9. DeterminationofClottingTime,BleedingTime

BASIC BIOCHEMISTRY

PAPER CODE-05270105

B. Sc. Semester I (Medical Laboratory Technology)

L	T	P	Credits		
3	-		3	Examination:	60 Marks
				Int. Assessment:	40 Marks
				Total:	100 Marks

Duration of Examination: 3 Hours

Basic concept of metabolism and their applied aspects

Unit-I

Carbohydrates: Definition, function and classification of carbohydrate. Monosaccharide, glycoside formation, oligosaccharides and polysaccharides. Glycolysis, catabolic fates of pyruvate, metabolic fate of Acetyl-CoA and Citric acid cycle, gluconeogenesis, glycogen metabolism, pentose phosphate pathway.

Unit-II

Amino acids and proteins: Definition, structure, classification, essential & non essential amino acids. Proteins definition and classification. Primary, secondary, tertiary and quaternary of proteins of proteins

Unit-III

Vitamins: Definition and classification of vitamins, difference between fat soluble and water soluble vitamins. Water soluble vitamins and fat soluble vitamins

Unit-IV

Lipids: Definition, classification and function of lipids. Fatty Acids, Triacylglycerols or Triacylgcerides or neutral fat. Fatty acid metabolism. Ketone body metabolism.

BASIC BIOCHEMISTRY-PRACTICAL

PAPER CODE-05270106

B. Sc. Semester I (MLT)

L	T	P	Credits		
-	-		1/2	Examination:	30 Marks
				Int. Assessment:	20 Marks
				Total:	50 Marks

1. Identification of carbohydrates by Molisch's test.
2. Identification of reducing sugar by Benedict's test.
3. Identification of ketose sugars by Seliwanoff's test.
4. Identification of reducing sugar by Osazone test.
5. Identification of cholesterol by Salkowski's test.
6. Identification of protein by Biuret's test.
7. Identification of protein by Ninhydrin test.

GENERAL MICROBIOLOGY

PAPER CODE-05270107

B. Sc. Semester I (Medical Laboratory Technology)

L	T	P	Credits		
3	-		3	Examination:	60 Marks
				Int. Assessment:	40 Marks
				Total:	100 Marks

Duration of Examination: 3 Hours

UNIT-I

Safety measures in laboratory

Microscopy: Principle, working and applications of Light microscope, Dark field, Phase contrast microscopy, Fluorescent & Electron microscopy

Sterilization and Disinfection: Physical Methods of Sterilization, Chemical Methods of Sterilization, Methods of Disinfection

UNIT-II

Introduction and classification of Bacteria, Morphology of bacteria, Growth, Nutrition & Metabolism of Bacteria

Normal microbial flora of human body, role of normal flora, probiotics.

Bacterial genetics- Bacterial DNA & RNA, Replication of bacteria.

Microbial pathogenicity

UNIT-III

Bacterial Culture and Identification: Culture Media & Transport Media, Aerobic Bacterial Culture Techniques, Anaerobic Bacterial Culture Techniques, Sample collection and transport methods

Bacterial identification techniques: Conventional methods, Automated culture techniques.

UNIT-IV

Smear preparation & Staining methods: Gram stain, Acid fast stain, Negative stain, Spore stain

Antimicrobial susceptibility testing: Principle and techniques of Diffusion Methods Dilution Methods

Preservation techniques of bacteria

GENERAL MICROBIOLOGY-PRACTICAL

PAPER CODE-05270108

B. Sc. Semester I (MLT)

L	T	P	Credits		
-	-	1/2		**Examination:**	**30 Marks**
				Int. Assessment:	**20 Marks**
				Total:	**50 Marks**

1. Microscope
   Light Microscope

2. Staining
   Grams staining
   ZN staining
   Negative stain

3. Preparation of commonly used culture media
   Nutrient Agar
   Blood Agar
   Chocolate agar
   Mac Conkey agar
   Muller Hinton agar

4. Culture methods
   Streak method
   Lawn method
   Stroke method
   Stab method
   Pour Plate method
   Liquid method

5. Antibiotic susceptibility test
   Diffusion methods
   Dilution Methods

BASIC PATHOLOGY AND HAEMATOLOGY

PAPER CODE-05270109

B. Sc. Semester I (Medical Laboratory Technology)

L	T	P	Credits		
3	-		3	**Examination:**	**60 Marks**
				Int. Assessment:	**40 Marks**
				Total:	**100 Marks**

Duration of Examination: 3 Hours

UNIT-I

Pathology & its branches
Normal cell and its functions
Various types of microscope & light microscope in details.

UNIT-II

Introduction to hematology and laboratory Organization.
Formation of Blood
Composition and functions of blood
Various anticoagulants, their uses, mode of action and their merits & demerits.
Collection & preservation of blood for various hematological investigations.

UNIT-III

Normal hematological indices (MCV, MCH, MCHC, PCV)
Normal and absolute values in hematology.
Quality assurance in hematology.
Various methods of estimation of Hb involved and standardization of instrument.

UNIT-IV

Haemocytometery:- Procedure of cell count, visual as well as electronic red cell, Leucytes and platelet count.
Romanowsky dyes, preparation and staining procedure of blood smears.
Morphology of normal blood cells and their identification.
ESR & Factors influencing ESR and various procedures for its estimation.

BASIC PATHOLOGY AND HAEMATOLOGY-PRACTICAL

PAPER CODE-05270110

B. Sc. Semester I (MLT)

L	T	P	Credits		
-	-		1/2	**Examination:**	**30 Marks**
				Int. Assessment:	**20 Marks**
				Total:	**50 Marks**

Hemoglobin estimation – Sahli's method
Peripheral blood film (PFB), Preparation, staining by leishman stain & examination.
Cell counts by Neubauer chamber – RBCs, WBC, Platelets.
ESR & PCV estimation

COMMUNICATION SKILLS AND PERSONALITY DEVELOPMENT

PAPER CODE-05270111

B. Sc. Semester I (Medical Laboratory Technology)

L	T	P	Credits		
3	1	-	4	**Examination:**	**60 Marks**
				Int. Assessment:	**40 Marks**
				Total:	**100 Marks**

Duration of Examination: 3 Hours

Unit I
Listening Comprehension

- Speeches
- Interviews
- audio-video clippings followed by exercises
- Introduction to Communication
- Importance of Communication
- Barriers to Communication and ways to overcome them

Unit II
Conversation Skills

- Greetings and introducing oneself
- Framing questions and answer
- Role play
- Buying: asking details etc
- Word formation strategies
- Vocabulary building: Antonyms, Synonyms, Affixation, Suffixation, One word substitution

Unit III
Reading Comprehension

- Simple narration and Stories
- Simple Passages
- Newspaper and articles clippings
- Note Making
- Paragraph Writing
- Comprehension
- Report Writing: types, characteristics
- Introduction to Letter Writing

Unit IV:
Pronunciation

- Pronunciation
- Syllable and Stress
- Intonation and Modulation

UNIT V

Writing Comprehension

- Letters: types, format, style
- Précis Writing
- Paragraph: Order, Topic sentence, consistency, coherence
- Report and Proposal

Project Writing: Features, Structure

HUMAN ANATOMY-II

PAPER CODE-05270201

B. Sc. Semester II (Medical Laboratory Technology)

L	T	P	Credits		
3	-		3	Examination:	60 Marks
				Int. Assessment:	40 Marks
				Total:	100 Marks
				Duration of Examination:	3 Hours

UNIT-I

Urinary system (with relevant applied anatomy)
Parts of urinary system
Salient gross features of kidney, urinary bladder, ureter and urethra.

UNIT-II

Reproductive system
Parts of male and female reproductive system with salient gross features of testis & uterus, ovary and fallopian tube

UNIT-III

Endocrine glands
List of the endocrine glands, their position and salient gross features
Hormones produced by each endocrine glands

Embryology
Spermatogenesis & oogenesis
Ovulation,fertilization, Placenta, Fetalcirculation

UNIT-IV

Nervous system
Classification of the nervous system, Definitions of central, peripheral and autonomic nervous system
Neuron- structure and classification, neuroglia
Names of lobes of Cerebrum and cerebellum, Parts of brainstem (salient features only)
.Cerebrospinal fluid and its circulation, names of cranial nerves, spinal nerve, meninges, ventricles (salient features only)

UNIT-V

Sensory organs
Skin: Its appendages and functions
Eye: Parts of eye and its structure
Ear: Parts of ear- external, middle and inner ear and contents**.**

HUMAN ANATOMY I-PRACTICAL

PAPER CODE-05270202

B. Sc. Semester II (MLT)

L	T	P	Credits		
-	-	1/2		**Examination:**	**30 Marks**
				Int. Assessment:	**20 Marks**
				Total:	**50 Marks**

Identification and description of all anatomical structures.

Demonstration of dissected parts

Demonstration of skeleton-articulated and disarticulated.

Surface anatomy: Surface land mark-bony, muscular and ligamentous. Surface anatomy of major nerves, arteries of the limbs.

HUMAN PHYSIOLOGY-II

PAPER CODE-05270203

B. Sc. Semester II (Medical Laboratory Technology)

L	T	P	Credits		
3	-		3	Examination:	60 Marks
				Int. Assessment:	40 Marks
				Total:	100 Marks
				Duration of Examination:	3 Hours

UNIT-I

Excretory system:

Functions of kidneys,
Composition of urine
Mechanism of urine formation
Regulations of body temperature
Fluid and electrolyte balance
Alterations in disease

UNIT-II

Sensory Organs:

Functions of skin, eye, ear, nose, tongue
Alterations in disease

UNIT-III

Endocrines

Functions of pituitary, Pineal gland, Thymus, Thyroid, Parathyroid,
Pancreas,
Suprarenal & placenta
Alterations in disease

UNIT-IV

Reproduction

Reproduction of cells-DNA, Mitosis, Meiosis, Spermatogenesis, Oogenesis
Functions of female reproductive organs:
Functions of breast, female sexual cycle
Introduction to embryology
Functions of male reproductive organs:
Fertility system
Alterations in disease

UNIT-V

Lymphatic and Immunological system:

Circulation of lymph
Immunity
Formations of T- Cells and B- Cells

Types of Immune response
Antigens
Cytokines

HUMAN PHYSIOLOGY II-PRACTICAL

PAPER CODE-05270204

B. Sc. Semester II (MLT)

L	T	P	Credits		
-	-	1/2		**Examination:**	**30 Marks**
				Int. Assessment:	**20 Marks**
				Total:	**50 Marks**

1. Haemoglobinometry
2. White Blood Cell count
3. Red Blood Cell count
4. Determination of Blood Groups
5. Leishman'sstainingand Differential WBC count
6. Determination of packed cell Volume
7. Erythrocyte sedimentation rate[ESR]
8. Calculation of Blood indices
9. Determination of Clotting Time, BleedingTime
10. Blood pressure recording
11. Auscultation for Heart Sounds
12. Artificial Respiration

LABORATORY APPARATUS, REAGENTS AND CONCEPTS OF SI UNITS

PAPER CODE-05270205

B. Sc. Semester II (Medical Laboratory Technology)

L	T	P	Credits		
3	-		3	Examination:	60 Marks
				Int. Assessment:	40 Marks
				Total:	100 Marks
				Duration of Examination:	3 Hours

INTRODUCTION TO LABORATORY APPARATUS:

Unit- I

Overview of the functioning of Biochemistry clinical laboratory.

Introduction to glass wares:
Test tubes and serum tubes.
Test tube draining rack, bottle racks, Pipette stands, tripod stand, wire gauze and Bunsen burner.
Cuvettes and their application in colorimetery and spectrophotometry.
Bottle Dispensers and their Maintenance.
Maintenance, Care and cleaning of laboratory glassware.

Unit-II

Introduction to the laboratory instruments and their maintenance:

Use care and maintenance.
Water Distillation Plant and Deionizers
Refrigerators
Centrifuges
Laboratory Balance and Direct Readout Electrical Balances
Colorimeter
Spectrophotometer
pH Meter and its Calibration

Unit-III

CONVENTIONAL AND SI UNITS USED IN THE LABORATORY

Molecular and equivalent weight
Normality, molality, molarity
Concentrations of solutions by w/w, w/v, v/v etc.
Preparation of standard solutions
Molar solutions and Percent solutions
Acid, base, salts and buffers
Indicators and their Functions

Buffers of the body

Unit-IV

DILUTIONS of solutions or samples:

Preparation of a stock standard and working standard.
Proper method of dilution of a solution or a laboratory sample.
Serial dilutions of samples
Saturated and supersaturated solutions
Significance of volumetric flask in preparing standard solutions,

LABORATORY APPARATUS, REAGENTS AND CONCEPTS OF SI UNITS

-PRACTICAL

PAPER CODE-05270206

B. Sc. Semester II (MLT)

L	T	P	Credits		
-	-	1/2		Examination:	30 Marks
				Int. Assessment:	20 Marks
				Total:	50 Marks

Introduction to glassware and instrument**s**

Preparation of %, molar and normal solutions

Understanding the principle of pH meter and Demonstration of pH meter

Colorimetry

Principle of colorimetry (Lambert and Beer's laws and their verification), colorimeter and its uses

Standard curve, features and uses

BASIC CONCEPTS OF IMMUNLOGY AND SYSTEMIC BACTERIOLOGY

PAPER CODE-05270207

B. Sc. Semester II (Medical Laboratory Technology)

L	T	P	Credits		
3	-		3	Examination:	60 Marks
				Int. Assessment:	40 Marks
				Total:	100 Marks
				Duration of Examination:	3 Hours

UNIT-I

Concept of Immunity and its types. Antigen & Antibody

Antigen antibody reactions I: Principle and types of Precipitation reaction and Agglutination reactions

Antigen antibody reactions II: Complement fixation, Neutralization, ELISA, RIA, IF

UNIT-II

Systemic Bacteriology I: Morphology, culture characteristic, identification, diseases caused and laboratory diagnosis of-Staphylococcus, Streptococcus,Bacillus, Neisseria, Corynebacterium, Clostridium, Mycobacteria

UNIT-III

Systemic Bacteriology I: Morphology, culture characteristic, identification, diseases caused and laboratory diagnosis of- Shigella, Salmonella, E.coli, Klebsiella, Proteus, Vibrio, Pseudomonas, Spirochetes

UNIT IV

Morphology, culture characteristic, identification, diseases caused and laboratory diagnosis of Mycoplasma, Nocardia, Actinomycetes, Legionella, Ricketssia

Immunoprophylaxis: Vaccines and its types.

National immunization schedule (NIS) for infants, children, pregnant women and healthcare workers.

BASIC CONCEPTS OF IMMUNLOGY AND SYSTEMIC BACTERIOLOGY

-PRACTICAL

PAPER CODE-05270208

B. Sc. Semester II (MLT)

L	T	P	Credits		
-	-	1/2		Examination:	30 Marks
				Int. Assessment:	20 Marks
				Total:	50 Marks

Identification of bacterial culture
Colony characteristics
Morphological characteristics

Bio medical waste
Use of colour coded bags
Black
Blue
Red
Yellow
Demonstration of Sterilization & Disinfection method
Autoclave
Hot Air oven
Water bath
Inspissator
Chemical Sterilization
Collection of specimen
From outpatient units
Inpatient units
Minor operation theatre
Major operation theatre for sterility testing
Disinfection of wards, OT and Laboratory
Visit to CSSD
Demonstration of personal protective equipment
Sterility testing Methods

SYSTEMIC AND CLINICAL PATHOLOGY

PAPER CODE-05270209

B. Sc. Semester II (Medical Laboratory Technology)

L	T	P	Credits		
3	-		3	**Examination:**	**60 Marks**
				Int. Assessment:	**40 Marks**
				Total:	**100 Marks**
				Duration of Examination:	**3 Hours**

UNIT-I

Clinical Pathology

Routine urine examination—specimen, physical examination, chemical examination, microscopic examination , **routine** examination of CSF ,semen analysis, routine examination of sputum , routine examination of body fluids- pleural , peritoneal , synovial .

UNIT-II

Haemodynamic Disorders-

Odema, thrombosis, Embolism, Infarction, Shock, Hyperemia & congestion, Heomorrhage. **Neoplasm-** Definition, Classification, nomenclature and charatteristics, Ateiology & agents causing neoplasm, Biology of neoplastic growth & neoplasm immunology.

UNIT-III

Cardiovascular System- Myocardial Infraction, Atherosclerosis, Pericardial Heart Disease, Ischemic Heart Disease, response of Vascular Walls to injury, Venous Diseases. **Respiratory system-**Restrictive lung disease, pulmonary infection, pleural disorders-pneumothorax, pleural effusion, carcinomas,

Digestive System- Disease of Oesophagus – Cngenital, Muscular, Infflamatory and Tumors, Salivary tumors, Stomach - Peptic Ulcer,Gastritis, Neoplasm of Stomach, Intestine – Inflammatory - Ulcerative Colitis, Crohns Disease,Infective – Entrocolitis, Colorectal cancer, Acute and Chronic Hepatitis, Cirrhosis of Liver, Hydronephrosis, Real cell carcinoma– Carcinoma of the Breast, Vaginitis, Endometrial Hyperplasia,Ovarian Tumors. Testicular Tumors,

Unit VI:

Nervous system- Meningitis, Encephalitis, Cerebrovascular disease, Demylenating Disease, Alzheimres disease, Muscular Dystrophy, Disorder of Neuromuscular Junction, **Skeletal System-** Pyogenic Osteomyelitis,Tubercular Osteomyelitis, Tumors, Osteoporosis, Rickets, Osteoarthritis, Musculoskeletal system

SYSTEMIC AND CLINICAL PATHOLOGY

-PRACTICAL

PAPER CODE-05270210

B. Sc. Semester II (MLT)

L	T	P	Credits		
-	-	1/2		**Examination:**	**30 Marks**
				Int. Assessment:	**20 Marks**
				Total:	**50 Marks**

1. BT & CT determination
2. ABO/Rh blood grouping by slide methods- Forward & reverse grouping
3. Urine examination – complete (Physical & chemical examination for glucose, proteins, bile salts & ketone bodies).
4. Semen analysis – Physical, Chemical & Neubauer's chamber counting.

FUNDAMENTALS OF COMPUTER SCIENCE

PAPER CODE-05270211

B. Sc. Semester II (Medical Laboratory Technology)

L	T	P	Credits		
3	1	-	4	**Examination:**	**60 Marks**
				Int. Assessment:	**40 Marks**
				Total:	**100 Marks**
				Duration of Examination:	**3 Hours**

UNIT-I

Introduction:

What are computers, Application areas, Characteristics & limitations, Evolution of computers, Classification& generations of computers, Data representation in computer memory (numbering system)

Computers Architecture /Organization:

Basicarchitecture, Functional Block diagram, Types of computers on the basis of purpose, Signal and Portability.

UNIT-II

Hardware:

CPU their generations and performance parameters, Input, output and storage devices.
Primary (Main) Memories (RAM, ROM, Types of RAM and ROM, Cache Memory, Registers and types of registers, Storage Evaluation Criteria, Memory Capacity),
Secondary Storage Devices: (Magnetic Disk, Floppy and Hard Disk, USBs, Optical Disks CD-ROMs)

Software:

Types: System Software (Machine Level Languages, Operating Systems, Device Specific Drivers), Higher Level Languages, and Applications

UNIT-III

Languages: Machine Language, Assembly Languages, Programming Languages. Use of Compilers, Assemblers, Linkers, Loaders and interpreters in programming languages

Operating System: Booting/Start Up Procedure of machines, Introduction to Operating System, Functions and Classification of Operating Systems, Basic introduction to DOS, UNIX/LINUX OS, Windows

HTML, Use of Multimedia, Computer aided teaching and testing
Application Software MS office (Word, Excel and Powerpoint)

UNIT-IV

Basic Introduction to Computer Networks:

Data Communication, Network devices (Hub, Switches, Modems, and Routers etc), LAN, LAN topologies, WAN, MAN, Internet: Introduction, Basics of E-mail, Web browsers (IE, Google Chrome, and Mozilla Firefox),
Structure of Universal Resource Locator, Domains (.com, .in, .country specific, .org and rationale behind them), IP address, Backbone network, Network connecting devices, HTTP, DNS, Network Security and Search Engine.

ENZYMOLOGY AND CLINICAL BIOCHEMISTRY

PAPER CODE-05270301

B. Sc. Semester III (Medical Laboratory Technology)

L	T	P	Credits		
3	1	-	4	**Examination:**	**60 Marks**
				Int. Assessment:	**40 Marks**
				Total:	**100 Marks**
				Duration of Examination:	**3 Hours**

Unit-I

Structure, Functioning and importance of enzymes in health and disease

Introduction, definition, Classification and mechanism of action of enzymes, Factors affecting enzyme activity, Clinical importance of enzymes and iso enzymes, Use of enzymes as reagents

Unit II

Plasma proteins: Major classes of Plasma proteins, Synthesis of Plasma proteins, Function of Plasma Proteins, Separation of Plasma Protein.

Unit III

Integration of Metabolism and Metabolism in Starvation: Definition and Significance of integration of Metabolism, Integration of Metabolism at Cellular and Tissue or Organ Level. Blood glucose regulation. Metabolism in Starvation, Phases of Starvation and Diabetes.

Unit IV

Metabolic intermediates: Introduction to Non-protein nitrogenous compounds ,urea/BUN: Synthesis, clinico-pathological correlations and estimations, Creatin and creatinine :Synthesis, clinico-pathological correlations and estimations, Uric acid :Synthesis, clinico-pathological correlations and estimations, Ammonia, Porphyrins.

Unit V

Mineral & Metabolic Bone Diseases: Metabolism of Calcium, Phosphorus, Sulfur etc. Metabolism of Trace elements. Bone metabolism, Markers of bone metabolism.

ENZYMOLOGY AND CLINICAL BIOCHEMISTRY

-PRACTICAL

PAPER CODE-05270302

B. Sc. Semester III (MLT)

L	T	P	Credits		
-	-	2/4		**Examination:**	**30 Marks**
				Int. Assessment:	**20 Marks**
				Total:	**50 Marks**

Auto pipettes
Working and calibration of auto pipettes of different types
Estimation on semi automated Biochemistry analyzers
Standardization and calibration of semi automated, Biochemistry Analyzers
Estimation of various biochemical parameters by using semi automated biochemistry analyzers :
Lipid Profile, Glucose, Calcium and Phosphorus
Blood collection and Separation of serum and plasma.

Estimation of glucose by GOD POD method.

Estimation of urea by Urease (Berthelot) test.

Estimation of uric acid by Uricase/PAP method.

Urine analysis

Analysis of urine for abnormal constituents

MYCOLOGY AND PARASITOLOGY

PAPER CODE-05270303

B. Sc. Semester III (Medical Laboratory Technology)

L	T	P	Credits		
3	1	-	4	**Examination:**	**60 Marks**
				Int. Assessment:	**40 Marks**
				Total:	**100 Marks**
				Duration of Examination:	**3 Hours**

UNIT-I

Mycology: Morphology and Classification of fungi.
Lab diagnosis of fungal Infections: stainings, culture media and conventional mycological techniques

UNIT-II

Superficial Mycoses: Dermatophytes, Malassezia
Subcutaneous Mycoses: Mycetoma, Rhinosporidium and Sporotrichosis
Systemic Mycoses: Histoplasmosis, Blastomycosis, Cryptococcosis
Opportunistic Fungi: Aspergillosis, Pencillosis, Zygomycosis, Candidiasis, Pneumocystis

UNIT-III

Parasitology I: Classification and morphology of Protozoa
Structure, life cycle pathogenesis & laboratory diagnosis of-Entamoeba, Trichomonas and Giardia,

Plasmodium, Leishmania, Toxoplasma, Cryptosporidium & coccidian parasites

UNIT-IV

Parasitology II: Classification and morphology of Helminthes- Taenia, Echinococcus,
Ascaris, Ancylostoma, Strongyloides, Trichuris, &Enterobius, Filaria

MYCOLOGY AND PARASITOLOGY-PRACTICAL

PAPER CODE-05270304

B. Sc. Semester III (MLT)

L	T	P	Credits		
-	-	2/4		**Examination:**	**30 Marks**
				Int. Assessment:	**20 Marks**
				Total:	**50 Marks**

Mycology::

1. Demonstration of fungi using KOH , Lactop henol cotton blue and India ink
2. Colony characteristics and Microscopic examination and identification tests for :
3. Candida and Cryptococcus,
4. Dermatophytes
5. Aspergillus sp
6. Miscellaneous fungi
7. Slide culture technique

Parasitology

1. Stool examination: Saline mount, Iodine mount
2. Stool concentration techniques
3. Preparation of thick and thin smears
4. Preparation and staining technique of Leishman's stain and Giemsa stain
5. Demonstration of malarial parasite in peripheral smear
6. Rapid test for malaria and QBC

FUNDAMENTALS OF HISTOLOGY, CYTOLOGY AND HEMATOLOGY

PAPER CODE-05270305

B. Sc. Semester III (Medical Laboratory Technology)

L	T	P	Credits		
3	1	-	4	Examination:	60 Marks
				Int. Assessment:	40 Marks
				Total:	100 Marks

Duration of Examination: 3 Hours

UNIT-I

Fundamentals of applied histology

Microscopy – working principle, maintenance and applications, & various types of microscope.
Dark ground microscope, Polarizing microscope, Phase contrast microscope, interference microscope, U.V light microscope.
H&E Stain & its importance.
Connective tissue stain, trichrome staining and other special stains.
Principle of metal impregnation techniques.
Principles of immunohistochemistry and its techniques.

UNIT-II

Cytology

Stains cytological preparation with special emphasis on MGG, Papanicolour Stains.
Special stains like PAS, Mucicarmine, Alcian blue.
Cytological screening and quality control in cytology laboratory.

UNIT-III

Haematology

Hematopoesis & stem cell.
Aneamias:- Types, classification, definition & microcytic hypochromic & macrocytic anemia
Bone marrow aspiration composition and function
Staining of bone marrow smears and preparation of histological section

UNIT-IV

Haemoglobin:- Its synthesis, functions and degradation
Haemoglobin pigments and their measurement
Abnormal haemoglobins and their means of identification & estimation
LE Cell phenomenon, and various methods of its demonstration.
Coagulation factors.
Haemostatic mechanism and theories of blood coagulation & Hemophilia
Preparation of packed cells and various fraction of blood for transfusion purposes

FUNDAMENTALS OF HISTOLOGY, CYTOLOGY AND HEMATOLOGY-PRACTICAL

PAPER CODE-05270306

B. Sc. Semester III (MLT)

L	T	P	Credits		
-	-	2/4		Examination:	30 Marks
				Int. Assessment:	20 Marks
				Total:	50 Marks

1. Coomb's test direct & indirect.
2. Urine – Microscopic examination.
3. Reticulocytes, count - preparation, staining & corrected retic count.
4. Semen analysis- physical and chemical & microscopy with Methylene blue staining for morphology.
5. Body fluid analysis (CSF, Pleural, Peritoneal/ascetic fluid)- Physical, Chemical, M/E.

ENVIRONMENTAL STUDIES

PAPER CODE-05270307

B. Sc. Semester III (Medical Laboratory Technology)

L	T	P	Credits
3	1	-	4

Examination: 60 Marks
Int. Assessment: 40 Marks
Total: 100 Marks
Duration of Examination: 3 Hours

Unit 1:

The Multidisciplinary nature of environmental studies

- Definition, scope and importance.
- Need for public awareness.

Natural Resources

Renewable and non-renewable resources: Natural resources and associated problems.

- Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people.
- Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams benefits and problems.
- Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.
- Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.
- Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources. Case studies.
- Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification.

Unit 2:

Ecosystems

- Concept of an ecosystem.
- Structure and function of an ecosystem.
- Producers, consumers and decomposers.
- Energy flow in the ecosystem.
- Ecological succession.
- Food chains, food webs and ecological pyramids.

Biodiversity and its conservation

- Hot-spots of biodiversity.
- Threats to biodiversity : habitat loss, poaching of wildlife, man-wildlife conflicts
- Conservation of biodiversity : In-situ and Ex-situ conservation of biodiversity.

Unit 3:

Environmental Pollution

Definition, causes, effects and control measures of:-

a. Air pollution
b. Water pollution
c. Soil pollution
d. Marine pollution
e. Noise pollution
f. Thermal pollution
g. Nuclear hazards

- Solid waste Management : Causes, effects and control measures of urban and industrial wastes.
- Fireworks, their impacts and hazards
- Pollution case studies.
- Disaster management : floods, earthquake, cyclone and landslides.

Unit 4 :

Social Issues and the Environment

- From Unsustainable to Sustainable development
- Urban problems related to energy
- Water conservation, rain water harvesting, watershed management
- Resettlement and rehabilitation of people; its problems and concerns. Case studies.
- Environmental ethics: Issues and possible solutions.
- Consumerism and waste products.
- Environmental Legislation (Acts and Laws)
- Issues involved in enforcement of environmental legislation

Human Population and the Environment

- Population growth, variation among nations with case studies
- Population explosion – Family Welfare Programmes and Family Planning Programmes
- Human Rights.
- Value Education.
- Women and Child Welfare.

MEDICAL EMERGENCIES AND PATIENT CARE

PAPER CODE-05270308

B. Sc. Semester III (Medical Laboratory Technology)

L	T	P	Credits
3	1	-	4

Examination: 60 Marks
Int. Assessment: 40 Marks
Total: 100 Marks
Duration of Examination: 3 Hours

Unit – I: Introduction to Emergency Services

Organization of Emergency Department, Guidelines in Emergency, Clinical Monitoring, Fluid Therapy and Blood Transfusion, Airway Management, Cardiopulmonary Resuscitation, Principal of Mechanical Ventilation, Injection – An Infusion Method, Acid Base and Electrolyte Imbalance

Unit – II: Handling of Different Emergencies

Cardiogenic Shock, Congestive Cardiac Failure, Myocardial Infarction, Head Injuries, Vasovagal Syncope, Seizer, Epilepsy, Conjunctival and Corneal Foreign Body, Foreign Body in Nose & in Ear, Epistaxis, Asthma, COPD, Haemoptysis, Rib Fracture, Tear Gas Exposure, Food Poisoning, Diarrhea, Urine Retention, Blunt Scrotal Trauma, Hypo & Hyperthermia

Unit – III: Fundamentals of Patient Care

Concept of health & Illness, Health Determinants, Concept of Patients & Their Types, Patient Centred Care & Fundamentals of Communications, Reporting & Recording of Patients, Rights of Patients , Concepts of Disease & Its Types, General Concept, Care & Prevention of Accident, Trauma & Infections

Unit – IV: Patient Care, Associated Units & Departments

Ambulatory Units, Critical Care Units ,Paediatric, Neonatal Intensive Care Unit (NICU), Emergency Department, Inpatient Units, Haematology/Oncology and Immunology Unit , Orthopaedic Unit, Psychiatry Unit ,Neurology and Neurosurgical Unit, Renal, Dialysis Unit, Gastroenterology/Endocrinology Unit, Life Flight Critical Care Transport Program, Radiology Department, Surgical Units, Cardiac Catheterization Lab, Operating Room, Post Anaesthesia Care Unit, Managing patients with disabilities, Geriatric Care, Care of Critically Ill Patients, Tracheotomise Patients. Nutritional Support in ICU

ENZYMOLOGY AND CLINICAL BIOCHEMISTRY-II

PAPER CODE-05270401

B. Sc. Semester IV (Medical Laboratory Technology)

L	T	P	Credits
3	1	-	4

Examination: 60 Marks
Int. Assessment: 40 Marks
Total: 100 Marks
Duration of Examination: 3 Hours

Unit I

Clinical enzymology & biomarkers: – Clinical enzymology, plasma lipid profile, hypolipoproteinemias, hyperlipidemias. Cardiac markers-creatine kinase (CK-MB), cardiac troponins, high sensitive TnT, AST & LDH. Markers of Muscle diseases-creatine kinase (CK-MM), aldolase. Markers of bone disease- Alkaline phosphatase, heat labile bone isoenzymes. Prostate markers- prostate specific antigen, acid phosphatase. Miscellaneous enzymes-Glucose-6-phosphate dehydrogenase, urease, glucose oxidase & peroxidase.

Unit-II

Diseases and Organ function tests: Kidney function tests, Liver function tests, Thyroid function tests, Pancreatic function tests, Diabetes Mellitus, Porphyrias, Jaundice, Atherosclerosis, Myocardial infarction, Nephrotic and Nephritic Syndrome

Unit III

Specimen Collection & Reports Release: Types of Specimens, Method of specimen collection (Blood, serum, Urine and others), Separating the serum and plasma, Use of preservatives in specimen collection, Use of proper Anticoagulants in specimen collection, Analyzing and releasing final Biochemistry reports, Precautions required before release of reports

Unit IV

Acid-Base balance & pH: - Buffers of body fluids, respiratory regulation of pH, renal regulation of pH, disturbances in acid-base balance- metabolic acidosis, metabolic alkalosis. Respiratory acidosis & alkalosis, anion gap, determination of blood pH & gases.

ENZYMOLOGY AND CLINICAL BIOCHEMISTRY-II

-PRACTICAL

PAPER CODE-05270402

B. Sc. Semester IV (MLT)

L	T	P	Credits		
-	-	2/4		**Examination:**	**30 Marks**
				Int. Assessment:	**20 Marks**
				Total:	**50 Marks**

Estimation on semi automated Biochemistry analyzers
Standardization and calibration of semi automated, Biochemistry Analyzers
Estimation of various biochemical parameters like using semi automated biochemistry analyzers
–LFT
KFT
Cardiac markers (CK-MB and CK total)
GTT and GTC
24 hour urinary creatinine, calcium and proteins
Blood Gas Analysis
Standardization and calibration of Blood Gas Analyzer
Blood -Gas Analysis and reporting
Quality control
Various quality control measures used in the laboratory and how to maintain the quality

VIROLOGY, SPECIMEN HANDLING AND APPLIED MICROBIOLOGY

PAPER CODE-05270403

B. Sc. Semester IV (Medical Laboratory Technology)

L	T	P	Credits
3	1	-	4

Examination: 60 Marks
Int. Assessment: 40 Marks
Total: 100 Marks
Duration of Examination: 3 Hours

UNIT-I

Virology I: General properties of Viruses ,Collection, transportation and storage of samples for viral diagnosis, Cultivation of viruses.
Morphology, replication, clinical features and laboratory diagnosis of Bacteriophages, Herpes viruses , Viral Hepatitis, Human Immunodeficiency Viruses , Rabies,

UNIT-II

Virology-II Morphology, replication, clinical features and laboratory diagnosis of:
Poliomyelitis, Influenza Viruses, Rubella, Mumps , Measles, Rota virus, Japanese encephalitis & Dengue Chikungunya, Kyasanur Forest disease ,Human Onocogenic Viruses.

UNIT-III

Specimen processing -Blood, Sputum, throat swab, nasopharyngeal swab, Swabs (pus, wound), CSF and other body fluids, Stool and rectal swabs.

UNIT-IV

Applied Microbiology-Hospital infection control, Healthcare associated infections
Emerging infectious diseases, Zoonosis. Bacteriology of Water, Milk, and Air

VIROLOGY, SPECIMEN HANDLING AND APPLIED MICROBIOLOGY

-PRACTICAL

PAPER CODE-05270404

B. Sc. Semester IV (MLT)

L	T	P	Credits		
-	-	2/4		**Examination:**	**30 Marks**
				Int. Assessment:	**20 Marks**
				Total:	**50 Marks**

I. Spot tests/ELISA : HBV,HCV,HIV, Dengue X2

II. Demonstration of embryonated egg inoculation

III. Demonstration of cell culture techniques and Cytopathic effect

Demonstration of heamagglutination and heamagglutination inhibition assay

GENERAL PATHOLOGY AND TRANSFUSION MEDICINE

PAPER CODE-05270405

B. Sc. Semester IV (Medical Laboratory Technology)

L	T	P	Credits
3	1	-	4

Examination: 60 Marks
Int. Assessment: 40 Marks
Total: 100 Marks
Duration of Examination: 3 Hours

UNIT-I

General Pathology

Inflammation:- Definition, causes, types & various cells of inflammation.
Immunity:- Definition, types of antigens & various types of antibodies.
Hypersensitivity:- Definition with types & examples.

UNIT-II

Neoplasia:- Definition, classification, difference between benign & malignant tumors in brief, various modes of invasion and diagnosis in brief.
Infections:- Malaria, tuberculosis, dengue & AIDS in brief.
Nutritional diseases:- Fat & water soluble vitamins, Rickets, Scurvy.

UNIT-III

Fundamentals of transfusion Medicine:

Compatibility of tests in blood transfusion.
Complications and hazard of blood transfusion
Blood groups:- Types & Bombay blood group
Blood donor selection.
Methods of bleeding donors.
Blood containers, anticoagulants and storage of blood.
Coomb's test and its significance.
Screening of blood for infective material
Blood components, preparation & component therapy.
Transfusion reactions and work up
Blood bank organization, standards, procedures, techniques and quality control.

UNIT-IV

Coomb's test and its significance.
Screening of blood for infective material
Blood components, preparation & component therapy.
Transfusion reactions and work up
Blood bank organization, standards, procedures, techniques and quality control.

Laboratory investigation of transfusion reactions and mismatched transfusion.
Various component of blood:- Separation & its uses.

GENERAL PATHOLOGY AND TRANSFUSION MEDICINE-PRACTICAL

PAPER CODE-05270406

B. Sc. Semester IV (MLT)

L	T	P	Credits		
-	-	2/4		Examination:	30 Marks
				Int. Assessment:	20 Marks
				Total:	50 Marks

1. Sickling test for sickle cell anemia.
2. Osmotic fragility test.
3. LE Cell preparation & estimation.
4. PT & APTT Test.
5. BT & CT Test with clot retraction time.

DIAGNOSTIC ENDOCRINOLOGY

PAPER CODE-05270501

B. Sc. Semester V (Medical Laboratory Technology)

L	T	P	Credits
3	1	-	4

Examination: 60 Marks
Int. Assessment: 40 Marks
Total: 100 Marks
Duration of Examination: 3 Hours

Unit I

Introduction and classification of hormones, difference between hormones and enzymes, Regulation and general mechanism of action of hormones. Diagnostic endocrinology techniques- ELISA, RIA, chemiluminescence assay

Unit II

Pituitary gland & hypothalamus, hormones of the Anterior Pituitary- Growth hormone, Prolactin, Gonadotropin, Follicle Stimulating hormone, Leuteinizing Hormone, Thyroid stimulating hormone (TSH), Adrenocorticotropic hormone (ACTH)

Unit III

Thyroid hormones – T3, T4, PTH, disorders. Neurohypophysis hormones-Oxytocin, Antidiuretic hormone.

Unit IV

Kidney, pancreatic and Gonads hormones -Renin, Adrenal gland hoemones-Aldosterone, Glucocorticoids, Mineralocorticoids, cortisol and disorders associated with them di. Insulin, glucagon, somatostatin and disorders associated with them. Testosterone, Estrogens, Progesterone, Human Chorionic Gonadotropin (HCG), disorders associated with them.

DIAGNOSTIC ENDOCRINOLOGY-PRACTICAL

PAPER CODE-05270502

B. Sc. Semester V (MLT)

L	T	P	Credits		
-	-	2/4		**Examination:**	**30 Marks**
				Int. Assessment:	**20 Marks**
				Total:	**50 Marks**

Estimation of TSH in a given sample by ELISA

Estimation of T3 in a given sample by ELISA

Estimation of T4 in a given sample by ELISA

Estimation of Prolactin in a given sample by ELISA

Estimation of Estradiol in a given sample by ELISA

IMMUNOLOGY AND APPLIED MICROBIOLOGY

PAPER CODE-05270503

B. Sc. Semester V (Medical Laboratory Technology)

L	T	P	Credits
3	1	-	4

Examination: 60 Marks
Int. Assessment: 40 Marks
Total: 100 Marks
Duration of Examination: 3 Hours

UNIT-I

Immunology: Immunity ,Components of immune system- Organs of immune system, B Lymphocytes and plasma cells, T lymphocytes and their subsets and Natural killer cells, Macrophages and dendritic cells. Immune responses

UNIT-II

Types of hypersensitivity reactions, Autoimmunity, Cytokines, Antigen & Antibody Complement, Types of antigen-antibody reactions-Precipitation, Agglutination, Complement Fixation Test, Neutralization, ELISA, Immunofluorescence ,Radioimmunoassay, Monoclonal Antibodies, Transplantation immunology and HLA typing

UNIT-III

. Laboratory Diagnosis of- Urinary Tract Infections, Diarrhea & Dysentery, Meningitis, Blood stream infection, Respiratory infection, Sexually Transmitted Diseases, Viral hepatitis HIV , Skin, soft tissue & wound infection.

UNIT-IV

Molecular techniques in diagnostic microbiology-PCR and its types.
Biomedical waste management, Biosafety levels and biosafety cabinets
Health care associated infections, Occupationally acquired infections in health care settings
Maintenance of laboratory records, Audit

IMMUNOLOGY AND APPLIED MICROBIOLOGY-PRACTICAL

PAPER CODE-05270504

B. Sc. Semester V (MLT)

L	T	P	Credits		
-	-	2/4		**Examination:**	**30 Marks**
				Int. Assessment:	**20 Marks**
				Total:	**50 Marks**

Antibiotic sensitivity testing-Kirby Bauer method
Immunology Serological tests
Specimen collection, Principle, Methods, Procedure
Demonstration of HIV, HCV, HBC, Dengue,
Rapid test for Malaria,
Demonstration of ASO, CRP, RA, Widal, VDRL, Typhidot
Applied
Biomedical Waste management and maintenance of equipment
Hanging drop preparation
Culture methods
Introduction to biochemical reactions
Identification of bacterial culture

i) Colony characteristics
ii) Morphological characteristics
iii) Motility study

Interpretation of biochemical reactions
Antibiotic sensitivity testing-Kirby Bauer method

APPLIED HISTOLOGY, CYTOLOGY AND CYTOGENETICS

PAPER CODE-05270505

B. Sc. Semester V (Medical Laboratory Technology)

L	T	P	Credits
3	1	-	4

Examination: 30 Marks
Int. Assessment: 20 Marks
Total: 50 Marks
Duration of Examination: 3 Hours

UNIT-I

APPLIED HISTOLOGY

Handling of fresh histological specimens (Tissues).
Lipids-identification and demonstration.
Micro-organism in the tissues-various staining, techniques for their demonstration and identification.
Immunohistochemistry-common antigens and their applications.
Electron microscope, working principles, components and allied techniques for electron microscopy.
Museum techniques.

UNIT-II

Cytology

Cervical cytology :- Basis of detection of malignant & premalignant lesion.
Aspiration cytology:- Principles, indications and utility of the techniques
Staining:- Pap stain, H&E stain & Giemsa stain.
Cytology of various body fluids.

UNIT-III

Cytogenetics

Introduction, terminology, classification & nomenclature.
Blood groups:- Types & Bombay blood groups.
Sex chromatin & identification
Chromosomes in neoplasia & oncogenes/anti-oncogenes.
Culture of bone marrow cells and peripheral blood lymphocytes.
Characterization of human chromosome by various banding techniques

UNIT-IV

Immunopathology

Cells of the immune system.
Immunoglobulins, antibodies and humoral immune response.
Auto immune disease & investigation.
Infection and the immune system
Cancer immunology
Tissue typing for kidney transplant.
HLA Antigen
Various grafts & graft versus host disease (GVHD).

UNIT-V

Haematology

Definition and classification of hemolytic anaemias :- Sickle cell anemia & Thalassemia.
Laboratory investigation for haemolytic anaemia including classification & causes.
Leukemia; definition and classification
Laboratory investigations for disseminated intravascular coagulation (DIC), Hemophilia
Mechanism of fibrinolysis; tests for fibrinolysis.
Platelet function test and their interpretation.
Electrophoresis :- Principles and application in hematology

APPLIED HISTOLOGY, CYTOLOGY AND CYTOGENETICS-PRACTICAL

PAPER CODE-05270506

B. Sc. Semester V (MLT)

L	T	P	Credits		
-	-	2/4		**Examination:**	**60 Marks**
				Int. Assessment:	**40 Marks**
				Total:	**100 Marks**

1. Plasma hepatoglobin
2. Hemosiderinuria
3. Fetal hemoglobin
4. Electrophoresis of various hemoglobin
5. Sickening test
6. Investigation for G6PD Deficiency

RESEARCH METHODOLOGY AND BIOSTATISTICS

PAPER CODE-05270507

B. Sc. Semester V (Medical Laboratory Technology)

L	T	P	Credits
3	1	-	4

Examination: 60 Marks
Int. Assessment: 40 Marks
Total: 100 Marks
Duration of Examination: 3 Hours

UNIT-I

Introduction

Meaning, definition, characteristics of statistics
Importance of the study of statistics
Branches of statistics
Statistics and health science including nursing
Parameters and estimates
Descriptive and inferential statistics
Variables and their types
Measurement scales

UNIT-II

Tabulation of Data

Raw data, the array, frequency distribution

Basic principles of graphical representation
Types of diagrams - histograms, frequency polygons, smooth frequency polygon, cumulative frequency curve, Normal probability curve

UNIT-III

Measure of Central Tendency

Introduction: Uses, applications and practical approach
Definition and calculation of mean - ungrouped and grouped data
Meaning, interpretation and calculation of median ungrouped and grouped data
Meaning and calculation of mode
Comparison of the mean, and mode
Guidelines for the use of various measures of central tendency

UNIT-IV

Measure of Variability

Introduction: Uses, applications and practical approach
The range, the average deviation or mean deviation
The variance and standard deviation
Calculation of variance and standard deviation for ungrouped and grouped data
Properties and uses of variance and Standard deviation

UNIT-V

Sampling Techniques

Introduction: Uses, applications and practical approach

Criteria for good samples

Application of sampling in Community

Sampling methods, sampling and non-sampling errors

Sampling variation and tests of significance

HOSPITAL MANAGEMENT AND MEDICAL ETHICS

PAPER CODE-05270508

B. Sc. Semester V (Medical Laboratory Technology)

L	T	P	Credits
3	1	-	4

Examination: 60 Marks
Int. Assessment: 40 Marks
Total: 100 Marks
Duration of Examination: 3 Hours

UNIT-I

Introduction to hospital staffing- Hospital staffing, administration, HIS.
Medical records and documentation- Medical records and documentation

UNIT-II

Legal & medical issues'Legal issues in Laboratories
Ethical issues , patient rights, patient responsibility, legal concerns, History taking, patient monitoring, inform consent, mal-practice, patient privacy issues.

Professional ethics- Professional ethics and Code of conduct of Lab technicians

UNIT-III

Handling of patients Seriously ill and traumatized patients, visually impaired, hearing and speech impaired patients, mentally impaired patients/ psychologically issues, infectious patients, critical/trauma patients, pregnant patient, patient with implant. Handling of patient with life threading diseases like HIV, STD, HBsAG, etc

UNIT-IV

Departmental Safety & Infection Control
Infection control Skin care, donning of gowns, gloves, face masks, head caps, shoe covers
First aid- Artificial respiration, hemostasis, first aid techniques, ABCD management

TOOLS AND TECHNIQUES IN MOLECULAR BIOLOGY & BIOCHEMISTRY

B. Sc. Semester V (Medical Laboratory Technology)

L	T	P	Credits
4	-	-	4

Examination: 60 Marks
Int. Assessment: 40 Marks
Total: 100 Marks
Duration of Examination: 3 Hours

Unit-I : Nucleic acid extraction Isolation of nucleic acids, Extraction of genomic DNA & plasmid DNA by boiling lysis method, alkaline lysis method, by Kit methods, RNA extraction, Qualitative and quantitative estimation of DNA & RNA.

Unit II: Polymerase Chain Reaction Polymerase chain reaction, Nested PCR, Colony PCR, Assembly PCR, touchdown PCR, multiplex PCR, Hot start PCR, Methylation specific PCR, LAMP Assay, Methods for synthesis of double strand cDNA, RT PCR and Real Time PCR, DNA sequencing by Maxum Gilbert method and Sanger's dideoxynucleotide method, RFLP, RAPD.

Unit-III: Protein purification techniques Salting in, Sating out, Dialysis, Chromatography: Principles of chromatography, Paper chromatography, Thin Layer Chromatography, Gel filtration Chromatography, Ion exchange Chromatography, Affinity chromatography, Hydrophobic interaction, Reverse-phase chromatography, HPLC, Gas chromatography.

Unit IV: Spectroscopic Techniques, Electrophoresis and Blotting Lambert Beer's Law, Analysis of biomolecules using UV/visible spectrophotometer, fluorescence, circular dichroism. Electrophoresis, types of electrophoresis. Polyacrylamide and Agarose gel electrophoresis; Capillary electrophoresis; 2D Electrophoresis; Isoelectric focusing, Southern Blotting, Northern Blotting and western Blotting.