DETAILED SYLLABUS

FOR

DISTANCE EDUCATION

Under Graduate Degree program

BACHELOR OF SCIENCE IN MEDICAL LAB TECHNOLOGY

(BSCMLT)

(SEMESTER SYSTEM)

Program Structure

First Semester

COURSE TITLE	Paper Code	MARKS				
		THEORY		PRACTICAL		TOTAL Marks
		INTERNAL	EXTERNAL	INTERNAL	EXTERNAL	
Effective Communication Skills	BSCMLT/S/110	40	60	40	60	200
Introduction to Computer -I	BSCMLT/S/120	40	60	NA	NA	100
Fundamentals of Anatomy	BSCMLT/S/130	40	60	NA	NA	100
Fundamentals of Physiology	BSCMLT/S/140	40	60	NA	NA	100
Laboratory Technology	BSCMLT/S/150	40	60	40	60	200

Second Semester

COURSE TITLE	Paper Code	MARKS				
		THEORY		PRACTICAL		TOTAL Marks
		INTERNAL	EXTERNAL	INTERNAL	EXTERNAL	
Introduction to Hematological Techniques	BSCMLT/S/210	40	60	40	60	200
Hematological Disorders	BSCMLT/S/220	40	60	40	60	200
Fundamentals of Biochemistry	BSCMLT/S/230	40	60	40	60	200
Lab. Reagents, Instrumentation and Techniques	BSCMLT/S/240	40	60	NA	NA	100
Elements of General Bacteriology - I	BSCMLT/S/250	40	60	40	60	200
Elements of Systemic Bacteriology – I	BSCMLT/S/260	40	60	NA	NA	100

Third Semester

COURSE TITLE	Paper Code	MARKS				
		THEORY		PRACTICAL		TO-TAL Marks
		INTER-NAL	EXTER-NAL	INTER-NAL	EXTER-NAL	
Introduction to Immunology, Serology and Parasitological - I	BSCMLT/S/310	40	60	NA	NA	100
Introduction to Mycology, Virology and Quality Control – I	BSCMLT/S/320	40	60	NA	NA	100
Fundamentals of Carbohydrates and Lipids	BSCMLT/S/330	40	60	40	60	200
Concepts of Proteins and Diagnostic Enzymology	BSCMLT/S/340	40	60	40	60	200
Basic Blood Transfusion Techniques - I	BSCMLT/S/350	40	60	40	60	200
Blood Bank Procedures and Hemolytic Diseases of the Newborn – I	BSCMLT/S/360	40	60	NA	NA	100

Fourth Semester

COURSE TITLE	Paper Code	MARKS				
		THEORY		PRACTICAL		TO-TAL Marks
		INTER-NAL	EXTER-NAL	INTER-NAL	EXTER-NAL	
Liver and Renal Function Tests, Hormones and Tumar Markers	BSCMLT/S/410	40	60	40	60	200
Electrolytes, Acid Base Balance, Factors in Hemoglobin Synthesis & Automation	BSCMLT/S/420	40	60	40	60	200
Histotechnology and Cytotechnology	BSCMLT/S/430	40	60	40	60	200
Examination of Body Fluids	BSCMLT/S/440	40	60	40	60	200

Fifth Semester

COURSE TITLE	Paper Code	MARKS				
		THEORY		PRACTICAL		TO-TAL Marks
		INTER-NAL	EXTER-NAL	INTER-NAL	EXTER-NAL	
Histology Routine and Special Staining	BSCMLT/S/510	40	60	40	60	200
Heamostasis and Quality Assurance	BSCMLT/S/520	40	60	40	60	200
Advance General Bacteriology – II	BSCMLT/S/530	40	60	40	60	200
Advance Systemic Bacteriology – II	BSCMLT/S/540	40	60	NA	NA	100
Immunology, Serology and Parasitology – II	BSCMLT/S/550	40	60	NA	NA	100
Mycology, Virology and Quality Control – II	BSCMLT/S/560	40	60	NA	NA	100

Sixth Semester

COURSE TITLE	Paper Code	MARKS				
		THEORY		PRACTICAL		TO-TAL Marks
		INTER-NAL	EXTER-NAL	INTER-NAL	EXTER-NAL	
Blood Transfusion Techniques – II	BSCMLT/S/610	40	60	NA	NA	100
Blood Bank Procedures and Hemolytic Diseases of the Newborn – II	BSCMLT/S/620	40	60	NA	NA	100
Organization and Management of Labs	BSCMLT/S/630	40	60	40	60	200
Project	BSCMLT/S/640	40	60	40	60	200

Sixth Semester(intership)

COURSE TITLE	Paper Code	MARKS				
		THEORY		PRACTICAL		TO-TAL Marks
		INTER-NAL	EXTER-NAL	INTER-NAL	EXTER-NAL	
Microbiology	BSCMLT/S/650	40	60	NA	NA	100
Biochemistry	BSCMLT/S/660	40	60	NA	NA	100

Syllabus

First Semester

I Effective Communication Skills **Subject Code: BSCMLT/S/110**

Unit 1: Language and Communication
Definition of communication; the process of communication; Barriers to effective communication; Types of communication; the impact of communication on performance.

Unit 2: Introduction to Grammar
Parts of speech: Nouns; Pronouns; adjectives; verbs; adverbs; prepositions; conjunctions; interjections.

Unit 3: Oral Skills
Advantages and disadvantages of oral communication; One-to-One Oral communication; oral presentations.

Unit 4: Vocabulary
Forming words; Words from everywhere.

Unit 5: English Language Remedial Skills
Sentences; subject-Verb Agreement; Active Voice and Passive Voice; Degrees of Comparison; Direct and Indirect Speech; Question Tags.

Unit 6: Listening Skills
What is listening; types of Listening; Barriers of effective listening; Semantic /Markers; Listening to current complaints.

Unit 7: Reading Skills
What is reading? Types of reading.

Unit 8: Writing Skills
Note taking; Paraphrasing; Elements of writing; Business letter writing; other business communications.

II Introduction to Computer –I **Subject Code: BSCMLT/S/120**

Unit 1: Introduction to Information Technology
What is information technology?; data; instructions and information; properties and scope of information; information economics(cost of information; value of information); information system; types of information systems (office automation system; transaction processing system); types of information computing models (file/server; client/server); internet.

Unit 2: Introduction to computers
Introduction to computer and associated terms (computer; input devices; output devices; Central Processing unit; secondary storage devices; hardware; peripheral devices or peripherals; terminal; port; advantages of a computer); computers and its history (evolution of the computer; generations of computers; types of computers; classification of computers); data representation (Binary system-BITS and BYTES; Standard codes- ASCII and EBCDIC; decimal to binary conversion; binary to decimal conversion; binary arithmetic; octal system; hexadecimal system).

Unit 3: Hardware
Central processing unit (control unit; registers; arithmetic logic unit; memory unit; clock speed); primary memory/storage (random access memory (RAM); read only memory(ROM); CACHE memory); secondary memory/ storage (direct access storage devices (DASD); sequential access storage devices (SASD); microprocessor (bus; word length); input devices (keyboard; mouse; trackball and joystick; light pen; digitizer; optical character recognition (OCR); magnetic ink character recognition (MICR); voice input system; machine vision systems); output devices(visual display unit; printer; plotter; COM).

Unit 4: Software
Software (generation of languages; compilers / interpreters; classification of software); operating system (functions of operating system; GUI; booting); computer applications (electronic fund transfer system; electronic mail system; CAD; CAM; robotics; desk top publishing system); introduction to data files; data processing(modes of processing); types of data files (sequential file; indexed sequential file; direct or random file; database file); data transfer (network; concepts of data communication).

MS – WORD

Unit 1: Basics
System requirements; working with word; parts of MS-Word screen; creating a document; moving around the document; file operations(saving the file; creating a new file; opening a file; closing a file); editing the text; formatting the text(text color; text border; advanced formatting adjusting the space between characters; positioning the characters; animation); change case; moving the text; copying the text; undo; redo; and repeat; function icon and shortcut keys for formatting; exiting word.

Unit 2: Formatting
Paragraph options (paragraph alignment; line spacing; spacing between paragraphs; paragraph indents); drop cap; borders and shading (paragraphs borders; page border; paragraph shading); bullets and numbering; tab stop; find ; replace and go to; spelling and grammar; auto text; auto correct; word count; text background; breaks; columns (typing the text by defining the columns; converting existing text to columns text; converting columns text to regular paragraph).

Unit 3: Tables
Inserting objects; and page design; table (creating table; moving around the table; typing the table; selecting the table; inserting and deleting a row/column; setting the row height and column width; applying borders; sorting a table; table auto format; merging the cells; converting table to text and text to table); inserting objects (insert date and time; insert symbol; insert drawings; insert picture); header/footer; footnotes and endnotes.

Unit 4: Mail Merge
Views; printing and creating documents – Introduction; objectives; mail merge (creating main document; creating data source; editing the data source); views; full screen; ruler; zooming; summary information; printing and protecting the document (page setup; print preview; print); protecting the document; style; template.

MS – WINDOWS

Unit 1: Windows Accessories
Special feature of MS-Windows; parts of MS-Windows screen; Word pad; Ms-paint; notepad; calculator; character map; phone dialer.

Unit 2: Control Panel
Starting with control panel; Control panel display; Mouse properties; Keyboard properties; Regional settings (number formatting; currency format; time format; date format); printing.

Unit 3: Multi Tasking
Multitasking; arranging the open application windows; cut and paste; object linking and embedding; finding files and folders; My computer; windows explorer; creating a folder; using recycle bin; taskbar settings (task bar options; start menu programs).

Unit 4: Features of Windows
Introduction; types of systems; (single user system; multiprogramming or multitasking operating systems; real time systems); functions of operating system; (management of input/output devices; management of CPU time; management of memory); DOS commands; UNIX operating system (UNIX command); virus and vaccine; features of windows 98 (basic elements of windows with a 98 interface; dragging items with a mouse; choosing a navigation style; display properties; recycle bin; pre-viewing the document with a quick view; paths for window accessories; icon properties; using the taskbar features; imaging; saving folder display option; web view; using the web view wizard.

MS - POWERPOINT

Unit 1: Introduction to PowerPoint
Invoking Microsoft PowerPoint; the initial screens; the standard toolbar; the formatting toolbar; the drawing palette; getting ahead with power PowerPoint; slide layouts (select slide layout; change slide layout); getting more familiar with PowerPoint; editing a slide; working with slides; slide back ground; applying templates; PowerPoint views; built in wizards (using the auto content wizard).

Unit 2: Working with objects
Inserting the clip art picture into slide; slide show; using slide transitions; text build; graphics; creating tables; organization chart; animation; inserting sound in PowerPoint; and printing.

III Fundamentals of Anatomy **Subject Code: BSCMLT/S/130**

Unit 1 : Anatomical Terms

Unit 2 : General Anatomy

Unit 3 : Skeletal System.

Unit 4 : Major Muscles of the body

Unit 5 : Major Joints of the body.

Unit 6 : Respiratory system

Unit 7 : Cardiovascular System

Unit 8 : Digestive System

Unit 9 : Urinary system

Unit 10 : Female Reproductive System.

Unit 11 : Male Reproductive System

Unit 12 : Basic Embryology

Unit 13 : Endocrine Glands

Unit 14 : Special Senses

Unit 15 : Central Nervous System

Unit 16 : Cranial Nerves

Unit 17 : Peripheral Nervous System

IV Fundamentals of Physiology Subject Code: BSCMLT/S/140

Unit 1: Physiology of cells
Physiology of cells: Cell membrane-structure, functions, Nucleus-structure, functions, The cytoplasm-structure, functions, Cell organelles; Transport mechanism across the cell; Chemical messengers; Ion channels in the cell membrane, types of intercellular junctions.

Unit 2: Blood
Composition of blood; erythrocytes; white blood cells; immunity; platelets; Hemostasis, blood coagulation: Blood groups.

Unit 3: Respiratory System
Functional anatomy of respiratory system; Physical aspects of ventilation; Mechanism of breathing; Spirometry; gas exchange in lungs; hemoglobin and oxygen transport; carbon dioxide transport and acid –base balance; control of respiration; hypoxia; effect of exercise and high altitude on respiratory function; definitions of the terms: apnea, dyspnea, cyanosis, asphyxia, artificial respiration .

Unit 4: Circulation
Functional organization; initiation of heart beat; electrocardiogram; heart as a pump; cardiac output; haemodynamics; blood pressure; special circulations.

Unit 5: Digestive system
Structure of G.I tract; functions; motility/movements; what is secretion; digestion and absorption? regulations of secretions and movements; details of individual organ structure and functions

Unit 6: Kidneys and Skin
Functional anatomy of kidneys; mechanism of urine formation; abnormal constituents of urine; micturation; technical terms; skin.

Unit 7: Endocrine system
What are endocrine glands needed for?; which are the endocrine glands present in our body?; individual glands; reproductive system; functional anatomy of reproductive system and the physiology of the same.

Unit 8: Excitable Tissues-Nerve and Muscle
Neurons, neuroglia and peripheral nerves; excitability of neurons; muscle tissue and muscle contraction; neuromuscular transmission and synaptic transmission.

Unit 9: Central Nervous System
Organization of nervous system; Sensory system; Motor system; Basal ganglia and cerebellum

Unit 10: Special senses
The chemical senses; Hearing and balance; Vision.

V Laboratory Technology **Subject Code: BSCMLT/S/150**

Unit 1: Surface Tension:
Definition; S.I.units of surface tension; Molecular theory of surface tension; Surface energy; Examples illustrating surface tension; Angle of contact; Capillary action; Examples of capillarity; Rise of liquid in a capillary tube; Wetting and water proofing; Interfacial tension; Determination of surface tension; Biological applications.

Unit 2: Diffusion; Brownian motion; Viscosity; Sedimentation:
Diffusion; Factors affecting diffusion; Its biological applications; Brownian movement; Its biological applications; Viscosity : Introduction; Definition; Poiseuille's formula; Stokes' law; Determination of viscosity; Biological applications; Liquid flow; Biological applications; Velocity of gases; Sedimentation; Erythrocyte Sedimentation Rate.

Unit 3: Optics:
Properties of light: Wave nature; Interference; Biological applications; Diffraction: Biological applications; Refraction; Bright field light microscopy; Ultra microscopy; Ultraviolet microscopy; Phase contrast microcopy.

Unit 4: Fundamentals of Spectroscopy:
Colorimetry and Photometry; Components of instruments for optical spectroscopy; Transmittance of optical materials; Radiation Sources; Wavelength Selectors; Monochromators; Filters; Photon Detectors; Visual colorimeter; Photometers: Biological applications; Flame Photometry; Optical Activity : Plane polarized light; Polarimetry : Uses of Polarimeter; Biological applications; Polarization microscopy; Fluorimetry : Fluorescence; Fluorimeter; Fluorescence Microscopy

Unit 5: Light in Medicine:
Properties of light which are used in medicine; Measurement of light and its units; Applications of Visible Light in Medicine; Transillumination; Application of Ultraviolet and Infrared Light in Medicine; Lasers in Medicine

Unit 6: Introduction to Modern Physics:
Structure of Matter; Types of Electron Emission; Spectra mission Spectra; Absorption Spectra; Electromagnetic Spectrum; Quantum Theory of Radiation; Planck’s Theory; Photo Electricity; Einstein’s explanation of photoelectric effect; Photoelectric cells- Photoemissive cell Photo tubes; Photovoltaic cell; Photo conductive cell; Applications of photoelectric effect.

Unit 7: Introduction to Clinical Biochemistry:
Basics of laboratory techniques-Methods of measuring liquids; Chemicals and reagents; Preparation of solutions-Saturated solution; Percent solution; Molar solution; Molal solution; Normal solution; Acids and bases; Hazards of clinical laboratory-Hazards from dangerous chemicals; Precautions to take to avoid the accidents; fire; infection; corrosive chemicals; toxic fumes; broken glassware’s; burns caused by heat; carcinogens.

Unit 8: The Cell:
Ultra structure of cell-Plasma Membrane; Endoplasmic Reticulum; Golgi Complex; Lysosomes; Peroxisomes; Mitochondria; Centrioles; Nucleus; Transport across membrane-Passive transport; Active transport; Exocytosis; Endocytosis.

Second Semester

I Introduction to Haematological Techniques **Subject Code: BSCMLT/S/210**

Unit 1: Blood Collection; Processing and Preservation
Constituents of blood; Methods of Blood collection; Anticoagulants; Storage of blood specimens; Precautions to prevent hemolysis; Preparation of serum; universal precautions.

Unit 2: Microscopy
Types of microscopes: simple microscope; Compound microscope and other types of microscopes.

Unit 3: Preparation and Staining of Blood Films
Types of Preparation; Labeling; Fixation; Staining of thin blood films; staining of thick blood films; Mounting and Preservation of blood films.

Unit 4: Blood Cell Counts
Principle of blood counts; RBC count by manual method; WBC count by manual method; Platelet count by manual method; Absolute eosinophil count; automated cell counters.

Unit 5:

5.1-Estimation of Haemoglobin
Structure of Haemoglobin; Different methods of Estimation of Haemoglobin; Errors in Haemoglobin estimation; Quality control; Normal values.

5.2-Packed Cell Volume (PCV) or Haematocrit
Methods; Measurement of PCV in automated instruments.

5.3-Erythrocyte Indices
MCV; MCH; MCHC; Normal range; clinical significance; errors; other indices.

5.4-Erythrocyte Sedimentation Rate
Stages in ESR; Methods; Normal values; Factors affecting ESR; Interpretation.

Unit 6: Examination of Blood Films
Uniform grading of blood picture-Examination under low power; Examination under high dry objective; Examination under oil immersion objective.

Practical:

(i) Blood Collection technique; Preparation and staining of blood films; Blood cell counts; Estimation of hemoglobin; Packed Cell Volume (PCV)/Hematocrit; Erythrocyte Sedimentation Rate (ESR); Examination of blood cell films and differential counts; Normal Constitutents of Blood; their Structure; Functions and Haematopoisis; RBC; WBC Counting; Platelet Counting.

(ii) Absolute Eosinophil Count; Differential count.

II Haematological Disorders Subject Code: BSCMLT/S/220

Unit 1:

1.1-Classification of anemia
Morphological classification; Etiological classification.

1.2- Iron deficiency anemia
Iron metabolism-distribution of body iron; Iron absorption; Iron balance; Pathogenesis; Clinical Features; Laboratory Findings; Differential diagnosis.

1.3 Megaloblastic anemia
Vitamin B12 Metabolism; Folate metabolism; causes of megaloblastic anemia; Clinical manifestations; Laboratory investigations; differential Diagnosis.

1.4 Anemia associated with deficient production of Red cells.
Anemia of chronic disorders; Anemia of renal insufficiency; Anemia of Liver disease; Anemia in Endocrine disease; Anemia associated with bone marrow infiltration; Sideroblastic Anemia.

Unit 2: Hemolytic Anemias
Types of hemolysis; Evidence for hemolysis/laboratory findings; Classification of hemolytic anemias; Hemolytic anemia due to hemoglobin defects; Hemoglobinopathy; Hemolysis due to defective RBC enzyme activity; Paroxysmal Nocturnal Haemoglobinuria (PNH); Hemolysis due to extrinsic defects.

Unit 3:

3.1-Reticulocyte Count
Definition; Principle; Specimen; Reagents; Equipments; Procedure; Sources of error; automated methods; Interpretation.

3.2-Osmotic Fragility Test
Principle; Equipments; Reagents; Procedure; Results and interpretation.

3.3- Auto Hemolysis
Principle; Equipments; Reagents; Procedure; Results and interpretation.

3.4-Acidified Serum Test (HAM Test)
Principle; Equipments; Reagents; Procedure; Calculations; Results and interpretation.

Unit 4

4.1-Tests for Hemoglobin S
Methods: Sickling using whole blood; Sickiling using Reducing agent; Hemoglobin S solubility test; Hemoglobin electrophoresis; Hemoglobin S detection using monoclonal antibody.

4.2-Estimation of Fetal Hemoglobin
Methods: Betke method; Jonxis and Visser method.

4.3-Heinz Body Test
Principle; Equipments; Reagents; Procedure; Results and interpretation.

4.4-Tests for Unstable Hemoglobin

4.5-Hemosiderin in Urine

Principle; Equipments; Reagents and Procedure.

Unit 5

5.1-Preparation of Hemolysate
Principle; Equipments; Reagents and Method.

5.2-Hemoglobin Electrophoresis at Alkaline pH
Principle; Equipments; Reagents; Method and Interpretation.

5.3-Estimation of Hb A $_2$Level
Estimation of Hb A $_2$Level; Measurement by Elution from cellulose acetate.

Unit 6: The Bone Marrow
Cell composition of Normal Adult Bone Marrow; Bone marrow aspiration; Percutaneous Trephine Bone Biopsy; Special stains in the bone marrow.

Unit 7

7.1- Non-Neoplastic Leucocyte Disorders
Commonly used terminologies; Functional Leucocyte Disorders; Hyper Eosinophilic syndrome; Tropical Eosinophilia; Infectious Mononucleosis.

7.2-Leukemia
Causes of Leukemia; Classification of Leukemia; Acute Leukemia; Acute myeloblastic Leukemia; Acute Lymphoblastic Leukemia; Chronic Myeloid Leukemia; Chronic Lymphocytic Leukemia.

7.3- Multiple Myeloma
Clinical features; investigations; Diagnosis of multiple Myeloma.

Practical:
Reticulocyte count; Osmotic fragility test; Acidified serum test; Tests for hemoglobin S Estimation fetal Hb; Heinz body test; Hemosiderin in urine; Preparation of hemolysate; Hb electrophoresis; Preparation and Staining of Blood Smear.

III Fundamentals of Biochemistry **Subject Code: BSCMLT/S/230**

Unit 1: Chemistry and Metabolism of Carbohydrates:
Chemistry of Carbohydrates; Classification of carbohydrates; Isomerism in carbohydrates; Properties of carbohydrates; Structure of carbohydrates; Mucopolysaccharides; Special carbohydrates; Digestion of carbohydrates; Metabolism of carbohydrates ;Regulation of Blood Glucose; Uronic Acid Pathway.

Unit 2: Chemistry and Metabolism of Lipids
Classification and Chemistry of Lipids; Properties of Lipids; Prostaglandins and related compounds; Digestion and absorption of lipids; Metabolism of lipids; Ketone body metabolism; Role of liver in lipid metabolism; Regulation of lipid metabolism.

Unit 3: Chemistry and Metabolism of Amino Acids and Proteins

Definition of an a-amino acid; Classification of amino acids; Peptides and peptide bond; Charge properties of amino acids and proteins; Classsification of proteins; Biological role of proteins; Structure of proteins; Denaturation of proteins; Plasma proteins Tests for protein and amino acids; Enzymes and diagnostic enzymes; Metabolism of amino acids; Catabolism of amino acids; Catabolism of carbon skeleton of amino acids; Catabolism of important amino acids.

Unit 4: Vitamins

Vitamin A; Vitamin D; Vitamin E; Vitamin K; Vitamin C; Thiamine(B_1); Riboflavin(Vitamin B_2); Niacin (Nicotinic acid); Pyridoxine (Vitamin B_6); Biotin; Pantothenic acid; Folic acid; Vitamin B_{12} (Cobalamin)

Unit 5: Mineral Metabolism

Calcium; Phosphorus; Magnesium; Iron; Copper; Zinc; Manganese; Molybednum; Cobalt; Selenium; Fluoride; Soduium; Potassium; Chloride.

IV Lab. Reagents, Instrumentation and Techniques Subject Code: BSCMLT/S/240

Unit 1: Spectrophotometry / Colorimetry and Centrifugation Techniques

Spectrophotometry-Basic Introductory terms; Principles of spectrophotometer/colorimeter; Instrumentation; Applications; Estimation of blood glucose by O-Toluidine method; Centrifugation-Introduction and Principle; Centrifuges; Types of centrifuges; Applications of centrifugation.

Unit 2: Electrophoresis and Chromatography

Introduction and general principle of Electrophoresis; Chromatography Technique; Other Chromatographic techniques.

Unit 3: Immunoassay Techniques (RIA and ELISA)

Radio immuno assay (RIA); Enzyme Linked Immunosorbent Assay.

Unit 4: Basic Concepts in Clinical Laboratory

Basic techniques; Chemicals and reagents; Acids and bases; pH and pH scale; Titrations; Buffers.

V Elements of General Bacteriology – I Subject Code: BSCMLT/S/250

Unit 1: Introduction to General Bacteriology

Classification of Bacteria; Morphology of Bacteria; Structure of Bacterial cell; staining techniques.

Unit 2: Culture Media and Culture Methods

Culture media – Constituents of basal culture media; Synthetic media;Culture Methods.

Unity 3: Identification of Bacteria

Pre-test; Bio-chemical tests.

Unit 4: Sterilization and Disinfection

Classification; Various agents used in sterilization and disinfection

Practical

Isolation and Identification of Pure Culture/Clinical Specimen; Antibiotic – Sensitivity test; Serology – WIDAL; VDRL; Staining – Gram's stain; ZN stain; Motility; Hanging drop preparation and uses of

common media used in lab; Operation and Uses of Common instruments used in lab and sterilization techniques for various lab articles; materials and culture media ; Various lab articles and materials; Stool microscopy

VI Elements of Systemic Bacteriology – I **Subject Code: BSCMLT/S/260**

Unit 1: Staphylococcus
Staphylococcus aureus; Virulence factors

Unit 2: Streptococcus
Streptococcus pyogenes

Unit 3: Mycobacterium
Mycobacterium-Morphology; cultural characters; biochemical reactions; Pathogenesis; Primary TB; Laboratory Investigations.

Unit 4: Non-Sporing Anaerobes
Classification; Gram positive cocci; Gram negative cocci; Anaerobic bacilli; Lab diagnosis; Treatment.

Unit 5: Family Enterobacteriaceae
E-coli; Citrobacter; Klebsiella; Proteus; Salmonella; Shigella.

Unit 6: Pseudomonas Aeruginosa
Morphology; Cultural characters; Pigment production; biochemical tests; Resistance; Pathogenesis; Cross infection; Laboratory investigation; treatment.

Unit 7: Vibriocholerae
History-Morphology; Culture; Blood sugar; Biochemical Reactions; Cholera red reaction; Hemolytic reaction; Vibrio-Antigenic classification; Differences between classical and El tor; Pathogenesis; Laboratory investigations; Treatment.

Third Semester

I Introduction to Immunology, Serology and Parasitology – I
Subject Code: BSCMLT/S/310

Unit 1: Architecture of the Immune System
Organs of the immune system; Cells associated with immune response

Unit 2: Innate Immunity
Barriers; Proteins; Cell Processes

Unit 3: Acquired Immunity
Active immunity; Passive immunity; Passive active immunity; Adoptive immunity; Local immunity; Herd immunity.

Unit 4: Antigens
Determinants of antigenicity; Antigenic specificity; Species specificity; Iso specificity; Auto specificity; Organ specificity; Heterophile specificity; Histocompatibility antigens

Unit 5: Antibodies
Monoclonal antibodies; Structure of antibody molecule; Immunoglobulin classes.

Unit 6: Antigen Antibody Reactions in the Laboratory
Types of serological reactions-Precipitation; Agglutination; Complement fixation test; Neutralization tests; Immunofluorescence; Radio immuno assay; ELISA; Western Blotting.

Unit 7: Serology – 1
General instructions to serology; Agglutination Tests for Serodiagnosis of Fever or Febrile Illness; Serological tests for syphilis; Enzyme Linked Immunosorbent Assay [ELISA]

II Introduction to Mycology, Virology and Quality Control – I
Subject Code: BSCMLT/S/320

Unit 1: Medical Mycology
Classification; Fungal diseases

Unit 2: Dermatophytes
Dermatophytes; Pathogenicity; Laboratory diagnosis

Unit 3: Dimorphic Fungi
Dimorphic fungi; characteristics of the six fungi; Histoplasma Capsulatum; Blastomyces dermatidis; Coccidiodes immitis; Paracoccidiodes brasiliensis; Sporothrix schenekii; Penicillium marneffei

Unit 4: Candidiasis
Candidiasis; Candida albicans; laboratory diagnosis

Unit 5: General Properties of Viruses
Morphology of viruses; physical and chemical properties; symmetry of viruses; classification of viruses; viral multiplication; cultivation of viruses; types of cell lines; laboratory diagnosis of viral infections

Unit 6: Hepatitis Viruses
Hepatitis A virus; pathogenesis; laboratory diagnosis; Hepatitis B virus; morphology; pathogenesis; laboratory diagnosis; prophylaxis; Hepatitis C virus; Hepatitis D virus; laboratory diagnosis; Hepatitis E virus; pathogenesis; laboratory diagnosis; Hepatitis G virus

Unit 7: Human Immunodeficiency Virus (HIV)
Replication of HIV; modes of transmission of virus; clinical features; laboratory diagnosis of HIV infection; antibody detection; antigen detection; virus isolation

Unit 8: Quality Assurance and Quality Control in Microbiology
Structure; pre-analytical stage; analytical stage; post analytical stage; external quality assessment; objectives of quality assurance; maintenance of equipment; performance tests on culture media; quality control of culture media; culture media plates used under quality control; media used for biochemical reactions; quality control procedures for immunological tests; in service training of staff; participation in external quality assurance; quality control of stains; salient features of quality assurance in antibiotic susceptibility testing

III Fundamentals of Carbohydrates and Lipids Subject Code: BSCMLT/S/330

Unit 1: Carbohydrates (Blood Glucose and Diabetes)
Utilization of glucose; Metabolic pathways; Determination of glucose in body fluids; Glycosurias; Glucose tolerance tests (GTT); Spot test; Diabetes Mellitus; Hypoglycemia; Blood glucose regulation

Unit 2: Lipids
Determination of serum Cholesterol by Zak's Ferric chloride method; Triglyceride estimation by GPO-PAP method; Estimation of HDL cholesterol; LDL-Cholesterol estimation; Estimation of LDL; VLDL by calculation method; Lipoproteins; Apoproteins; Atherosclerosis and Coronary heart disease.

Practical
Blood glucose - Ortho - Toluidine BST and standard graph; Glucose oxidase – Kit method; Folin Wu Method; Cholesterol – Zak’s with standard graph; Triglycerides – Kit method; HDL Cholesterol – Estimation using kit; Benedict’s test for urine sugar

IV Concepts of Proteins and Diagnostic Enzymology Subject Code: BSCMLT/S/340

Unit 1: Plasma Proteins
Albumin; Globulins; Fibrinogen; Separation of plasma proteins; Proteins belong to different globulins; Clotting factors; Proteins in urine; Proteins in CSF.

Unit 2: Diagnostic Enzymes
Enzymes; Factors affect the enzyme activity; Diagnostic Enzymes.

Practical

Blood
Total Protein – Biuret method; Albumin – Dye binding standard graph; AST; ALT – Manual and Kit method; ALP – 4-aminoantipyrine method; Amylase – Kit method; LDH – Enzymatic; CK – Kit method; Urine protein – Kit method; Urine creatinine; Urine screening test – Strip; CSF proteins – Turbidimetry and sulfosalicylic acid method

V Basic Blood Transfusion Techniques - I **Subject Code: BSCMLT/S/350**

Unit 1: Basic Immunology related to Blood Group Serology
Immunology; Major Histocompatibility Complex (MHC); Method of Antibody Production; Immunoglobulins; Complements.

Unit 2: Red Cell Antigen Antibody Reactions
Red Cell Antigen Antibody Reactions; Methods for Enhancement of Antigen-Antibody.

Unit 3: ABO Blood Group System
ABO Blood Group System; Biochemistry of ABO system; Antibodies of ABO Blood Group System

Unit 4: The Rh Blood Group System
Basic Genetics of Rh System: Weak D (D u); Significance of Weak D; Partial D; Rh Null Syndrome; Rh Antibodies; Other Blood Group Systems

Unit 5: Donor Selection and Blood Collection
Types of Blood Donors; Donor Selection; Medical History; Post Donation Management of Donors; General instructions for handling donor reactions.

Unit 6: Preservation; Storage and Transport of Blood
Blood Bags; Anticoagulant Preservative Solution; Additive System (AS). Storage Temperature for Blood.

Unit 7: Blood Components
Blood Component preparation and Therapy; Whole Blood; Blood Collection; Red Blood Cells (RBCs) or Packed Red Blood Cells (PRBCs); Platelets (Random Donor Platelets); Fresh Frozen Plasma (FFP) Cryoprecipitated AHF.

Practical
Collection of blood and processing; Donor registration; Collection of blood; Adverse donor reaction; Storage and preservation of blood; ACD solution; uses of CPDA; CPDA ; Heparin; ABO blood grouping ; Slide technique; Tube technique; Rh blood group and D typing; Selection of blood; Choice of blood in ABO system; Choice of blood in Rh system; Identification of recipient's blood sample; ABO and Rh grouping of recipient's antibodies; Issue of blood

VI Blood Bank Procedures and Hemolytic Diseases of the Newborn – I
Subject Code : BSCMLT/S/360

Unit 1: ABO Testing Procedures
ABO Blood; ABO Blood Grouping Procedures; Problems in ABO Grouping

Unit 2: Rh Grouping Procedures
Reagents for Rh (D) Grouping; Controls for Rh(D) Grouping; DU Testing; Microplate Technique for Rh(D) Grouping; Problems in Rh Grouping; Resolving Rh Grouping Problems.

Unit 3: Antiglobulin Test
Anti globulin tests – Principles; Direct Antihuman globulin Test (DAT); Indirect Antihuman globulin Test (IAT); Rh-Du test; Anti Human Globulin reagent (AHG); Application of antiglobulin test; Direct antiglobulin test; Indirect Antiglobulin Test (IAT); Control cells for AHG tests; Coomb's control cells;

Direct anti human globulin test (DAT); Indirect anti human globulin test (IAT); Sources of error in anti-globulin test

Unit 4: Compatibility Testing (Pretransfusion Testing)

Request form for Blood; Checking the Patient's Previous Record; Major Cross Match Techniques; Causes of positive result in major cross matchCompatibility testing in emergencies; Neonatal and Paediatric Transfusion Practice.

Unit 5: Infectious Complications of Blood Transfusion

Infectious complications of Blood Transfusion; Screening Blood Donations for Transfusion Transmitted Infections (TTIs);Principles of Screening Assays or HIV; HBV and HCV; Sandwich EIA (screening for antigen: e.g. HBsAg)Particle Agglutination Assays; Simple Immunochromatographic Membrane Assay; Confirmatory Test for HIV: Western Blot

Fourth Semester

I Liver and Renal Function Tests, Hormones and Tumar Markers
Subject Code: BSCMLT/S/410

Unit 1: Liver Function Tests (LFT)
Functions of the Liver; Tests related to protein metabolism; Tests related to carbohydrate metabolism; Tests related to lipid metabolism; Tests related to conjugation and excretion; Test related to bile pigment metabolism; Serum enzymes in liver disease; Bile acid synthesis and utilization; Markers for Viral Hepatitis

Unit 2: Renal function tests
Functions of Kidney; The tests measuring GFR Tests measuring tubular function; Determination of Electrolytes; Determination of calcium and phosphorous; Pathological conditions of the Kidney.

Unit 3: Hormones
General endocrinology; Pituitary hormones; Thyroid Hormones; Parathyroid Hormones (PTH); Adrenal Gland hormones; Pancreas; Ovary; Testes

Unit 4: Tumor Markers
Clinical importance of tumor marker determination; Prostatic acid phosphatase (PAP);Prostate specific antigen (PSA);Cancer Antigen 125 (CA 125);Human Chorionic Gonadotropin (HCG);CA 27.29;CA 19.9;Alkaline phosphatase (ALP);Oncofetal Antigens.

Practical Syllabus
Urea; Diacetyl monoxime method BST and with standard graph; Kit method; Creatinine – Jaffes method BST and with standard graph; Uric acid – Henry et. al and Kit method; Bilirubin – Malloy and Evelyn

II Electrolytes, Acid Base Balance, Factors in Hemoglobin Synthesis & Automation
Subject Code: BSCMLT/S/420

Unit 1: Acid Base Balance
Henderson – Hassel Balch's equation; Regulation of acid-base balance Blood buffer system; Respiratory regulation of acid-base balance; Renal Regulation of pH; Acid-base disorders; Anion Gap; Assessment of acid base analysis

Unit 2: Normal and Abnormal Hemoglobin
Normal hemoglobin; Abnormal hemoglobin; Thalassemia; Sickle cell hemoglobin (HbS); Detection of abnormal Hb; Derived hemoglobin compounds.

Unit 3: Factors involved in Hemoglobin Synthesis
Iron; Folate; Vitamin B_{12}(Cobalamin)

Unit 4: Fluid Balance
Fluid distribution; Daily input and output; Regulation of fluid balance; Hypovolemia or dehydration; Hypervolemia.

Unit 5: Electrolyte and Electrolyte Balance
Sodium; Potassium; Electrolyte balance; Chloride (Cl); Determination of calcium by o- cresolpthalein method; Determination of serum inorganic Phosphorus by Fiske-Subba Row method.

Unit 6: Automation in the Clinical Biochemistry Laboratory
Types of Analyzers available in the Market; Types of analysis; the steps in the automated systems; Selection of autoanalysis.

Unit 7: Quality Control in the Biochemistry Laboratory
Quality control material Standard Deviation (SD);Co-efficient of variation (CV);Quality control Quality control Programmes; Types of errors; Selection of a new method

Practical syllabus
Calcium – Diethanolamine method; Phosphorus- Fiske Subb Rao method

Demonstration
Serum protein electrophoresis; Immunodiffusion; Hormones and Tumour markers by FIA and ELISA; Drug analysis; Blood gas analysis; Electrolyte analysis

III Histotechnology and Cytotechnology Subject Code: BSCMLT/S/430

Unit 1: Histology: Tissue Preparation and Processing
Tissue Preparation; Fixation; Dehydration; Clearing (Dealcoholisation); Embedding Media; Embedding or Blocking; Decalcifying Agents; Section Cutting; Mounting of Sections; Automatic tissue processor; Celloidin Embedding; Application of Microwave Technology to Histology

Unit 2: Cytotechnology
Specimen Collection; Preservation; Preparation of Smears; Fixation; Staining; Mounting; Destaining; Automation.

Unit 3: Handling and Embedding of Tiny Tissue Biopsies
Labeling of tissues; Fixation and cutting of small biopsies; Orientation of tissues blocks.

Unit 4 : Frozen Section Techniques
Frozen section overview; Use of Freezing Microtome; Frozen sections using cryostat; LEICA CM 1850 Cryostat.

Practical
Preparation of fixative – 10% formalin; 10% formal saline; 10% Neutral buffered formalin; 10% formal calcium/calcium acetate formalin; Heidenhain's susa; Zenker's fluid; Zenker's formal (Helly formal Zenker); Bouin's fluid; Preparation of decalcifier –formic acid – formalin; Tissue processing – Dehydration; clearing Impregnation; Embedding; Microtomes and Sharpening of their knives; Technique of section cutting; Haematoxylin and Eosin stain

IV Examination of Body Fluids Subject code: BSCMLT/S/440

Unit 1: Urine Analysis
Renal Structure; Formation of Urine; Functions of the Kidney; Composition of Normal Urine; Collection of Urine Specimen; Preservation ; Routine Examination of Urine; Microscopic Examination of Urine Sediment.

Unit 2: Cerebrospinal Fluid (CSF) Examination

Formation and Composition of CSF; Clinical Application of CSF Examination; Collection and Handling of CSF; Examination of CSF.

Unit 3: Examination of Body Fluids

Pathophysiology of Effusion; Difference between Transudate and Exudates; Examination of Pleural Fluid; Examination of Pericardial Fluid; Examination of Peritoneal Fluid (Ascitic Fluid);Examination of Synovial Fluid.

Unit 4: Sputum Examination

Production and Normal Composition of Sputum; Sputum Collection Examination of the Sputum; Culture Studies.

Unit 5: Semen Analysis

Composition and Production of Semen; Clinical Applications of Semen Analysis; Specimen Collection and Transportation; Routine Examination of Semen; Normal and Pathological Ranges in Semen Analysis (WHO Criteria – 1999)

Unit 6: Stool Examination

Collection; Physical Examination; Chemical Examination; Microscopic Examination

Practical

Physical examination of urine; chemical examination of urine ; Bile Pigments; Bile Salts; Urobilinogen; Blood; Protein; Sugar; Ketone Bodies Microscopy; Urine Analysis; Faeces examination; CSF analysis and other body fluids; Sputum Examination; Semen Analysis

Fifth Semester

I Histology Routine and Special Staining — Subject code: BSCMLT/S/510

Unit 1: Routine Staining
Methods of Employing Stains; Theories of staining; Principles of dye chemistry; Classification of dyes; Mordants; accentuators; metachromasy and differentiation; Haematoxylin and its subtypes; Alum Haematoxylins Staining procedure for formalin fixed tissue with H&E; Mounting stained sections.

Unit 2: Special Staining
Carbohydrate and Mucoproteins; Lipids; Amyloid; Stains for Connective Tissue; Pigments; Micro-organisms; Cytoplasmic Granules and Special Tissues; Miscellaneous staining procedures.

Practical
Haematoxylin and Eosin stain; PAS for carbohydrates; Southgate's Mayer's mucicarmine method; Alkaline Congo Red technique for Amyloid; Masson's trichrome for collagen fibres; Gomori's silver impregnation for Reticulin fibres; Methanamine silver – Grocott's method for fungi; Gomori's method for demonstrating haemosiderin (Ferric Salts); Veroff's method for Elastic fibers; Grimelius silver method for Argyrophel cells; Warthin – Starry method for spirochaetes; Papanicolou Technique for diagnostic Exfoliative cytology; Fite stain for Mycobacterium Leprae in Tissue; Ziehl – Neelsen Technique for Mycobacterium Tuberculosis; Phosphotungstic acid Haematoxyln (PTAM) for Neurological Fibres; Sudan III or Sudan IV staining for Fat; Masson Fontona – For Melanin etc.

II Heamostasis and Quality Assurance — Subject Code: BSCMLT/S/520

Unit 1: Normal Hemostasis
Definition of Hemostasis; Phases of Hemostasis; Vascular component Platelets; Coagulation factors; Events in hemostasis; Inhibitors; Fibrinolytic system.

Unit 2: Tests of Hemostasis and Coagulation
Tests of vascular component; Tests for platelet component; Test for coagulation factors; Tests of fibrinolytic activity; Laboratory precaution and pre analytical variables

Unit 3: Disorders of Hemostasis
Approach to a bleeding patient; Bleeding disorders; Common bleeding disorders.

Unit 4: Quality Assurance
Definitions; Biases in testing; Components of Quality Assurance-Internal Quality Control; External Quality Assurance; Proficiency Surveillance.

Practical
Coagulation: Normal Hemostasis; Bleeding Time; Clotting Time; Clot Retraction; PT and APTT; Coagulation disorder; Lecell Phenomenon; Acid Elution Technique; Sucrose Lysis Test; Autohemolysis test

III Advance General Bacteriology – II **Subject code: BSCMLT/S/530**

Unit 1: Nutrition; Growth and Multiplication of bacteria
Types of bacteria based on oxygen requirements; Growth and multiplication of bacteria; Bacterial growth curve

Unit 2: Antibiotic Susceptibility test
Antimicrobial Resistance; Antimicrobial sensitivity testing.

Unit 3: Infection
Classification; Sources of infection; Methods of transmission of infection

Practical
Isolation and Identification of mixed culture/Clinical Specimen

IV Advance Systemic Bacteriology – II **Subject Code: BSCMLT/S/540**

Unit 1: Pneumococcus
History-Morphology; Cultural Characteristics; Biochemical Reactions; Resistance; Blood agar; Antigenic properties; C-Reactive Protein(CRP);Pathogenicity; Epidemiology; Blood Culture; Treatment.

Unit 2: Neisseria
Neisseria meningitidis; Nisseria gonorrhoeae

Unit 3: Corynebacteria
Corynebacterium diptheriae-Cultural characters; Biochemical reactions; Pathogenicity;c Laboratory Diagnosis; Epidemiology; Prophylaxis; Treatment.

Unit 4: Clostridium
Clostridium; Clostridium tetani; Clostridium botulinum.

Unit 5: Spirochaetes
Treponema pallidum-Cultivation; Pathogenesis; Laboratory diagnosis; treatment; Leptospira ictero hemorrhagiae.

Unit 6: Miscellaneous bacteria
Bacillus Anthracis; Yersinia pestis; Haemophilus influenzae; Brucella; Mycoplasms; Campylobacter; Helicobacter.

V Immunology, Serology and Parasitology – II **Subject code: BSCMLT/S/550**

Unit 1: Complement
Complement mediated diseases; Complement pathway; Control mechanisms; Biological effects of complement.

Unit 2: Immune Response
Humoral immunity; Cell mediated immunity; Adjuvants; Immuno suppressive agents; Immunological tolerance.

Unit 3: Hypersensitivity
Classification of hypersensitivity: Type I hypersensitivity (Anaphylaxis); Type II hypersensitivity; Type III hypersensitivity; Type IV hypersensitivity.

Unit 4: Serology – 2
C-reactive protein (CRP); Antistreptolysin 'O' test; Indirect Hemagglutination test; Immunofluorescence test

Unit 5: Parasitology
Terms Employed in Parasitology; Classes of Parasite; Classes of hosts; Schemes followed in parasitic studies; Protozoology; Helminthology; and Classification

Unit 6: Protozoology
Oral Protozoal Parasites;Entamoeba Histolytica;Malaria;Other Protozoal Parasites

Unit 7: Helminthology
Ascaris Lumbricoides; morphology; Eggs; life cycle of round worms; laboratory diagnosis of Ascaris; treatment; prevention and control; Ancylostoma duodenale; Wucheraria bancrofti; Echinococcus granulosus; concentration techniques for fecal parasites

Unit 8: Entomology
Mosquitoes; Flies; Cockroaches; Fleas; Lice; Bugs; Tics; Mites; Cyclops

VI Mycology, Virology and Quality Control – II Subject Code: BSCMLT/S/560

Unit 1: Cryptococcosis
Cryptococcosis; laboratory diagnosis

Unit 2: Opportunistic Fungal Infections
Opportunistic fungal infections; laboratory diagnosis; Penicillosis; laboratory diagnosis; Zygomycetes; laboratory contaminants

Unit 3: Mycotoxin
Mycotoxin; Mycetismus

Unit 4: Influenza Virus
Morphology; antigenic variation; pathogenesis; laboratory diagnosis

Unit 5: Rabies Virus
Morphology; pathogenesis; laboratory diagnosis; prophylaxis; rabies vaccine; cell culture vaccines

Unit 6: Polio Virus
Pathogenesis; laboratory diagnosis; prophylaxis

Unit 7: Oncogenic Viruses
List of Oncogenic viruses; mechanism of viral Oncogenesis

Sixth Semester

I Blood Transfusion Techniques – II Subject Code: BSCMLT/S/610

Unit 1: Autologous Blood Donation and Transfusion
Advantages of autologous transfusion; Disadvantages of autologous transfusion; contraindications to autologous transfusion; criteria for autologous donation; transfusion of autologous units; types of autologous transfusion

Unit 2: Special Components to meet Special Patient Needs
Leukocyte reduced blood; CMV negative blood; irradiated blood; washed blood; frozen cellular components

Unit 3: Apheresis
Apheresis; platelet pheresis; plasmapheresis; granulocytapheresis; neocytapheresis; therapeutic apheresis; adverse effects of apheresis

Practical
Procedures of blood component transfusion; For transfusion: Testing procedures; Free transfusion-testing procedures; Screening in recipient's blood; Screening of diseases transmitted through blood; Laboratory diagnosis of blood transfusion reaction; Quality assurance: Documentation; specification and Quality Control of reagents.

II Blood Bank Procedures and Hemolytic Diseases of the Newborn - II Subject Code: BSCMLT/S/620

Unit 1: Biosafety Guidelines and Basic Tests
Biosafety precautions and guidelines; Sample (Pilot Tube) labeling; Grading test results; Antibody titration – Doubling dilution; Haemoglobn estimation of donor-copper sulphate specific gravity method; Cyanmethaemoglobin (HICN) method; Hemo-Cue blood hemoglobin system; Bovine albumin serum; Enzymes; Low Ionic Strength Salt Solution (LISS)-The effects of LISS solution; Preparation of LISS solution; Method (LISS-IAT); Uses of LISS

Unit 2: Antibody Screening and Identification
Methods for screening of antibodies-Selection of screening cells; Methods of antibody detection when screening cells are not available; Saline test at room temperature (20- 25°C) and 4°C

Unit 3: Hemolytic Disease of Newborn
Etiopathogenesis; D Hemolytic disease of the Newborn-Classification of HDN; Effects; Rh(D) Hemolytic disease of newborn-Factors affecting the production of Rh antibodies; Prenatal evaluation; Investigation of newborn; Antenatal management of Rh immunization; Postnatal management of infant; Prevention of Rh(D) HDN; ABO Hemolytic disease of newborn

Unit 4: Non-Infectious Complications of Blood Transfusion
Classification; Acute or Immediate HTR; Most frequent causes of immune hemolytic transfusion reactions; Clinical features; Management; Febrile Non Hemolytic Transfusion Reaction (FNHTR); Treatment; Anaphylactic & Anaphylactoid Reactions; Non- cardiogenic pulmonary edema (NCPE); Transfusion Related Acute Lung Injury (TRALI); Delayed complications; Delayed Hemolytic Transfusion Reaction (DHTR); Graft Versus Host Disease (GVHD); Iron overload; Investigating a transfusion reaction.

III Organization and Management of Labs — Subject Code: BSCMLT/S/630

Unit 1: Organization and Management of Clinical Biochemistry Laboratory

Purpose of the laboratory medicine; Main Objectives of Laboratory organization and management; Facilities and design; Laboratory management; Functions and tasks; responsibilities and competencies; Sections within the clinical biochemistry laboratory; Laboratory operational flow; General equipments; instruments; and reagents; Washing room; Office; Accessories; Work force/staffing; Reporting laboratory test results and
record keeping; Quality control; quality assurance and Accreditation; Laboratory Safety; Legal and ethical regulations.

Unit 2: Organization and Management of Microbiology Laboratory

Microscopy; Organization of microbiology laboratory (to be copied from the book page number 27-36); Methods for Prevention and Management of Laboratory Accidents.

Unit 3: Organization of a Histopathology Laboratory

Quality Management; Safety in the Laboratory; Organizing the Laboratory-Ventilation; Organizing the flow of specimens; Miscellaneous Equipment; Chemical Laboratory Supplies; Organizing the autopsy room; Legal aspects; Purchase.

Unit 4: Organization and Management of Hematology & Clinical Pathology Laboratory

Facilities and Design; Considerations in Laboratory Design; Sections in the Clinical Pathology Laboratory; Laboratory Operational Flow; General Equipments; Instruments and Reagents Used; Standardization of Equipment and Calibration; Work Force/Staffing ;Personnel Management; Standard Operating Procedures; Reporting Laboratory Results and Record Keeping; Quality Control; Quality Assurance and Accreditation; Laboratory Safety; Basic Financial Considerations in Laboratory Planning; Medico Legal Concerns.

Unit 5: Organization and Management of Blood Bank

General considerations for setting up a blood bank; Location of the blood bank; Functional Plan ;Designing the blood bank/transfusion center premises; General Equipments and Instruments ;Reagents used in blood bank; Work flow of the blood bank; Work force (Staffing) of the blood bank; Personnel Management; Policies of the Blood bank; Quality control ;Laboratory Safety; Basic financial considerations ;Legislation.

IV Project — Subject Code: BSCMLT/S/640

Few topics will be provided by the university. Student can choose the topics from the list or choose the topic which is feasible at the Learning Center. In such cases prior approval from the University should be obtained.

List of Reference Books

S. No	Subject	Book Title, Author (s) & Publisher
1.	English/ Communication Skills	Current English, K S Yadurajan, Oxford. Crystal Clear Communication, Kris Cole/ EW Books English Vocabulary in Use – Upper Intermediate, Michael McCarthy Felicity O' Dell/ Cambridge University press.
2.	Anatomy	Clinical Anatomy for medical student, Richard.S Snell, Lippincot & Williams publishers. Manipal Manual Of Anatomy, Dr. Sampath Madhyastha Human Anatomy, B. D. Chaurasia, Cbs Publishers and Distributors Human Histology, Inderbir Singh Jaypee Brothers Medical Publisher, New Delhi
3.	Physiology	Concise medical physiology, Chaudhuri, new central book agency, Calcutta Review of medical Physiology – William F Ganong, Prentice Hall International Manipal Manual of Physiology C.N.Chandrashekar Text Book of Physiology, Prof. A. K. JAIN Text Book of Physiology, Sembulingam Jaypee Brothers Human Physiology , Chattarjee Medical Allied Agency / Jaypee Brothers Review of Medical Physiology,W.F.Ganong Prentice Hall International
4.	Pathology	Pathologic Basis of Disease, Robins, Saunders publication Essential of Human Diseases and Conditions, Margaret Schell Frazier, Saunders publication Theory and Practice of Histological Techniques John D. Banwofti, Chaurchil Living Stone Histological Techniques,Cummings Diagnostic Cytology, Lippincott Williums & Wilkins Koss Exfoliative Cytopathology ,Zuhain M. Naib Little Brown and Company Diagnostic Cytopathology Gray Winifred ; Mckee Grace T Chaurchil Living Stone
5.	Biochemistry	Text Book of Biochemistry ,Vasudevan Books and Allied (P) Ltd. Text Book of Medical Biochemistry, M.N.Chatterjee, Jaypee Brothers Medical Publisher, New Delhi Clinical Biochemistry, Mosby Kaplan Tietz Text Book of Clinical Chemistry Tietz, WB Saunders Company Philadelphia Manipal Manual of Clinical Biochemistry Dr. Shivananda Nayak ,Jaypee Brothers Medical Publishers, New Delhi
6.	Microbiology	Text Book of Microbiology , Ananthanarayana Orient Langman Microbiology ,Pelczar Michael Tata Mcgraw Hill Publishing Company Clinical Virology ,Diana S. Leland W.B.Sounder's and Company Immunology, Faris Kuby, Freeman Immunology ; A Short Course ,Eli Benzamin WileylissGeneral Microbiology ,Starier Roger ,Macmillan London
7.	Others	Text Book of Medical Laboratory Technology Godkar Bhalani Publishing House, Mumbai. W.B.Sounder's and Company John Bernard Henry, Clinical Diagnosis and Management by Laboratory Medicine Vellore Manual of Medical Laboratory Technology, Vellore Medical college Medical Lab Technology ,Kani L. ,Tata Mac- Grew Hill