Diploma in Medical Lab Technology (DMLT)

SEMESTER I

BSCMLT-101: Microbiology

GENERAL MICROBIOLOGY

Introduction and Brief History of microbiology: Definition,History and relationship of micro-org. to man Safety measures in microbiology

Care and maintenance of laboratory equipment[3]

Culture media :

(a) Preparation of various media (b) Standardization and use Sterilization :

(a) Definition (b) Different methods and principles –Moist heat ,dry heat,Radiation &filtration (C) Autoclave - its structure ,functioning , control & indicators Antiseptics and disinfectants ; Definition , types ,mode of action & propertiesUses of disinfectant & antiseptics ,testing efficiency Glassware : Description of glass ware ,its use ,handling and care,Decontamination and disposal of contaminated material General characteristics and classification of important bacteria and fungi VIROLOGY Introduction to virology Physiochemical characteristics of viruses Diseases caused by different viruses and mode of infection PARASITOLOGY Introduction to medical parasitology and safety measures General characters and classification of protozoa of Medical Importance Morphology, Life cycle and laboratory diagnosis of Intestinal Protozoa-Amoebae and Giardia

SEMESTER I BSCMLT-102: Anatomy & Histotechnology

Introduction to Histopathology and laboratory organization

Laboratory equipment ,its uses and maintenance Laboratory hazards and safety precautions Anatomy and physiology of human body: General organization , synopsis of all systems Cell organization and function : Structure & function of all cell organelles 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) Blood : Functions of blood , composition of blood ,plasma & its functions ; Blood clotting (mechanism ,clotting factors) ; Morphology of red blood cells , their function and development ,Haemoglobin ,anaemia ; WBC :classification development & functions ; platelets : morphology &functions ; Blood groups , blood transfusion and transfusion reactions Respiratory system : Structure of respiratory pathway ,function of respiratory tract ,cough reflex ,intraplerual pressure, mechanism of breathing and respiration , muscles of respiration ,vital capacity , tidal volume ,inspiration ,reserve volume and residual volume I.

Reception, recording and labeling of histology specimens Fixation and various fixatives Processing of histological tissues for paraffin embedding Embedding and embedding media Decalcification -various methods Introduction to exfolative cytology with special emphasis on female genital tract(PAP smear, cone biopsy) Solvents, mordents, accelerators and accentuators

BSCMLT-103: Haematology and Clinical Pathology

Introduction to hematology : Definition , importance , important equipment and chemicals, various tests performed, laboratory organization Composition and function of blood : Definition

of blood , composition of blood (cells, plasma /serum) Formation of blood : Erythropoiesis ,Leucopoiesis , Thrombopoiesis Anticoagulants :Definition , uses, different types , mode of action, their merits and demerits Morphology of normal blood cells : Normal morphology , morphology in diseases Collection and preservation of blood :Different methods of collection , preservation ,changes in stored blood Normal and absolute values in hematology: RBC count , WBC count ,Platelet count ,DLC value , Hb , MCH ,MCV ,MCHC , ESR, PCV Blood film : Different types , Methods of preparation ,Staining Romanwsky stains : Principle of staining , Different stains ,their composition and preparation , method of staining

SEMESTER I BSCMLT-104: Biochemistry

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.

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

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

Standard solutions: Various std. solutions used , their preparation ; storage of chemicals .

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

Molarity, Molality: volumetric apparatus, calibration of volumetric apparatus

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

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

indicators (pH papers , universal & other indicators) ;pH measurement :different methods (pH paper , pH meter ,

principle of pH meter , structure ,working and maintenance.

SEMESTER I BSCMLT-105: Introductory Biology Unit I Living World

Biology & Its Branches; relationships with other sciences; scientific methods in Biology; historical breakthroughs; scope of biology and career options; role of Biology in dispelling myths and misbelieves; characters of living organisms, (elementary idea of metabolism, transfer of energy at molecular level, open and closed systems, omoeostasis, growth and reproduction, adaptation, survival, death).

Origin and evolution of life - theories of evolution; evidence of evolution; sources of variations

(mutation, recombination, genetic drift, migration, natural selection); concept of species; specification and isolation (geographical and reproductive); origin of species.

Unit II Diversity of Life

Variety of living organisms, Systematic; need, history and types of classification (artificial, natural, polygenetic); biosystematics; binomial nomenclature; Two kingdom system, Five

kingdom System, their merits and demerits, status of bacteria and virus; botanical gardens and herbia; zoological parks and museums.

Unit III Cell and Cell Division

Cell as a basic unit of life - discovery of cell, cell theory, cell as a self - contained unit; procaryotic and eukaryotic cell; unicellular and multicellular organisms; tools and techniques

(compound microscope, electron microscope and cell fractionation); Ultrastructure of prokaryoytic and eukaryotic cell - cell wall, cell membrane - unit membrane concept (flauid mosaic model); membrane transport; cellular movement (exocytosis, endocytosis); cell organelles and their functions
- nucleus, mitochondria, plastids, endoplamasic reticulum, Gogli complex, lysosomes, lysosomes, microtubules, centriole, vacuole, cytoskeleton,
cilia and flagella, ribosomes.
Molecules of cell; inorganic and organic materials - water, salt, mineral ions, carbohydrates, lipids, amino acids, proteins, nucleotides, nycleic acids (DNA and RNA);
Enzymes (Properties, chemical nature and mechanism of action); vitamins, hormones and steroids.

Unit IV Genetics
Continuity of life - heredity, variation; mendel's laws of inheritance, chromosomal basis of inheritance; other patterns of inheritance - incomplete dominance, multiple allelism, quantitative inheritance. Chromosomes - bacterial cell and eukaryotic cell; parallelism between genes and chromosomes; genome, linkage and crossing over; gene mapping; recombination; sex chromosomes; sex determination; sex linked inheritance; mutation and chromosomal aberrations; Human genetics - methods of study, genetic disorders. DNA as a genetic material - its structure and repliaction; structure of RNA and its role in protein synthesis; Gene expression - transcription and translation in prokaryotes and eukaryotes; regulation of gene expression, induction and repression - housekeeping genes; nuclear basis of differentiation and development; oncoenes. Basics of Recombinant DNA technolgy; cloning; gene bank; DNA fingerprinting; genomics - principles and applications, transgenic plants, animals and microbes.

Unit V Morphology of Plants and Animals
Morphology - root, stem and leaf, their sturucture and modification; Inflorescence, flower, fruit, seed and their types;Description of Poaceae, Liliaceae, Fabaceae, Solanaceae, Brassicaceae and Asteraceae.
Morphology of animals - salient features of earthworm, cockroach and rat; tissue systems, structure and function of tissues - epithelial, connective, muscular and nervious.

Practical
1. 1. Study of parts of Compound Microsope

2. 2. Study of mitosis in onion root tip and animal cell (grasshopper)

3. 3. Study of meiosis in onion flower buds, and testis iof grasshopper.

4. 4. Study of cyclosis in leaf cell of Hydrilla, or Tradescantia and in Paramoecium.

5. 5. Study of cell wall components (cellulose, lignin, suberin and mucilage).

6. 6. Study of mitochondria by staining with a Janus Green.

7. 7. Study of specimens and their identification with reason - Bacteria, Oscillator, Spirogyra,
Rhizopus,

mushroom/bracket fungi, yeast, liverwort, moss, fern, Pinus, one monocotyledon, one dicotyledon and lichens.

8. 8. Study of characters of specimens and identification with reason - Amoeba, Hydra, Liver -
Fluke, Ascaris, Leech, Earthworm, Prawn, Silk moth honey bee, snail, Starfish, Dogfish, Rohu, Frog, Lizards,
Pigeon/ any other bird and rabbit/ any other mammal.

9. 9. Study of squamous epithelium, muscle fibres, nerve cells and mammalian blood film through temporary/permanent slides.

10. 10. Study of external morphology of earthworm, cockroach, from and rat through models.

SEMESTER I BSCMLT-106: Communication & Soft Skills UNIT I Essentials of Grammar:

. • Parts of Speech
. • Punctuation
. • **Vocabulary Building**
. • Phonetics

UNIT II Office Management:

. • Types of Correspondence
. • Receipt and Dispatch of Mail
. • Filing Systems
. • Classification of Mail.
. • Role & Function of Correspondence
. • MIS
. • Managing Computer

UNIT III Letter & Resume Writing:

. • Types of Letters-Formal / Informal
. • Importance and Function
. • Drafting the Applications
. • Elements of Structure
. • Preparing the Resume
. • Do's & Don'ts of Resume
. • Helpful Hints

UNIT IV Presentation Skills:

. • Importance of Presentation Skills
. • Capturing Data
. • Voice & Picture Integration
. • Guidelines to make Presentation Interesting
. • Body Language
. • Voice Modulation
. • Audience Awareness
. • Presentation Plan
. • Visual Aids

. • Forms of Layout
. • Styles of Presentation.

UNIT V Interview Preparation:
. • Types of Interview
. • Preparing for the Interviews
. • Attending the Interview
. • Interview Process
. • Employers Expectations
. • General Etiquette
. • Dressing Sense
. • Postures & Gestures

UNIT VI Group Discussion & Presentation:
. • Definition
. • Process
. • Guidelines
. • Helpful Expressions
. • Evaluation (Note: Every student shall be given 15 minutes. of presentation time & 45 minutes of discussion on his/ her presentation.)

The student will be evaluated on the basis of :

• his / her presentation style • Feedback of Faculty & Students • General Etiquette • Proficiency in Letter Drafting / Interview Preparation • The paper is internal and at least 3 tests will be taken. Best 2 of 3 shall account for final grades (70% Test & 30% Presentation)

SEMESTER I BSCMLT-107: Practical
Microbiology - 15 Marks Anatomy & Histotechnology - 15 Marks Haematology & Clinical Pathology - 15 Marks Biochemistry - 15 Marks Introductory Biology - 15 Marks Internal Assessment: 25 Marks

SEMESTER II

BSCMLT-201: Microbiology
I GENERAL MICROBIOLOGY Principle of staining methods and preparation of reagents Aerobic and anaerobic culture methods General characters and nature of antigen and antibody Principle of antigen antibody reaction Collection, transportation and processing of clinical samples for microbiological investigations Principle and mode of action of antibiotics and chematherapeutic agents for bacteria and fungi Care and handling of laboratory animals Laboratory organisation, management, recording of results and quality control in microbiology II VIROLOGY Isolation of viruses in laboratory by tissue culture, Embryonated eggs and different laboratory animals, cell and tissue culture technology, Animal cell lines Principles of different serological tests used in

Virology III 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 General characters and classification of Medical Helminthology Morphology and life cycle of Nematodes(Intestinal) Ascaris, Enterobious, Ancylostoma, Trichuris, Strongloides Laboratory diagnosis of intestinal nematode infection Compound microscope optical systems,magnification and maintenance

SEMESTER II BSCMLT-202: Anatomy & Histotechnology

Body fluids and their significance Cardiovascular system Alimentary system, mechanism and physiology of digestion and absorption Liner structure and function Urinary system Genital system- male and female Nervous system Spleen, lymph node and recticuloendothelial system Endocrine glands and their functions Microtomes various types, their working principle and maintenance Microtomes Knives and Knife sharpening Practical section cutting, cutting faults and remedies Routine staining procedures, mounting and mounting media Dye chemistry, theory and practice of staining Use of controls in various staining procedures Collection, processing and staining of cytological specimen

SEMESTER II BSCMLT-203: Haematology and Clinical Pathology

Quality assurance in hematology Hb : Definition ,synthesis and breakdown Haemoglobinometry-various methods of estimation of Hb, errors involved and standardization of instrument for adaptation for Hb estimation Haemocytometry Procedure for cell count(visual and electronic), Red cell count, leukocyte count, platelet count. Errors involved and means to minimize such errors Physiological variation in Hb , PCV , TLC , platelets Erythrocyte sedimentation rate, factors influencing ESR, various methods of estimation and their significance Haemocrit value by macro and micro methods their merits and demerits Routine examination of urine Examination of biological fluids such as CSF etc. Examination of semen

BSCMLT-204: Biochemistry

Radio isotopes and their use in biochemistry. Osmosis, dialysis, surface tension Urine analysis(Qualitative)for sugar, proteins, bile pigments, Ketone bodies, porphoblinogen, faecal occult blood, bile salts Collection and recording of biological specimens, separation of serum plasma preservation and disposal of biological samples/materials Basic statistics(mean, SD, CV, normal distribution, probability) Volumetric analysis preparation of standard acid and base solutions, chloride estimation

SEMESTER II BSCMLT-205: Computer Application

Introduction to Computers Block diagram of a computer & overview of its working Interconnections of various peripherals with computers Input/Output & Secondary storage device Classified of programming languages Classification of computers Familiarization with operating system Introduction to Computer Operating System (Dos,Windows95/XP) Introduction to DOS structure, system files, batch files & configuration files Booting the system from floppy and hard disk Brief introduction to DOS, Internal and External commands Familiarization with windows structures, its use and application Prepation of Documents through word processing Idea of Text Editors like Microsoft Word, write etc. Opening a document Preparing documents, inserting diagrams and tables Editing documents Character, Word and line editing Margin setting, Paragraph alignment Block operations Spell checker Saving a document Printing a document Information Presentation for Decision making using Spreadsheet (Excel) Application of spread sheet Structure of spreadsheet Preparing spreadsheet for simple data and numeric operations Using formulae in spreadsheet operations Making tables, sorting and quering Creation of graphs, Pie charts, bar charts Printing reports Computer Aided Drafting (CAD) Making simple drawings using features of CAD and conforming the drafting specifications Saving and retrieving drawings Dimensioning Lettering Plotting drawings

Practicles (4 hrs/ week)

Indentification of various parts of the PC Demonstration of dis-assembly and assembly of PC and interconnection of Input and Output devices to PC Installation of DOS and simple exercise on TYPE, REN,CD,MD,TREE,COPY,BACKUP commands Grouping commands with batch files Disk diagnose, Correction of partitioning Installation of windows 95 Familiarization with start menu, taskbar icons, windows explorer Control panel of settings Getting hardware recognized Installation of MS-office MS-Word, Basics of Letterwriting,tempalates,wizards,formatting documents Creating Graphics, tables,mail merge,etc.. using MS-Word

Building a sample worksheet using MS-Excel Formulas for calculations, sorting etc.. Creating Lotus 1-2-3 sheet Formulas, ranges and fuctions of Lotus 1-2-3 simple Graphics Importing and exporting graphics through CAD Drawing of geometric figures

SEMESTER II BSCMLT-206: Practical

Microbiology - 15 Marks Anatomy & Histotechnology - 15 Marks Haematology and Clinical Pathology - 15 Marks Biochemistry - 15 Marks Computer Application - 15 Marks Internal Assessment : 25 Marks