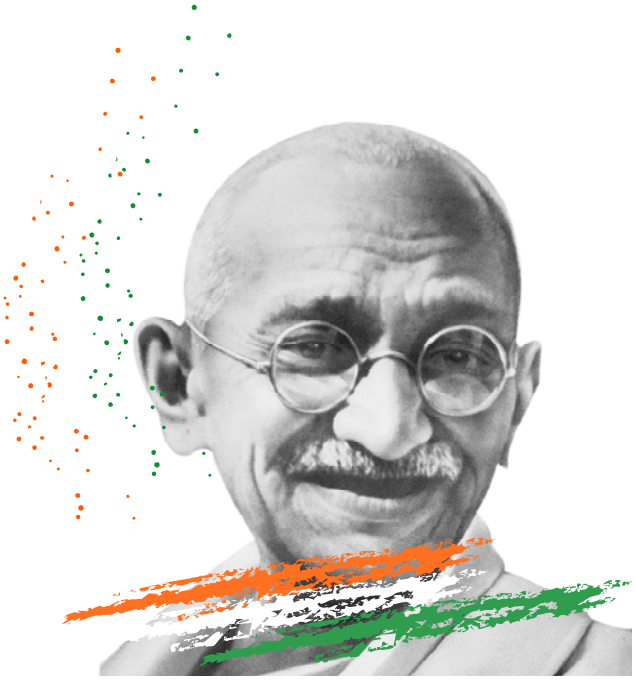

Mahatma Gandhi University
MEGHALAYA
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PROFESSIONAL PROGRAMME

PROGRAMME CODE--- 312
Bachelor of Science in Medical Lab Technology (BSCMLT)

SEMSTER I

CODE	SUBJECT	CREDIT
BSCMLT11	Biochemistry: chemistry	3
BSCMLT12	Microbiology: general Microbiology	3
BSCMLT13	Haematology: introduction haematology	3
BSCMLT14	Anatomy and Histotechnology: different body systems of human beings	3
BSCMLT15P	Biochemistry: chemistry practical	4
TOTAL		**16**

SEMESTER II

CODE	SUBJECT	CREDIT
BSCMLT21	Biochemistry: techniques of biochemistry	3
BSCMLT22	Microbiology: techniques	3
BSCMLT23	Basic cellular pathology	3
BSCMLT24	Human anatomy & physiology	3
BSCMLT25P	Microbiology: techniques practical	4
TOTAL		**16**

SEMESTER III

CODE	SUBJECT	CREDIT
BSCMLT31	Biochemistry: clinical aspects	3
BSCMLT32	Applied microbiology	3
BSCMLT33	Blood banking and special haematological tests	3
BSCMLT34	Cytopathology	3
BSCMLT35	Organization and Ethics practical	4
TOTAL		**16**

SEMESTER IV

CODE	SUBJECT	CREDITS
BSCMLT41	Biochemistry: Metabolism	3
BSCMLT42	Detailed techniques of clinical microbiology	3
BSCMLT43	Haematology: haemostatic and pathology	3
BSCMLT44	Histopathology & Techniques	3
BSCMLT45	Biochemistry practical	4
TOTAL CREDITS		**16**

SEMESTER V

CODE	SUBJECT	CREDITS
BSCMLT51	General microbiology	3
BSCMLT52	Methodology of staining	3
BSCMLT53	Microbial molecular genetics	3
BSCMLT54	Applied immunology	3
BSCMLT55	Microbial molecular genetics practical	4
TOTAL CREDITS		**16**

SEMESTER VI

CODE	SUBJECT	CREDITS
BSCMLT61	Virology	3
BSCMLT62	Mycology	3
BSCMLT63	Research methodology	3
BSCMLT64	Project	7
TOTAL CREDITS		**16**

Detailed Syllabus

SEMESTER –I

BSCMLT11 --- Biochemistry: Chemistry and techniques of Biochemistry

UNIT I: Introduction

Bioenergetics, Entropy, Enthalpy & their basic introduction, Concept of free energy, Thermodynamics 1st & 2nd Law.

UNIT II: Terms

Structure, properties,, chemical reactions & functions. Amino Acids :Essential & non Essential

amino acids with structure & function.

UNIT III: Proteins

Proteins: Primary, Secondary, tertiary & quatnery (Overrview).

UNIT IV: Lipids

Lipids; Structure, Classification & properties, Enzymes: Classification, enzyme action & their mechanism.

UNIT V: Carbohydrates

Carbohydrates intermediate metabolism, glycogens, glycogenolysis, gluconeogenesis & glycolysis. TCA, HMP, and its regulations Disorcerds of carbohydrates metabolism related to each cycle (inborn error of metabolism).

UNIT VI: Proteins

Different metabolic pathway of amino acid.The flow sheet of amino acids oxidation. ransamination, oxidativedeamination and pathways leading to acetyl co-A.

UNIT VII: Ammonia excretion

Decarboxylation of Amino acids, formation of nitrogenous excretion products. Urea cycle and ammonia excretion.

UNIT VIII: Biochemical aspects of Hormone

Hormone receptors and intracellular messengers, Adenylate cyclase, protein kinase and phosphodiesterase.Role of Insulin, glucagons, epinephrine and their mechanism .Various endocrine and regulatory systems mediated by cyclic AMP.

UNIT IX: Vitamin

Fat and Water soluble and their deficiency.**Mineral metabolism** Minor and Major (cu, Fe, Ca, Mg & P) Inborn error of Nucleic acids metabolism.

UNIT X: Molarity

Molarity, Molality: volumetric apparatus, calibration of volumetric apparatus.

UNIT XI: Units of measurements

Units of measurements: S.I units: Definitions, conversions; Measurement of volume : Strength , Normality .

UNIT XII: Analytical balance

Analytical balance: Principal ,Working & maintenance ; Preparation of reagents : Formulation and preparation.

Reference Books :-

1. Clinical biochemistry: techniques and instrumentation by John S. Varcoe.
2. Basic Separation Techniques in Biochemistry by R O Okotore.
3. Modern physical methods in biochemistry by Albert Neuberger, Laurens L. M. van Deenen.

BSCMLT12 --- Microbiology General Microbiology and Techniques

UNIT I: Classification of bacteria

On bacilli of differential staining Gram,s Stain .(its modification) ZN .Stain (its modification) On basis of their structure, Pre –remit of sample collections-general & disease specific their processing & storage.

UNIT II: Features of bacteria

Identification of bacteria on basis of cultural characteristics ,morphological , & serological features Staphylococcus & streptococcus including pneumonococcI, Family Enterobacterical, Haemophilus bordetlla, Corynebacterium, Nessieria .Treponema, Leptospira ,mycoplasma,chlamydia & Trieagents.

UNIT III: Identification of pathogenic & nonpathogenic fungi
(Morphologically,biochemically,Yeast,Dermatophytes,Cryptococococci,Histoplasma,Nocardia,Common lab fungal contaminants.
UNIT IV: Characteristic diagnostic serological tests in diseases
Cholera,Typhoid,Tuberclosis ,VDRL,TPHA, Satellitism.ELISA, PCR.
UNIT V: Uerology Viral genome
General morphology & ultra structure of virus and growth cycles. Their types & symmetry.Cultivation of virus in embryonated eggs, primary culture & secondary culture.Assay methods: Physical & chemical.
UNIT VI: Classification
On basic of structure, On basic of nuclear material, Clinical diagnosis serological techniques for identification of bacteria: TMV Bacteriophages.HIV .SV 40 ,myxo & paramyxovirus.
UNIT VII: Antiseptics and disinfectants
Antiseptics and disinfectants ; Definition , types ,mode of action & propertiesUses of disinfectant & antiseptics ,testing efficiency.
UNIT VIII: Glassware
Glassware : Description of glass ware ,its use ,handling and care,Decontamination and disposal of contaminated material.
UNIT IX: Virology
Introduction to virology, Physiochemical characteristics of viruses, Diseases caused by different viruses and mode of infection.
UNIT X: Parasitology
Introduction to medical parasitology and safety measures, General characters and classification of protozoa of Medical Importance.
UNIT XI: Morphology
Morphology, Life cycle and laboratory diagnosis of Intestinal Protozoa- Amoebae and Giardia.
UNIT XII: Sterilization
Sterilization: Definition , Different methods and principles –Moist heat ,dry heat,Radiation &filtration Autoclave - its structure ,functioning , control & indicators.
Reference Books:-
1. General Microbiology by Hans Günter Schlegel, C. Zaborosch, M. Kogut.
2. General Microbiology by Roger Y. Stanier.
3. General Microbiology by Robert F. Boyd.

BSCMLT13 --- Basics of Haematology

UNIT I: Haematology
Introduction to haematology: Definition, importance , important equipment and chemicals, various tests performed, laboratory organization.
UNIT II: Red Blood Cells
Normal morphology count, Isolation from whole blood & count, Effect on count & morophology of physiochemical parameters & the diseased state, Red cell anomalies & their relevance w.r.t normal & diseased state.
UNIT III: Blood Transfusion
Pre-requisitement & the complication of mis-matched transfusion, Methods of blood matching.
UNIT IV: White blood cells & platelets
Morphology count & methods of isolation, Effect on count & morophology of cell by the

physiochemical parameters,diseased . State & the relevance of condition of the diseases.

UNIT V: Formation of blood

Formation of blood : Erythropoiesis ,Leucopoiesis , Thrombopoiesis.

UNIT VI: Anaemia

Anaemia's:Defination(in general) & courses, types of anaemia & their classification, Physiochemical , characteristic features & eterology of a plastic anaemia, haemoloytic,megaloblastic, Clinical features & diagonosis..

UNIT VII: Leukaemia

Definition (in general) & their etrology, Classification of leukaemia, FAB classification, Etiologies ,physiochemical features of different Type of leukaeias, with reference to clinical states, Diagonosis of different types of leukaemias.

UNIT VIII: Coagulation studies

General pathways (intrinsic & extrinsic), Properties (physiochemical) mode of action of coagulation factors, Platelet studies ,platelet function tests (for different Coagulation factors), Effect of promoters & inhibitors at diff steps in coaguation,their solution & mode of action, Diseases associated with coagulation disorders ,their etrology & characteristics Features.

UNIT IX: Red Cell mass studies

Chemical method & radioactive methods, Red Cell function studies.

UNIT X: Anticoagulants

Anticoagulants :Definition , uses, different types , mode of action, their merits and demerits Morphology of normal blood cells : Normal morphology , morphology in diseases.

UNIT XI: Blood film

Blood film : Different types , Methods of preparation ,Staining.

UNIT XII: Romanwsky stains

Romanwsky stains : Principle of staining , Different stains ,their composition and preparation , method of staining.

Reference Books:-

1. Haematology at a Glance by Atul B. Mehta, Victor Hoffbrand.
2. A beginner's guide to blood cells by Barbara J. Bain.
3. Diagnostic Hematology by Norman Beck.

BSCMLT14 --- Anatomy and Histotechnology: Different Body Systems Of Human Being

UNIT I: Human Anatomy & Physiology

Cell structure, division & function,Cell organelles,Tissue: Types of tissues and their functions,Skeletal system.

UNIT II: Digestive system

Physiology and anatomy of mouth, stomach, intestine ,Absorption of food and its excretion,Role of Bile in digestion and excretion,Liver function and a brief description of liver and biliary tree.

UNIT III: Respiratory system

Brief description of larynx, bronchi, lungs,Cardiovascular system: Anatomy and Physiology of heart, arteries and veins. Circulation: Systematic and pulmonary (in brief),Brief review of chamber.

UNIT IV: Urinary system

Structure and Function of the Kidney, utrus, bladder, urethra and nephron Give special emphasis on formation of Urine, Physiology and Anatomy of male and female reproductive organs,Endocrine: Pituitary, thyroid, parathyroid, thymus, adrenals and pancreas.

UNIT V: Central nervous system

Brain, spinal cord and meninges explain with its functions.Skins: Structure and Functions,Study and give small project on bones and cartilages,HLA system.

UNIT VI: Cytology

Cytological Staining, Cytological preparation with special emphasis on MGG, Pap stains, Cytological Fixatives, Cytological Screening.

UNIT VII: Histopathology

Theory of Histopathology, Reception of specimens, Histopathology of Tumor cell, Histopathology of Liver, Kidney, Adrenal, Ovary, Testies, Method of preparing stains & Fixatives .

UNIT VIII: Preparation

Preparation of smear for Fine needle aspiration cytology, Pap's smear theory and identification of cells in a normal vaginal smear.

UNIT IX: Stool examination

Stool examination: normal, abnormal constituent. Normal and abnormal constituent of Urine, Normal and abnormal constituent of aminotic fluid, Normal and abnormal constituent of Semem analysis.

UNIT X: Laboratory equipment

Laboratory equipment ,its uses and maintenance, Laboratory hazards and safety precautions.

UNIT XI: Tissue processing

Theory of Tissue processing and embedding, Theory of H & E staining, Use of Microtome, Tissue section cutting, Embedding and preparation of blocks, Fixation of Tissue with DPX mount, Theory of frozen section preparation.

UNIT XII: Skeletal system

Skeletal system : Structure and function of all individual bones and joints ,movement of joints,,Skeletal muscles ,Cardiac muscles ,smooth muscles , muscles of upper arm & anterior, compartment of thigh (their name, attachments , functions and nerve supply).

Reference Books:-

1. Histotechnology: A Self-Instructional Text by Frieda L Carson and Christa Hladik (Hardcover - May 8, 2009).
2. Histotechnology: A Self-Assessment Workbook by Freida L. Carson (Spiral-bound - Jan 15, 1997).
3. Theory and Practice of Histological Techniques by John D. Bancroft and Marilyn Gamble (Hardcover - Oct 4, 2007).

BSCMLT15P --- Biochemistry: Chemistry Practical

UNIT I: Introduction

Bioenergetics, Entropy, Enthalpy & their basic introduction,Concept of free energy, Thermodynamics 1st & 2nd Law.

UNIT II: Proteins

Proteins: Primary, Secondary, tertiary & quatnery (Overrview).

UNIT III: Lipids

Lipids:Structure, Classification & properties,Enzymes: Classification, enzyme action & their mechanism.

UNIT IV: Carbohydrates

Carbohydrates intermediate metabolism, glycogenesis, glycogenolysis, gluconeogenesis & glycolysis. TCA, HMP, and its regulations Disorcerds of carbohydrates metabolism related to each

cycle (inborn error of metabolism).

UNIT V: Ammonia excretion

Decarboxylation of Amino acids, formation of nitrogenous excretion products. Urea cycle and ammonia excretion.

UNIT VI: Biochemical aspects of Hormone

Hormone receptors and intracellular messengers, Adenylate cyclase, protein kinase and phosphodiesterase.Role of Insulin, glucagons, epinephrine and their mechanism .Various endocrine and regulatory systems mediated by cyclic AMP.

UNIT VII: Vitamin

Fat and Water soluble and their deficiency.**Mineral metabolism** Minor and Major (cu, Fe, Ca, Mg & P) Inborn error of Nucleic acids metabolism.

UNIT VIII: Analytical balance

Analytical balance: Principal ,Working & maintenance ; Preparation of reagents : Formulation and preparation.

SEMESTER-II

BSCMLT21 --- Biochemistry: Techniques of Biochemistry

Unit I: Introduction

Bioenergetics, Entropy, Enthalpy & their basic introduction.

Unit II: Concept of free energy

Concept of free energy, Thermodynamics 1st & 2nd Law.

Unit III: Methods of tissue homogenization

(Potter-Elvejham, mechnical blender, sonicator and enzymatic). Principle and applications of centrifugation techniques- differential, density gradient.

Unit IV: Ultra - centrifugation

Ultra- centrifugation- preparative and analytical.

Unit V: Principle and applications of chromatographic techniques

Principle and applications of chromatographic techniques- paper, thin layer, gel filtration, ionexchange
and affinity chromatography.Elementary treatment of an enzyme purification.

Unit VI: Electrophoresis

Electrophoresis- principles and applications of paper, polyacrylamide (native and SDS) and agarose gel electrophoresis.

Unit VII: Colorimetry and Spectrophotometry

Colorimetry and Spectrophotometry- Laws of light absorption- Beer-Lambert law.

Unit VIII: UV and visible absorption spectra

UV and visible absorption spectra, molar extinction coefficient, biochemical applications of spectrophotometer.

Unit IX: Tracer techniques

Tracer techniques: Radio isotopes, units of radio activity, half life, β and γ- emitters, use of radioactive isotopes in biolog.

Unit X: Mineral metabolism Minor and Major

Mineral metabolism Minor and Major (cu, Fe, Ca, Mg & P) Inborn error of Nucleic acids metabolism.

Unit XI: Fat and Water soluble

Fat and Water soluble and their deficiency.

Unit XII: Insulin

Role of Insulin, glucagons, epinephrine and their mechanism .Various endocrine and regulatory systems mediated by cyclic AMP.

Reference Books:-

1. Clinical biochemistry: techniques and instrumentation by John S. Varcoe.
2. Basic Separation Techniques in Biochemistry by R O Okotore.
3. Modern physical methods in biochemistry by Albert Neuberger, Laurens L. M. van Deenen.

BSCMLT22 --- Microbiology: Techniques

UNIT I: Origin of Life

Time scale of Chemical and Biological evolution, Chance and necessity considerations, Molecular ontogenesis, Working assumptions, cosmo-chemistry, synthesis and polymerisation of biopolymers.

UNIT II: Review of important milestones in Microbiology and Immunology

Review of important milestones in Microbiology and Immunology -Contributions of scientists during 1990 to update.

UNIT III: Microscopy

Electron microscopy and high voltage electron microscopy.

UNIT IV: Principle and structure

Greater resolution, and higher magnification of electron microscope.

UNIT V: General Methodology

Sample preparation (fixation, dehydration, embedding, etc).

UNIT VI: Ultramicrotomy

Ultramicrotomy (instrument knife, thickness of section, etc),section processing (transfer on grid, staining procedures, etc).

UNIT VII: Special techniques related to microscopy

freeze etching, freeze facturing and epoxy resins, shadow casting.

UNIT VIII: Microscopy techniques

Immunoelectron and flourescence microscopy techniques.

UNIT IX: Applications

Ultrastructure studies, localisation of enzymes and micromolecules.

UNIT X: Pre –remit of sample collections

General & disease specific their processing & storage.

UNIT XI: General morphology

General morphology & ultra structure of virus and growth cycles.

UNIT XII: Clinical diagnosis serological techniques

Clinical diagnosis serological techniques for identification of bacteria: TMV Bacteriophages.

Reference Books:-

1. General Microbiology by Hans Günter Schlegel, C. Zaborosch, M. Kogut.
2. General Microbiology by Roger Y. Stanier.
3. General Microbiology by Robert F. Boyd.

BSCMLT23--- Basic cellular Pathology

UNIT I: Study of Body Tissues

Epthelial Tissue : Simple epithelum, Compund epithelium.

UNIT II: Connctive Tissue

Connctive Tissue: Connective tissue Proper, Skeletal tissue , Vascular tissue.

UNIT III: Muscular Tissue

Muscular Tissue : Striated Muscles, Unstriated Muscles, Cardiac Muscles.

UNIT IV: Alimentary system

Alimentary system : Diseases of Mouth(Inflammatory & Infectious (conditions) , Diseases of Pharynx(Tonsilitis and diphtheria), diseases of Salivary Glands(Mumps, Calculus formation), Diseases of Oesophagus (Oesophageal varies, Inflammatory & infections condition).

UNIT V: Digestive System

Digestive System : Diseases of Stomach(Gastritis, Peptic Ulceration Tumours), Diseases of Intestine(Appendicitis, microbial diseases, typhod, food poisoning, cholera & desentry), bowel disease Tumours, Hernias, Intestnal, Obstruction & Malabsorbtion.

UNIT VI: Liver

Liver : Haepatits, Inflammation & Liver failure.

UNIT VII: Pancreas

Pancreas : Pancreatitis, Fibrosis & Tumour.

UNIT VIII: Gall Blader

Gall Blader : Gall Stones, Jaundice.

UNIT IX: Circulatory System

Circulatory System: Shock, Diseases of Blood Vessel(Atheroma, arterioselerosis, aneurysms, thombosis, varicose vein tumours), Thrombosis, embolism, Infarction, Oedema.

UNIT X: Diseaes of Heart

Cardiac failure, disorders of heart valves, rheumatic heart disease, cardiac arrhythmias, heart block),

Disorders of blood pressure(types & hypo tension).

UNIT XI: Respiratory system

Respiratory system : Disorders of upper Respiratory Tract(Infectious & inflammatory disorders common cold, sinusitis, tonsiliti pharyngitis, laryngitis,Diptheria, Hay fever) .

UNIT XII: Disorders of lungs

Disorders of lungs-Pneumonia, Lung abscess, tuberculosis, Bronchial carcinoma, lung collapse.

Reference Books:

1.Diagnostic Criteria Handbook in Histopathology: A Surgical Pathology Vade Mecum by Paul Joseph Tadrous (Hardcover - Apr 25, 2008).

2.Cellular Pathology Technique by C. F. A. Culling, R. T. Allison, and W. T. Barr (Hardcover - Mar 1985).

BSCMLT24 --- Human Anatomy & Physiolgy

UNIT I: Introduction Human Body

Overview of organ systems , Directional and regional terms , Cavities and planes , Homeostasis and negative and positive feedback systems , Life processes.

UNIT II: Tissues and Integumentary System

Cell membranes, transport and junctions ,Structure, function and locations of epithelial, connective, muscle and nerve tissues ,Microscopic identification of tissue types ,Structure and function of skin, (layers and accessory organs).

UNIT III: Skeletal System

Functions of skeletal system ,Anatomy of long bone ,Bone histology ,Naming all bones of axial and appendicular skeleton ,Formation, growth and repair ,Structural and functional classification of joints ,Types of movement Calcium homeostasis.

UNIT IV: Muscular System

Functions of muscular system ,Names of all major muscles ,Origin, insertion and action ,Sliding Filament Model :Neuromuscular junction ,Structure (gross and microscopic) ,Physiology of muscle contraction ,Muscle metabolism (ATP) ,Fiber types.

UNIT V: Cardiovascular System

Functions of circulatory system ,Heart structures (chambers, valves, vessels) ,Circulatory routes (systemic, pulmonary, coronary and hepatic portal) ,Blood vessels and pressure ,Blood components, function and typing Blood clotting ,Regulation and conduction (EKG).

UNIT VI: Lymphatic/Immune System

Functions of lymphatic system ,Structures (vessels, nodes, cells) ,Lines of defense ,Humoral immune response,Cell mediated immune response ,Immune cell types ,Disease/AIDS.

UNIT VII: Digestion and Nutrition

Functions of digestive organs ,Modes of mechanical digestion ,Chemical digestion (hormones, enzymes, pH),Absorption and elimination ,Name parts of GI Tract and accessory organs ,Nutrition and metabolism (production of ATP) ,Biological polymers.

UNIT VIII: Excretory System

Functions of urinary system ,Kidney, ureter, bladder, urethra ,Microanatomy and function of nephron.

UNIT IX: Respiratory System

Functions of respiratory system ,Anatomy of respiratory tract ,Mechanics and regulation of breathing,Gas exchange and gas laws.

UNIT X: Nervous System

Functions of nervous system ,Nerve cell anatomy ,Neural physiology (action potential, synaptic transmission, Na/K pump) ,Brain anatomy and hemispheres ,Spinal cord anatomy, reflex arc ,PNS (autonomic and somatic) ,Sensory motor nerve functions ,Sensory organs.

UNIT XI: Endocrine System

Functions of endocrine system ,Naming organs/glands/cells and their hormones ,Hormone types and target cells ,Homeostasis and feedback loops ,Chemical messengers.

UNIT XII: Reproductive System

Functions reproductive systems ,Male and female anatomy ,Menstrual cycle ,Meiosis/gamete production.

Reference Books:-

1.MCQ's for the MRCP Part 1: Infectious Disease, Haematology and Chemical Pathology (MRCP Study Guides) - Paperback (Nov. 3, 1999) by D. W. Galvani, Nicholas J. Beeching MD, Fred J. Nye MD, and W. D. Neithercut.

2.Cells, Tissues, and Disease: Principles of General Pathology (Majno, Cells, Tissues, and Disease) - Hardcover (Aug. 26, 2004) by Guido Majno and Isabelle Joris.

BSCMLT25P --- Microbiology:Techniques Practical

UNIT I: Microbiology laboratory

To demonstrate safe code of practice for a microbiology laboratory, To prepare cleaning agents and to study the technique of cleaning of glassware.

UNIT II: Compund microscope

To study the working and handling of compund microscope, To study the method of sterlization by Autoclave.

UNIT III: Method of sterlization

To study the method of sterlization by Hot Air Oven, To study the method of sterlization of media/solutions by filteration.

UNIT IV: Nutrient Agar

To prepare Nutrient Agar in laboratory,To prepare Blood Agar in Laboratory .

UNIT V: Plates and agar slants

To prepare culture plates and agar slants, To perform inoculation of culture media (plates, slants and culture media).

UNIT VI: Antimicrobial susceptibility

To test the antimicrobial susceptibility of given bacterial culture on nutrient agar plates by Disc Diffusion Method.

UNIT VII: Morphology of giardia lambia

To study the morphology of giardia lambia from permanent slides.

UNIT VIII: Entamoeba histolytica

To study the morphology of Entamoeba histolytica from permanent slides.

SEMESTER-III

BSCMLT31--- Biochemistry: Clinical Aspects

UNIT I: Management and planning

Reception and recording of specimens, maintenance of laboratory records, reporting.

UNIT II: Specimen collection

Whole blood, plasma, serum, urine, C.S.F & other body fluids, preservation of specimens, anticoagulants.

UNIT III: Quality Control

Role of quality control and its importance. Accuracy, Reliability, Precision. Internal and external quality control measure, preparation of reagents, standardization of methods, safety measures and precautions.

UNIT IV: Glasswares

Types, use, care and maintenance of flasks, pipettes, cylinders, funnels, tubes, thermometers.

UNIT V: Analytical instruments and techniques

Principles, types, use, care and maintenance of photoelectric colorimeters, spectrophotometers, flamephotometers, electrophoresis, Chromatography, Elisa and RIA, isotopes.

UNIT VI: Medical lab technology

Introduction to medical lab technology : General introduction Role of medical lab technologists, ethics, responsibility, safety measures and first aid. Cleaning and care of general laboratory glassware and equipment.

UNIT VII: Biochemical test profiles

Principle and use of Glucose tolerance test, liver function tests, kidney function tests, Thyroid Function Test.

UNIT VIII: Distilled water

Distilled water :Types of distilled water plants , preparation & storage.

UNIT IX: Solutions

Definitions : Mole, molar and normal solutions (preparation , Standardization) ; pH (Definition ,Pka value, Example.

UNIT X: Derivation of Henderson

Derivation of Henderson-Hasselbalch equation) ; Buffer solutions(Definition , preparation of important solutions), Ph.

UNIT XI: Analytical balance

Analytical balance: Principal ,Working & maintenance ; Preparation of reagents : Formulation and preparation.

UNIT XII: Medical lab technologists

General introduction Role of medical lab technologists, ethics, responsibility, safety measures and first aid.

Reference Books:-

1.Clinical Biochemistry: Metabolic and Clinical Aspects by William J. Marshall MA MSc PhD MBBS FRCP FRCPath FRCPEdin FIBiol.

2.Molecular Genetics, Biochemistry and Clinical Aspects of Inherited Disorders of Purine and Pyrimidine Metabolism by Ursula Gresser.

3.Handbook of Cell-Penetrating Peptides, Second Edition (Pharmacology and Toxicology: Basic and Clinical Aspects) by Ulo Langel (Hardcover - Aug 15, 2006).

BSCMLT32--- Applied Microbiology

UNIT I: Management and Planning.

The reception and recording of specimen, ataloguing and indexing maintenance of laboratory records.

UNIT II: Working and maintenance of Equipment

A knowledge of working and maintenance of the following Incubators, Refrigerators, Water baths, Ovens, Steamers, Autoclaves, Inspissator, Centrifuges, Vaccum Pumps, Water Steel. leaning and sterilization of syringes and needles. Simple glass wares.

UNIT III: Sterilization

Methods of sterilization and their uses. Chemical, dry heat, steam sterilization, Tyndalisation, filtration, sterilization by ultra-violet light, Care and use of microscope.

UNIT IV: Dark ground illumination

Dark ground illumination, fluorescence and microscopy, Common bacteriological staining techniques, Cultural Methods.

UNIT V: Systemic Bacteriology

The general principles of the methods employed in identifying an unknown organism. Elementary knowledge of common pathogenes.

UNIT VI: Technique oriented examination

Technique oriented examination of specimens such as pus, urine, stool, sputum, throat swab, Parasitological techniques and elementary knowledge of life cycle and lab.

UNIT VII: parasites

diagnosis of common parasites, Introduction to virology techniques.

UNIT VIII: Serological Methods

Methods of performing agglutination, complement fixation, precipitation tests. General knowledge of antigen antibody reactions, Mycology as related to Candida and Dermatophytes.

UNIT IX: Preservation and Maintenance

Methods of preservation of cultures, maintenance of stock cultures, disposal of infected material

and culture media.

UNIT X: Introduction to Entomology Identipcation of Adultworms

Introduction to Entomology Identipcation of Adultworms- mosquitoes, flies, ticks and fleas Animal care, handling and uses in parasitology.

UNIT XI: parasitic antigens

Preparation of parasitic antigens, antigens and antisera Handling and operating of sophisticated equipment.

UNIT XII: Advanced techniques in microbiology

Advanced techniques in microbiology ELISA, RIA, CCIEA, Co-agglutination GLC, HPLC etc.

Reference Books:-

1.Microbial Biotechnology: Fundamentals of Applied Microbiology by Alexander N. Glazer and Hiroshi Nikaido (Hardcover - Oct 1, 2007).

2.Statistical Analysis in Microbiology: StatNotes by Richard A. Armstrong and Anthony C. Hilton (Paperback - Nov 22, 2010).

3.Wastewater Microbiology (Wiley Series in Ecological and Applied Microbiology) by Gabriel Bitton (Hardcover - May 18, 2005).

BSCMLT33 --- Blood Banking and special Hematological Tests

UNIT I: Red Blood Cells

Normal morphology count, Isolation from whole blood & count, Effect on count & morophology of physiochemical parameters & the diseased state, Red cell anomalies & their relevance w.r.t normal & diseased state.

UNIT II: Blood Transfusion

Pre-requisitement & the complication of mis-matched transfusion, Methods of blood matching

UNIT III: White blood cells & platelets

Morphology count & methods of isolation, Effect on count & morophology of cell by the physiochemical parameters, diseased .

UNIT IV: State & the relevance of condition of the diseases Anaemia

Defination(in general) & courses, types of anaemia & their classification, Physiochemical , characteristic features & eterology of a plastic anaemia, haemoloytic,megaloblastic, Clinical features & diagonosis.

UNIT V: Leukaemia

Definition (in general) & their etrology, Classification of leukaemia, FAB classification, Etiologies ,physiochemical features of different Type of leukaeias, with reference to clinical states, Diagonosis of different types of leukaemias.

UNIT VI: Coagulation studies

General pathways (intrinsic & extrinsic), Properties (physiochemical) mode of action of coagulation factors, Platelet studies ,platelet function tests (for different Coagulation factors) .

UNIT VII: Effect of promoters

Effect of promoters & inhibitors at diff steps in coaguation,their solution & mode of action, Diseases associated with coagulation disorders ,their etrology & characteristics Features.

UNIT VIII: Red Cell mass studies

Chemical method & radioactive methods, Red Cell function studies.

UNIT IX: Steps in Blood Management

Reception, labeling and recording of laboratory investigations, Cleaning of glassware, pipettes, E.S.R tubes and counting chambers, preparation of capillary pipette, distilled water, reagents.

UNIT X: Buffers collection of blood

buffers collection of blood, preparation of blood smear, staining of blood and bone marrow smears. Measurement of hemoglobin, counting of leucocytes, erythrocytes, platelets and reticulocytes.Recognition of blood cells in peripheral blood smear.

UNIT XI: Haematocrite

Determination of haematocrite and E.S.R, preperation of haemolysate and determination of alkali resistant hemoglobin, paper electrophoresis of haemoglobin.

UNIT XII: Platelet studies

Platelet function tests (for different Coagulation factors).

Reference Books:

1.Special Tests for Orthopedic Examination - Paperback (Jan. 15, 1997) by Jeff G. Konin MEd MPT ATC, Denise L. Wiksten PhD ATC, and Jerome A. Isear Jr. MS PT ATC.

2.The Special Educator's Comprehensive Guide to 301 Diagnostic Tests - Paperback (Aug. 25, 2006) by Roger Pierangelo Ph.D. and George Giuliani J.D. Psy.D.

BSCMLT34 --- Cytopathology

UNIT I: Cytology

General properties of living organisms; chemistry of the cells; cellular membranes; cytoskeleton; endoplasmic reticulum; Golgi body; lysosomes; nuclear envelope; chromatin and chromosomes; mitosis; meiosis.

UNIT II: Outline of Embryology

Gametogenesis; reproductive cycle; fertilisation; cleavage; a model of gastrulation.

UNIT III: Histology

Epithelial tissue; connective tissues (blood connective, cartilage, bone); muscular tissue; nervous tissue.

UNIT IV: Evaluation

Introduction, Evaluation and reporting of Cytopathology specimens.

UNIT V: Clinical residents

clinical residents in the following, keeping in view the special requirements of each case (Cytohormonalstatus,
malignancy, infection, etc.).

UNIT VI: Type of smear

Type of smear (morning specimen, after specimen, pre-menstrual specimen, etc.).

UNIT VII: Method of obtaining various specimens

Method of obtaining various specimens urine sample, gastric smear,colonic lavage etc.

UNIT VIII: Solutions of stains

principles and preparation of solutions of stains.

UNIT IX: Techniques for concentration of specimens

techniques for concentration of specimens: various filters and cytocentrifuge.

UNIT X: Gynaecological Cytopathology Module:

Normal anatomy, histology and cytology of the cervix and endometrium, Sampling methods for the cervix, Microbiology of the female genital tract and the cytological presentations of common infections of the cervix.

UNIT XI: Non - Gynaecological Cytopathology Module:

Introduction to routine screening and reporting of Non-Gynaecological Cytology specimens including those from: Respiratory, Effusion, and Urinary; as well as FNA cytology of Breast.

UNIT XII: Cytopreparation techniques

Cytopreparation techniques, Ancillary testing and Laboratory safety, The role of Cytology in clinical evaluation and patient management.

Reference Books:

1.Diagnostic Cytopathology: Expert Consult: Online and Print by Winifred Gray MB BS FRCPath and Gabrijela Kocjan MB BS FRCPath (Hardcover - Jun 21, 2010).
2.Practical Principles of Cytopathology Revised by Richard M. DeMay (Hardcover - Oct 9, 2007).
3.Differential Diagnosis in Cytopathology with CD-ROM by Paolo Gattuso, Vijaya B. Reddy, and Shahla Masood (Hardcover - Oct 30, 2009).
4.The Bethesda System for Reporting Thyroid Cytopathology: Definitions, Criteria and Explanatory Notes by Syed Z. Ali and Edmund S. Cibas (Paperback - Dec 11, 2009).

BSCMLT35P --- Organization and ethics practical

UNIT I: Water analysis by MPN technique--Presumptive coliforms test,Confirmed coliforms test, completed coliforms test.
UNIT II: Isolation of microorganisms from air - air sampler techniques - settle plate method.
UNIT III: Isolation and counting of fecal bacteria from water.
UNIT IV: Detection of bacteria in milk by Dye reduction test; Detection and quantification of bacteria in milk.
UNIT V: Litmus milk reaction.
UNIT VI: Isolation of lactobacilli and staphylococcus from curd.
UNIT VII Azolla - Morphological study; seed inoculation with rhizobia.
UNIT VIII Isolation of bacteria and fungi from spoiled food,Isolation of fungi from molting leaves.

SEMESTER IV

BSCMLT41 --- Biochemistry:Metabolism

UNIT I: Introduction to Metabolism and Bioenergetics

Introduction, universal carrier molecules, Bioenergetics of phosphate compounds, Regulation of metabolic processes.

UNIT II: Glycolysis

Glycolysis :Introduction,Release of energy from glucose , Phases of glycolysis, Energy yield from the pathway, Anaerobic glycolysis, Sources of glucose for glycolysis.

UNIT III: The Citric Acid Cycle

Cellular espiration, Stages of cellular respiration, The Citric acid cycle, Phases of reactions of citric acid cycle.

UNIT IV: Additional Pathways in Carbohydrate Metabolism

Pentose phosphate pathway, Glyoxylate cycle, Gluconeogenesis, Glycogen synthesis, Starch synthesis.

UNIT V: Electron Transport and Oxidative Phosphorylation

Introduction, Components of electron transport chain, Electron Transport – Carriers and arrangement of carriers into complexes, pathway of Electron Transfer through the Carriers, Proton Motive force.

UNIT VI: Photosynthesis

Basic process of photosynthesis, physics of light, Chloroplast structure, Light reaction and

photophosphorylation.

UNIT VII: Dark reaction

Dark reaction – Calvin cycle, Photorespiration.

UNIT VIII: Lipid Metabolism

Lipid digestion and absorption, Fatty acid oxidation , Ketone body metabolism, Fatty acid biosynthesis, Cholesterol biosynthesis, Eicosanoids, Synthesis of phospholipids and sphingolipids.

UNIT IX: Carbohydrate Metabolism

Uptake of carbohydrates by animals, microbes and plants; Catabolism of carbohydrates.

UNIT X: Biosynthesis

Biosynthesis and metabolism of mono, di, oligo and Polysaccharides.

UNIT XI: Integration of Metabolis

Integration of Metabolism - Organ specialization and hormone action.

UNIT XII: Metabolic principles

Metabolism-Metabolic principles and analysis of pathways.

Reference Books:-

1.Medical Biochemistry: Human Metabolism in Health and Disease by Miriam D. Rosenthal and Robert H. Glew (Paperback - Mar 30, 2009).

2.Nutritional Biochemistry, Second Edition by Tom Brody (Hardcover - Nov 30, 1998).

3.Annual Plant Reviews, Biochemistry of Plant Secondary Metabolism (Volume 40, 2) by Michael Wink (Hardcover - Jun 1, 2010).

BSCMLT42 --- detailed techniques of clinical microbiology

UNIT I: Classification of bacteria

On bacilli of differential staining Gram,s Stain .(its modification) ZN .Stain (its modification) On basis of their structure.

UNIT II: Pre –remit of sample collection

Pre –remit of sample collections-general & disease specific their processing & storage, Identification of bacteria on basis of cultural characteristics ,morphological , & serological features.

UNIT III: Features

Staphylococcus & streptococcus including pneumonococcI, Family Enterobacterical, Haemophilus bordetlla, Corynebacterium, Nessieria .Treponema, Leptospira ,mycoplasma,chlamydia & Trieagents.

UNIT IV: Characteristic diagnostic serological tests in diseases

Cholera,Typhoid,Tuberclosis ,VDRL,TPHA, Satellitism.ELISA, PCR.

UNIT V: General morphology

Uerology General morphology & ultra structure of virus and growth cycles.

UNIT VI: Introduction to clinical microbiology

public health, diagnostic testing, pharmaceutical sales, and basic research and development.

UNIT VII: Mechanisms of Microbial Pathogenicity

microbial pathogenicity including both overt microbial factors and complex interactions with the host that produce symptoms of disease.

UNIT VIII: Microbial disease

The cellular, biochemical, molecular, and genetic bases for modern understanding of microbial disease .

UNIT IX: Epidemiology of Infectious Disease

the causes, distribution, control, and prevention of infectious disease in human populations. Basic epidemiological concepts, including study design, analysis, and modeling of infectious disease data, establishing causal relationships, detecting confounding factors.

UNIT X: Gram negative cocco bacilli

Brucella,Bordetella,Pasteurella,Gardnerella,Francisella,Hemophilus,Legionella.

UNIT XI: Rickettsiae

Rickettsiae-Introduction,Pathology,Diagnostic procedures, Antibiotic susceptibility testing- -Agar disc diffusion test,MIC,Quality control.

UNIT XII: Chlamydiae

Introduction,Pathology,Diagnostic procedures.

Reference Books:-

1.Basic Clinical Laboratory Techniques - Paperback (July 10, 2007) by Barbara H. Estridge, Anna P. Reynolds, and Norma J. Walters.
2.Clinical Laboratory Microbiology: A Practical Approach (MyHealthProfessionsKit Series) - Hardcover (Apr. 2, 2010) by Karen Kiser, William Payne, and Theresa Taff.
3.Cumulative Techniques and Procedures in Clinical Microbiology (CUMITECH Series, #1-#15) - Ring-bound (1974) by John C. Sherris.

BSCMLT43 --- Haematology: Haemostatis and Pathology

UNIT I: Introduction

Definition and scope of pathology, Causes of diseases, hereditary and acquired, Diseases, Subdivisions of pathology , Techniques in pathology , Diagnostic pathology (biopsies, cytology, autopsy).

UNIT II: Inflammation

Definition, causes and types, General Effects of inflammation, Dynamics of Inflammation - Function of fluid exudates; function of cellular exudates, Chemical mediators.

UNIT III: Environmental and nutritional pathology

Smoking, Radiation injury, Nutritional: malnutrition, obesity, Vitamin deficiencie.

UNIT IV:Haemodynamics

Introductionand circulatory disorders,Haemorrhage, thrombosis and embolism, Ischaemia, infarction and oedema, Haemorrhage, haemostasis, Shock.

UNIT V: Neoplasia

Definition, Nomenculature, Examples of benign and malignant tumours, Features of benign and malignant tumours, Spread of tumours.

UNIT VI: Growth disorders

Atrophy, hypertrophy, hyperplasia, metaplasia, dyplasia and neoplasia, Precancerous lesions, and carcinoma in situ.

UNIT VII: Introduction to Haematology & Haemostasis

Hematopoiesis, Anemia introduction & Classification.

UNIT VIII: Megaloblastic anemia

Iron deficiency anemia & other hypochromic microcytic anemias.

UNIT IX: Hemolytic Anemias I Introductions & Classification, Hemolytic Anemias II- Structural hemoglobinopathies, Aplastic Anemia, Anemia of chronic disorders Malaria.

UNIT X: Leukemiasintroductions & classification,Acute leukemia, Chronic myeloid leukemias, Chronic Lymphocytic

leukemias, Myelodysplastic syndromes & other preleukemic conditions, Physiology of coagulation & Haemostasis.

UNIT XI: Bleeding disorders

Introduction & Classification, Congenital bleeding disorders, Acquired bleeding disorders.

UNIT XII: Haemolytic anaemias

Mechanisms of shortened red cell survival, Feature and management of congenital and acquired haemolytic states, Molecular pathology of thalassaemia and common haemoglobinopathies, Causes of haemolysis, Diagnostic of haemolytic anaemia. Anaemias complicating systemic disease, Aplastic anaemia, Myelodysplastic syndromes.

Reference Books:-

1.MCQ's for the MRCP Part 1: Infectious Disease, Haematology and Chemical Pathology (MRCP Study Guides) - Paperback (Nov. 3, 1999) by D. W. Galvani, Nicholas J. Beeching MD, Fred J. Nye MD, and W. D. Neithercut.

2.Cells, Tissues, and Disease: Principles of General Pathology (Majno, Cells, Tissues, and Disease) - Hardcover (Aug. 26, 2004) by Guido Majno and Isabelle Joris.

BSCMLT44 --- Histopathology and Techniques

UNIT I: Histopathology and Techniques

Management and planning, receiving and recording of specimens, indexing, maintaining records.

UNIT II: Maintenance and use

Knowledge of maintenance and use of the following : Microscope, Automatic tissue processor, vacuum embedding bath, mictotomes (various types with working of each), hot plates, refrigerators, cryostat.

UNIT III: Tissue processing

Introduction,details of paraffin embedding, vacuum embedding, Decalcification.

UNIT IV: Microtomes

Section cutting and different types of microtomes.

UNIT V: Frozen section

Introduction,uses and techniques, Theory and principles of different staining procedures in Histopathology, Histochemistry.

UNIT VI: Functions of organs

Structure and function of vital organs like liver, spleen, kidney, heart, brain etc.

UNIT VII: Museum methods

Museum methods — mounting of specimens, preparation of mounting medium, sealing the Jars, Various medicolegal procedures maintaining records.

UNIT VIII: Histopathology

Theory of Histopathology, Reception of specimens, Histopathology of Tumor cell, Histopathology of Liver, Kidney, Adrenal, Ovary, Testies, Method of preparing stains & Fixatives.

UNIT IX: Tissue processing

Theory of Tissue processing and embedding, Theory of H & E staining, Use of Microtome, Tissue section cutting. Embedding and preparation of blocks, Fixation of Tissue with DPX mount, Theory of frozen section preparation.

UNIT X: Preparation

Preparation of smear for Fine needle aspiration cytology, Pap's smear theory and identification of cells in a normal vaginal smear.

UNIT XI: Stool examination

Stool examination: normal, abnormal constituent. Normal and abnormal constituent of Urine, Normal and abnormal constituent of aminotic fluid, Normal and abnormal constituent of Semem analysis.

UNIT XII: Staining

H and E staining, preparation of stain solutions.

Reference Books:-

1.Basic Techniques in Diagnostic Histopathology by Alexander Kennedy (Hardcover - Oct 10, 1977).
2.Carleton's Histological Technique (Oxford Medical Publications) by H. M. Carleton, R. A. B. Drury, and E. A. Wallington (Hardcover - Nov 6, 1980).
3.Diagnostic Criteria Handbook in Histopathology: A Surgical Pathology Vade Mecum by Paul Joseph Tadrous (Hardcover - Apr 25, 2008).
4.Cellular Pathology Technique by C. F. A. Culling, R. T. Allison, and W. T. Barr (Hardcover - Mar 1985).

BSCMLT45P --- Biochemistry Practical

UNIT I: Study of the cell

Cell culture, lymphocyte isolation & culture, growth rate studies, staining techniques ,Cell fractionation, homogenization of the tissue, centrifugation, marker enzyme assays
Microscopy and microphotography.

UNIT II: Quantitative assays

Enzyme assays , RIA , ELISA ,DNA, RNA & proteins.

UNIT III: Quantitative assays

Enzyme assays , RIA , ELISA ,DNA, RNA & proteins., Protein fractionation – Salting in and out, gel filtration, electrophoretic separation, Gel filtration affinity based techniques , SDS-PAGE, Electrophoretic separation of LDH isoenzymes.

UNIT IV: Enzymology

Introduction, purification of enzyme & its kinetics.

UNIT V: DNA

Genomic and plasmid DNA isolation , Restriction enzyme digestion , Electrophoresis,PCR, RTPCR.

UNIT VI: blotting

Southern blotting, Western blotting.

UNIT VII: Chromatographic techniques

HPLC, Gel filtration, ion exchange, affinity chromatograph.

UNIT VIII: Absorption

Absorption & fluorescence spectroscopy.

SEMESTER-V

BSCMLT51 --- General Microbiology

UNIT I: Principle of staining methods

Principle of staining methods and preparation of reagents,Aerobic and anaerobic culture methods.

UNIT II: Antigen and Antibody

General characters and nature of antigen and antibody,Principle of antigen antibody reaction Collection.

UNIT III: Microbiological Investigations

transportation and processing of clinical samples for microbiological investigations.

UNIT IV: Bacteria and Fungi

Principle and mode of action of antibiotics and chematherapeutic agents for bacteria and fungi Care and handling of laboratory animals.

UNIT V: Laboratory organisation

Laboratory organisation, management, recording of results and quality control in microbiology.

UNIT VI: Virology

Isolation of viruses in laboratory by tissue culture, Embryonated eggs and different laboratory animals, cell and tissue,culture technology, Animal cell lines.

UNIT VII: Principles of Virology

Principles of different serological tests used in Virology.

UNIT VIII: Parasitology

Morphology and diagnosis of Oral vaginal flagellates Trichomonas, E. Gingivalia,Morphology and life cycle of Haemoprotozoa Material parasite including falciparum,Laboratory diagnosis of Material infection.

UNIT IX: Medical Helminthology

General characters and classification of Medical Helminthology.

UNIT X: Morphology and life cycle

Morphology and life cycle of Nematodes(Intestinal) Ascaris, Enterobious, Ancylostoma,Trichuris, Strongloides.

UNIT XI: Intestinal nematode infection

Laboratory diagnosis of intestinal nematode infection.

UNIT XII: Microscope optical systems

Compound microscope optical systems,magnification and maintenance.

Reference Books:-

1. General Microbiology by Hans Günter Schlegel, C. Zaborosch, M. Kogut.
2. General Microbiology by Roger Y. Stanier.
3. General Microbiology by Robert F. Boyd.

BSCMLT52 --- Methodology of Staining

UNIT I: Microbial Media

Microbial Media : Preparation of media for bacteriological culture (Nutrient agar, Mc Conkey),Specimen collection from patients, clinics and hospitals, Specimen collection for epimiological investigation.

UNIT II: Types of media

Types of media with their general or special use and example.

UNIT III: Microbial culture

Microbial culture : Mixed and pure culture, Isolation of pure culture.

UNIT IV: Cultural characteristics of different plate

Cultural characteristics of Spread plate, Streak plate and Pour plate, Aerobic and Anaerobic culture, Storage of stock culture.

UNIT V: Microbiological stains

Introduction,uses , Microbiological stains.

UNIT VI: Staining technique

Different types of staining techniques and their uses, The wet mount, hanging drop and fixation.

UNIT VII: Structural staining

Staining of smear, simple, negative, differential and structural staining.

UNIT VIII: Staining properties

Staining properties of bacteria.

UNIT IX: Gram

Gram positive and gram negative stain.

UNIT X: AFB Staining

Introduction ,properties of AFB Staining.

UNIT XI: Physical and chemical theories of staining

Principle, procedure and applications of simplepositive and negative staining.

UNIT XII: Structural staining

Cell wall, endospore, flagella and capsule.

Reference Books:-

1. Aneja K.R. Experiments in Microbiology, Plant Pathology, Tissue Culture & Mushroom. Cultivation, Vishwa Prakashan.
2. Gunasekaran P, Lab Mannual of Microbiology, New Age Publishers.
3. Davis, Dulbetco, Eisen Microbiology.

BSCMLT53 --- Microbial Molecular Genetics

UNIT I: The study of Microbial genetics

Inheritance of characteristics and variability,) Phenotype & genotypic.

UNIT II: Genotypic changes

Mutation (Types), Its Occurs, Repairing.

UNIT III: Bacterial Recombination

Introduction : Conjugation ,Advantages,Properties.

UNIT IV: Transduction

Introduction generalized and specialized transduction, Transformation.

UNIT V: Gene Activity

The Regulation and expression of gene Activity ,properties.

UNIT VI: Control of Microbes and Antibiotics

Physical methods of control: Moist heat-principle and application of pasteurization, tyndallization and autoclaving.

UNIT VII: Microbial Physiology

Properties, nomenclatures, classification, mechanism of action, factors affecting enzyme activity, enzyme inhibitors, regulation.

UNIT VIII: Microbial Genetics

Nucleic acids: DNA and RNA-composition, structure, replication in prokaryotes and eukaryotes, models of replication.

UNIT IX: Microbial interactions

Rhizoplane, rhizosphere, mycorhizza, symbiotic and non-symbiotic,interactions.

UNIT X: Types of Microbiology

Agricultural Microbiology,Environmental Microbiology,Food and Dairy Microbiology,Industrial Microbiology ,Medical Microbiology.

UNIT XI: Nucleic Acids

Structure, physical and chemical properties of DNA and RNA, extrachromosomal DNA- profile, function and evolution. DNA replication, damage and repair, spontaneous and induced mutation, reversion of mutation.

UNIT XII: Transposition

Structure of transposons, replicative and non-replicative transposition, transposon mutagenesis,Genetic- recombination, Molecular models and mechanism, Gene conversion.

Reference Books:-

1.H Lodish et al, Molecular Cell Biology, 6/e. Freeman, 2008.
2.B Alberts et al, Molecular Biology of the Cell. 5/e, 2007.
3.G M Cooper & R E Hausman, The Cell - A Molecular Approach.

BSCMLT54 --- Applied Immunology

UNIT I: Basic concepts

Introduction of Immunology and its application.,Antigen, Antibody, Immune complex.

UNIT II: Autoimmunity

Introduction of Autoimmunity, Laboratory test for detection of Antigen and Antibodies, Autoimmune disorders.

UNIT III: ELISA and RIA

Introduction of ELISA technique and its application,Introduction of RIA - Principle and its application.

UNIT IV: Serological techniques

Basic and advanced Serological techniques and its application.

UNIT V: Serological tests

Serological tests : Widal, VDRL Resewaller, Brucella aggutination and Cold agglutination.

UNIT VI: Electrophoresis and Chromatography

Principle, Technique and application.,I. Thin layer chromatography (TLC) , II.Polyacrylamide Gel Electrophoresis (PAGE), SDS – PAGE, III. Agrose Gel Electrophoresis.

UNIT VII: Antigens and antibodies

Types of antigens, antigenecity, factors influencing antigenicity and types of immunoglobulins.

UNIT VIII: Structure of Immunology

Structure of Immunoglobulins, production of polyclonal and monoclonal antibodies.

UNIT IX: Major histocompatibility complex

Major histocompatibility complex: Generation of humoral and cellular immune responses and effector mechanisms; antigen processing and presentation.

UNIT X: Antigen antibody

Antigen antibody interactions and its applications.

UNIT XI: immunological memory

complement system; action of cytotoxic T lymphocytes; Natural killer cells, ADCC.

UNIT XII: Immunology in health and disease

autoimmunity, immunodeficiencies hypersensitivity; concept of immunotherapy.

Reference Books:-

1. Kuby immunology; R.A. Goldsby, T.J. Kindt and B.A. Osborne; W. H. Freeman & Co, 6th edition, 2000.
2. Immunology: understanding the immune system;K.D. Elgert; Wiley-Blackwell Publication, 2nd edition,2009.

3. Janeway's immunobiology; K. Murphy, P.Traversand M. Walport; Taylor & Francis Publishers, 7thedition, 2008.

BSCMLT55P--- Microbial Molecular Genetics Practical

UNIT I: Bacterial genome
The bacterial genome and gene expression.,DNA replication and fidelity of replication in bacteria.
UNIT II: Mutations Terms
Mutations, mutants and mutagenesis,DNA damage and repair.
UNIT III: Genetic information
Exchange of genetic information between bacteria,The eukaryotic genome and gene expression.
UNIT IV: Control of gene
Control of gene expression in prokaryotic and eukaryotic systems.
UNIT V: Bacterial molecular genetics
bacterial molecular genetics and recombinant DNA technology.
UNIT VI: Experiments-I
Bacterial molecular genetics including DNA damage by UV-light and exchange of microbial resistance genes via conjugation.
UNIT VII: Experiments-II
Demonstrate the key t.echniques in gene cloning.
UNIT VIII: Molecular cell biology
Molecular cell biology dry practical case study and data interpretation.

SEMESTER VI

BSCMLT61 ---Virology

UNIT I: General morphology and ultra structure of Viruses
Introduction,Capsids- Helical Symmetry, icosahedral symmetry and complexsymmetry,Envelope: Glycoprotein and matrix protein.
UNIT II: Viral genome
Introduction: their types and structure.
UNIT III: Cultivation of Viruses
Cultivation of Viruses in embryonated eggs, experimental animals and cell culture: primary and secondary cell culture,suspension cell culture and monolayer cell cultures.
UNIT IV: Assays of viruses
Introduction of Assays of viruses,physical and chemical methods of assays (protein nuclei acid, radioactivity traces, electrons microscopy),plaque method, pock counting method, end point method and infectivity of plant viruses).
UNIT V: Serological methods
haemagglutination haemagglutinationinhibitation, complement fixation, immunofluroscence assays
(IFA) ELISA, RIA.
UNIT VI: Plant viruses
Recent advances in classification of plant viruses,Life sciences and other details of TMV and mosaic virus, potato virus X General idea about cyanophages, actinophages and mycoviruses.

UNIT VII: Bacterophages
Classification, Morphology and ultrastructure ,One step growth curve (Latent period, eclipse period and burst size).
UNIT VIII: Life cycle
Lytic and Lysogenic cycles of bacteriophages.
UNIT IX: Animal viruses
Animal viruses; classification and nomenclature.
UNIT X: DNA viruses DNA viruses
Life cycles and other details of DNA viruses: herpes, adeno and SV40.
UNIT-XI: RNA viruses
Life cycle and other details of RNA viruses: Retroviruses, oncogenic viruses and lentiviruses (HIV), picorna, ortho myxo and paramyxo.
UNIT XII: Characteristics of the following viruses with tests
Pox virus Myxovirus ,Arbovirus ,Herpes virus ,Enterovirus ,Rabies virus ,Rota virus ,HIV virus ,Oncogenic viruses (in brief).
Reference Books:-
1. Lelind-Clinical virology: Elsevier .
2.Text book of Medical Microbiology-R.Ananthnanarayanan&C.K. Jayaram Paniker. 34.

BSCMLT62 --- Mycology

UNIT I: Mycology
Introduction to mycology, classification of fungal infections, fungal infections in men.
UNIT II: Fungal infections
Laboratory diagnosis of fungal infections-Specimens collection, transport of specimens.
UNIT III: Direct microscopic
Different methods employed-direct microscopic examination, Slide culture technique, fungal culture, serology and animal inoculation.
UNIT IV: Cutaneous mycoses
Superficial cutaneous mycoses- Malassezia infections, Taenia nigra, Piedra, Dermatophytosis.
UNIT V: Subcutaneous mycosis
Subcutaneous mycosis-Mycetoma, Sporortricosis, Chromoblastomycosis, Phaeohypomycosis, Rinosporidiosis, Lobomycosis .
UNIT VI:Systemic mycoses
Systemic mycoses-Histoplasmosis, Blastomycosis,Coccidioidomycosis, Paracoccidioidomycosis.
UNIT VII: Opportunistic mycoses
Introduction- Candidiasis, cryptococcosis, Penicilliosis, Aspergillosis, Zygomycosis, ,Occulomycosis , Otomycosis , Mycotic poisoning.
UNIT VIII: Types of Mushroom Poisoning
Types of Mushroom Poisoning and other Mycotoxins: Prognosis and Treatment,Culture isolation and identification.
UNIT IX: Treatment options for infections
Treatment options for infections in animals humans,Isolation and culture of pathogenic fungi; Common laboratory contaminants.
UNIT X: Superficial mycoses
Introduction, Pityriasis Versicolor; Tinea Nigra; Piedra.
UNIT XI: Subcutaneous mycoses

Chromoblastomycosis; Phaeohyphomycosis;Sporotrichosis; Lobomycosis; Rhinosporidiosis.

UNIT XII: Opportunistic Infections

resulting from a weakened immune system due to a variety of intrinsic and extrinsic causes: Candidiasis; Cryptococcosis;Pseudallescheriasis Aspergillosis; Zygomycosis.

Reference Books:-

1.Esser, K. and P. A. Lemke, eds. 1994-2002. The Mycota. A Comprehensive Treatise on Fungi as Experimental Systems for Basic and Applied Research. Springer-Verlag, New York.
2.Farr, D. F., G. F. Bills, G. P, Chamuris and A. Y. Rossman.1989. Fungi on Plants and Plant Products in the United States. APS Press, St. Paul, MN.
3.Hawksworth, D. L. 1974. Mycologist's Handbook. Commonwealth Mycological Institute. Kew.
4.Kirk, P.M., P.F. Cannon, J.C. David and J.A. Stalpers. 2001. Dictionary of the Fungi. 9th Edition. CABI Publishing.

BSCMLT63 --- Research Methodology

UNIT I: Introduction

Need and importance of Research in General and with special reference to Physical Education & ports.

UNIT II: Characteristics

Characteristics of Research and Research Worker.

UNIT III: Classification of Research

Classification in relation to Nature, Methods and Nature of data.

UNIT IV: Formulation

Formulation of Research Problem.

UNIT V: Research problem.

Location and criteria of selecting a Research problem, Limitations and Delimitations.

UNIT VI: Reasons for surveying

Reasons for surveying related literature, Allied and critical Literature.

UNIT VII: Hypothesis

Introduction and Significance of Hypothesis,Types of Hypothesis.

UNIT VIII: Historical Research

Meaning, Historical sources and their Evaluation.

UNIT IX: Survey Studies

Introduction and Tools of Survey and Case Studies.

UNIT X: Philosophical Studies

Introduction- Meaning, Steps in Critical Thinking, Experimental Research,Meaning and Nature of Experimental Research, Sources of Experimental Invalidity.

UNIT XI: Experimental Designs

Introduction, Pre, True and Quasi Experimental designs..

UNIT XII: Research Methodology

Research proposal, Research Report.

Reference Books:-

1.Bogdan, R. & Biklen, S. (1992). Qualitative research for education: An introduction to theory and methods (2nded.). Boston: Allyn & Bacon.
2.Denzin, N. & Lincoln, Y. (Eds.). (2000). Handbook of qualitative research, (2nded.). Thousand.

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