B. Voc. in Medical Lab Technician

Diploma in Medical Lab Technician			
Semester	**Course Code**	**Course Title**	**Credits**
I	BVOC – MLT 1.1	General Human Anatomy and Physiology	2
	BVOC – MLT 1.2	Biomolecules	2
	BVOC – MLT 1.3	Routine Laboratory Techniques	2
	BVOC – MLT 1.4	Vocational Practical	12
	GE – MLT 1.1	Basic Computing Skills	6
	GE – MLT 1.2	English Language	6
II	BVOC – MLT 2.1	Hematology and Clinical Pathology	2
	BVOC – MLT 2.2	Special Laboratory Techniques	2
	BVOC – MLT 2.3	Fundamentals of Microbiology	2
	BVOC – MLT 2.4	Vocational Practical	12
	GE – MLT 2.1	Digital and Financial Literacy	6
	GE – MLT 2.2	Health and Safety at Workplace	6
Advanced Diploma in Medical Lab Technician			
III	BVOC – MLT 3.1	Cytology and Transfusion Technology	2
	BVOC – MLT 3.2	Biochemistry-I	2
	BVOC – MLT 3.3	Microbiology-I	2
	BVOC – MLT 3.4	Vocational Practical	12
	GE – MLT 3.1	Environmental Studies	6
	GE – MLT 3.2	Communication Skills	6
IV	BVOC – MLT 4.1	Microbiology-II	2
	BVOC – MLT 4.2	Histopathology	2
	BVOC – MLT 4.3	Biochemistry-II	2
	BVOC – MLT 4.4	Vocational Practical	12

	GE – MLT 4.1	Human Values and Ethics	6
	GE – MLT 4.2	Personality Development	6
B. Voc. in Medical Lab Technician			
V	BVOC – MLT 5.1	Research Methodology	2
	BVOC – MLT 5.2	Cytogenetic	2
	BVOC – MLT 5.3	Laboratory Organization and Recent Advances in Pathology	2
	BVOC – MLT 5.4	Vocational Practical	12
	GE – MLT 5.1	Organizational Behaviour	6
	GE – MLT 5.2	Business Communication	6
VI	BVOC – MLT 6.1	Quality Management	3
	BVOC – MLT 6.2	General Human Psychology and HR Management	3
	BVOC – MLT 6.3	Vocational Practical	12
	GE – MLT 6.1	Entrepreneurship Skills	6
	GE – MLT 6.2	Project Management	6

Detailed Syllabus

Diploma in Medical Lab Technician

SEMESTER - I

BVOC- MLT 1.1 : General Human Anatomy and Physiology

Unit I : Basics of Human Anatomy

- Introduction to anatomy epithelial tissue, muscular tissue, nervous tissue, skeletal system, structure of bones, types of bone, bone of cranium, face, vertebral column, upper and lower limbs.
- Circulation system: Structure of heart, names and position of main blood vessels.
- Lymphatic system: lymph vessels, lymph nodes, lymphoid organs, their structure and functions.
- Digestive system: parts of gastrointestinal tract and associated glands (names).
- Respiratory system: parts of respiratory system, (diagram, names, and functions).

Unit II : Basic Physiology

- Blood, composition and functions of blood, hemopoiesis, blood coagulation, blood groups, body fluids.
- Cardiovascular system: circulation of blood, function of heart and blood vessels, control of heart rate, blood volume (names, diagram and functions in detail).
- Respiratory system: functions of lungs, respiration disorders eg. Anoxia, dyspnea, lung function test.
- Digestive system: digestion of food in mouth, stomach and small intestine. Absorption of food, function of liver (formation of bilirubin, and other functions in detail).

BVOC - MLT 1.2 : Biomolecules

Unit I : Structure, Function and Classification of Amino Acids and Proteins

- Amino acids and protein: introduction to biochemistry, water as a solvent. Dissociation of water, buffer solution, Henderson Hasselbalch equation.
- Amino acids: common structural features- stereoisomerism and RS system of designating optical isomers. Classification based on nature of “R” groups. Amino

acids present in proteins and non-proteins amino acids. Specialized role of amino acids. Physical and chemical properties and Titration of amino acids.

- Peptide bonds: rigid and planar nature and of a peptide bond. Folding of peptide chain into regular repeating structures. Turn in polypeptides. Chemical synthesis of polypeptide, biologically active peptides.
- Proteins: Levels of proteins structure. Determination of primary structure. Forces stabilizing structure and shape of proteins. Native proteins and their confirmations. Behavior of proteins in solutions. Boiling in and salting out proteins. Denaturation of proteins. Structural and functional diversity of proteins, fibrous proteins, globular proteins and conjugated proteins.

Unit II : Structure, Functions and Classification od Carbohydrates.

- Carbohydrates: Definition and Classification of Carbohydrates.
  Fischer and Haworth structures of Carbohydrates.
  Stereoisomerism and mutation; Anomeric form of monosaccharides; Derivatives of monosaccharides (glycosides, deoxysugars, aminosugars and other derivatives of biological importance); Oligosaccharides (Structure of maltose, lactose, sucrose, cellebiose, trehalose, raffinose).
- Characteristics Reaction of Monosaccharides: reaction with hydrazine, hydrogen cyanide, hydroxylamine; reduction and oxidation of sugar; periodic acids oxidation, action of alkali upon sugars; acylation and methylation of sugars.
- Homo and Hetero-polysaccharides (structure of amylose, amyl protein, starch, insulin, pectin's, dextrin, glycogen, cellulose, chitin). (GAGS) as component of connective tissue. Polysaccharides of Bacterial cell wall.

Unit III : Structure, Functions and Classification of Lipids

- Lipids: Definition and classification of fatty acids (saturated and unsaturated); Essential fatty acids; Important reactions of functional group present in fatty acids; Characteristics of fatty acids and fats (saponification, iodine, acid, acetyl and peroxide values); Refractive index, m.p, b.p, and their relation to molecular size, properties of glycerol; Fats as source of energy; Waxes.
- Structures, characteristics and functions of lipids: triacyglycerosis, phospholipids: lecithin (Phosphatidyl chlorines), lysolecithin, cephalins, Phosphatidyl serine, phosphatidyl inositol, sphingomyelins, cerebrosides, gangliosides, sulfatides.
- Lipoprotein – composition, classification and biological functions. Liposomes
- Terpenes and steroids: terpenes of biological significance e.g carotenes, phytol, cholesterol and other animals sterols; Colour reaction of sterol; Sterol of yeast and fungi; Phytosterols; Steroidal hormones; Bile acids.
- Structure and properties of eicosanoids-
  Prostaglandins, leukotrienes, thromboxane, prostacyclin.

Structure, sources and biochemical function of fat soluble vitamins.

Unit IV : Physical and Chemical Properties of Nucleic Acids.

- Nucleic acids and porphyrins: Nucleic acids structure and properties of purines, pyrimidine bases; Nucleosides and nucleotides. Biologically important nucleotides. Double helical model of DNA and forces responsible for it; Shorthand representation of polynucleotides; Denaturation of DNA; Physical and chemical properties of nucleic acids; Methods for isolation, purification and characterization of nucleic acid; Chemicals and enzymatic hydrolysis of nucleic acids; Sequencing of polynucleotide.
- Porphyrins: porphyrin nucleus and classification of polypyrenes; Heme and other metalloporphyrins occurring in nature; Detection of porphyrin spectrophotometrically and fluorescence; Chemical nature and physiological significance of bile pigments.

BVOC - MLT 1.3 : Routine Laboratory Techniques

Unit I : Human Healthcare and Safety Regulation

- Basic cause of accidents, common types of laboratory accidents, first aid in laboratory.
- Human health and homeostasis, medical care in India, medical laboratories of developing countries, importance of biomedical wastes, NABL and SOP.

Organization of Laboratory

- Functional component of clinical laboratories, cleanliness, precaution to be taken WRT patients and the medical laboratory professional, basic needs of clinical laboratory technician, awareness of soft skills.

Basic Laboratory Equipments

- Identification, use, maintenance and care of common laboratory glassware equipments handling of all glassware, use, principles, and care of centrifuge, colorimeter, oven, incubator, microscope, Newber's chamber, autoclave etc.

Automation

- Semiautoanalysers

Introduction to hematology and routine test

- Components of blood and their function, haematopoietics systems of the body

Hematological diseases

- Anemia and various types of anemias, thalassemia, polycythemia, leukemia, hemolytic diseases of new born, multiple myeloma, parasitics infection of blood.

Specimen collection

- Specimen collection for hematological studies

Laboratory preparation in hematology

- Cleaning of laboratory glassware in hematology.

BVOC – MLT 1.4 : Vocational Practical

Practicals will be based on the courses conducted during the semester and will be decided in consultation with Industry Partners/Associations.

GE – MLT 1.1 : Basic Computing Skills

Unit I : Know the Computer - Introduction, What does computer stand for?, Strengths of computers, Limitations of computers, Fundamental uses of computers, Development of computers, Types of Computers, Generations of Computers, Personal Computer. Input Devices and Output Devices, Central Processing Unit.

Unit II :Features of Computer Systems - Storage Devices: Introduction. Basics of Software, Operating System - Introduction, Operating System, Functions of Operating System, the Booting Process, Types of Reboot, Booting From Different Operating System, Types of Operating System, Some Prominent Operating Systems, Programming Languages, Computer Virus, Networking.

Unit III : MS Word Basics -Introduction to MS Office; its components, Creating a New Document; Saving document, Saving as different format, Different Page Views and layouts; Applying various Text Enhancements; **Advanced Features of MS-Word:** Spell Check, Thesaurus, Find & Replace; Headers & Footers ; Inserting – Page Numbers, Pictures, Files, Auto texts, Symbols etc.; Working with section breaks and page breaks, Working with Columns, Tabs & Indents; Creation & Working with Tables including conversion to and from text; Margins & Space management in Document; Adding References – footnotes, endnotes, and Table of contents, Insert drawing, Mail Merge, Envelops & Mailing Labels, protect and secure documents in MS Word, Working in different languages in MS Word.

UbitIV :MS Excel -Introduction and area of use; Working with MS Excel.; concepts of Workbook & Worksheets; Using Wizards; **Advance MS Excel Concepts -**Use of Formulas, Calculations using various type of functions-Logical, string, date & time, maths and other types; Cell Formatting including Borders & Shading; conditional formatting, sorting data items, Working with Different Chart Types; Printing of Workbook & Worksheets with various options. Import and export excel sheets to/from various format, add headers and footers, using macros in excel sheet- Record, edit and run macros.

Unit V : MS PowerPoint -Introduction & area of use; Working with MS PowerPoint; Creating a New Presentation; Working with Presentation; Using Wizards; Slides & it's different views; Inserting, Deleting and Copying of Slides; Working with Notes, Handouts, Columns & Lists; Adding Graphics, Sounds and Movies to a Slide; Working with PowerPoint Objects, Insert WordArt and other objects like shapes, clipart, charts

and SamrtArts, symbol in PowerPoint, Designing & Presentation of a Slide Show; Master slide, Adding custom animation and effects in your presentation, Add time to your slide, Slide Sorting, Printing Presentations, Notes, Handouts with print options, Package your presentation for CD.

GE – MLT 1.2 : English Language

- Parts of Speech,
- Articles and Determines,
- Noun and Pronoun,
- Adjective and Adverb,
- Verb,
- Conjunctions and Prepositions,
- Tenses and their uses
- Punctuations,
- Active & Passive Voice,
- Type of Sentences (simple, complex, compound),
- Reported Speech (direct and indirect),
- Transformation of Sentences
- Prepositions, Gerunds, Infinitives,
- Analysis, Transformation, Synthesis
- Picture Composition
- Written English: Advance Writing Skills (formal, informal paragraph, story, letter, application)
- Situational Communication

SEMESTER - II

BVOC- MLT 2.1 : Haematology and Clinical Pathology

Unit I : Haematology

- Morphology of Red cells in Health and diseases.
- Systematic methods of examination of Blood Film (Blood picture) and Reporting.
- Disorders of structure and synthesis of Haemoglobin.
- General introduction to Bone marrow transplantation techniques
- LE phenomenon and demonstration of LE cell, Principle
- Coagulation factors, mechanism of blood coagulation, Fibrinolytic system, Disorders of coagulations.
- Laboratory methods used in the investigation of haemostasis:- Clotting time, Bleeding time, Partial Thromboplastin time, Plasma prothrombin time, INR. Thromboplastin generation time, Prothrombin consumption time, Thrombin time,

Test for fibrinogen degradation product. Test for fibrinolysis. Assay of plasma fibrinogen.

- Haemophilia and its laboratory parameters.
- Disorders of Platelets and Blood vessels.
- Platelet function test.

Unit II : Clinical Pathology

1. Microscopical examination of urine, collection of urine and its preservation, Colour, cloudiness, specific gravity, reaction, pH

- Different methods for detection, importance and its interpretation of – Protein, Sugar, Bile pigment, Bile salt, Urobilinogen, ketone bodies, Bence-Jones protein & Blood
- Examination and identification of sediment for: various cells, crystals, casts, parasites.
- Concentration methods for examination identification of urine sediment for: Gonococci, Trichomonas vaginalis, monilia.
- Pregnancy test-Production of HCG, HCG level at various stages of pregnancy, pregnancy test, Different types of pregnancy test such as Gravindex test& card test. Method of urine collection, Compare their advantage, disadvantages accuracy.

2. Faeces

- Examination of motion sample for: colour, mucous, consistency,ova,Amoeba,cyst,parasitesPuscells, RBCs&crystals.
- Detection of occult blood in stool, measurement of faecal urobilinogen& faecal fat, their importance interpretations.

3. Sputum

- Method for the collection, examination of sputum for AFB, sputum in disease conditions

4. Semen

- Methods of collection, Macroscopic and microscopic examination of semen, Motility, count, other findings.
- Staining and morphological studies of spermatozoa, importance & interpretation in each step of investigation in case of infertility.

5. Cerebrospinal Fluid

- Collection, transport, preservation, examination and interpretation total and differential count, staining methods, CSF in disease.

6. Other Body Fluids

- Examination of Ascitic fluid, Pleural fluid, Pericardial fluid, Synovial fluid.

B VOC - MLT 2.2 : Special Laboratory Techniques

Unit I

- Principles and working of laboratory instruments.
- Importance and methods of cleaning of glass apparatus.
- Calibration of apparatus and glass ware.
- Preparation and standardization of volumetric solution.
- Basic titration such as acid vs alkali, silver nitrate vs sodium chloride.
- Preparation of buffer solution and measurement of their pH.

Unit II

- Verification of Beer Lamber's Law.
- Determination of blood sugar level of plasma: Orthotoluidine method, glucose oxidase method .
- Determination of the serum urea nitrogen: Diacetyl monoxime method
- Determination of serum creatinine: alkaline picrate method.
- Determination of serum total cholesterol.
- Determination of serum bilirubin: malloy and evelyn, DMSO method
- Determination of serum glutamate pyruvate transaminase (SGPT) and serum glutamate oxaloacetate transaminase (SGOT) End point reaction.
- Sterilization technique.

BVOC- MLT 2.3 : FUNDAMENTAL OF MICROBIOLOGY

Unit I : Introduction to Microbiology

- History, development, scope and application of Microbiology.
- Methods of microbiology, isolation of pure cultures, theory and practice of sterilization.
- Microscopic examination of microorganisms, bright field microscopy, dark field microscopy, phase contrast microscopy, electron microscopy.
- Staining of microbes, theory of gram staining.
- Nature of microbial world: Procaryotes and eucaryotes , growth pattern of microbes.

Unit II : Morphology and Structure of Microorganisms

- Morphology and fine structure of bacteria, fungi, actinomycetes and algae.
- Organization of cell wall, cell membrane, flagella and capsules in bacteria.

- Morphogenesis in bacteria, formation of spores and cyst.
- Animal virus : morphology cultivation and viral disease cycle.
- Bacteriophages: morphology, multiplication, detection and enumeration.
- Biotransformation of : D-Sorbitol to L-sorbose, Antibiotics, steroids.

Unit III : Recombinant DNA Technology

- Recombinant DNA technology, genetic engineering and gene cloning in microorganisms.
- Strategies of genetic engineering. Restriction. Enzymes, vectors, plasmids.
- Genetic engineering for human welfare : production of Pharmaceuticals, insect pest control, use of genetically engineered micro organisms (GEMs)

For control of pollution.

Unit IV : Microbial Ecology and Biotic Interaction

- Rhizosphere and rhizoplane microorganisms, reasons for increased microbial activity in rhizosphere.
- Biogeochemical cycling : carbon cycle, nitrogen cycle, phosphorus and sulphur cycle.
- Symbiotic and non-symbiotic nitrogen fixation biofertilizers and biopesticides.
- Sewage(waste water) treatment, chemical characteristic, microbiological characteristic, waste water treatment process.

BVOC – MLT 2.4 : Vocational Practical

Practicals will be based on the courses conducted during the semester and will be decided in consultation with Industry Partners/Associations.

GE – MLT 2.1 : Digital and Financial Literacy

Unit I - How to operate the elements of a computer : Operate the elements of a computer including power chord, power switch, network connecting cable, USB ports, Mouse (click , click and drag, double click, right click (for the context menu), Keyboard (some of the more common letters, enter, backspace, shift, tab and arrows), interface icons, GUI Elements (use the menu, resize a window, minimize a window, maximize a window, move a window, locate items in Start Menu, using the scrollbar) Editing Options (copy, paste, cut, undo, redo, spell check)

Unit II - Perform operations on the computer : Perform operations including switching on the computer, logging in, locating a file, opening a file, printing a document, storing a file with proper extension, creating a folder/ sub folder in a volume on hard disk and desk top, shifting files from one folder to another, shutting off the computer under Windows O.S.

Access the Internet and finding information of interest : Access the Internet, use a search engine, and find information on a topic of interest, Register for a web-based e-mail account, log

in and log out of an e-mail account, access email with attachments, Opening an attachment and saving it, reply to an e-mail, forward an e-mail and delete an e-mail message

Unit III - Digital Literacy to understand the concept of Online Banking : Make bill payments, Make money transaction through online banking, book train and bus tickets, pension transactions, seek information on agricultural operations and land records, and interact with employment exchange, municipalities, gram panchayats, police and passport offices.

Create, edit and format documents using a word processor : Word Processing Basics, Creating, Editing and Formatting of text, Saving and Printing of word document

Unit IV - Introduction, Concept of Financial Literacy : Definitions of Financial Literacy, Importance of Financial Literacy, Theoretical Background of Financial Literacy, History of financial literacy, Financial Literacy and World Historical Developments, Financial Literacy and Initiatives in India; Basics of Investments, Insurance, and Pension **:** Growth /Equity Oriented Scheme, Income /Debt oriented scheme, Basic difference of Insurance and pension; Investment goals, Why Invest, National pension system, Financial Planning, Fraud protection.

Unit V - Why savings are needed, Why save in a bank, Banking products-ATM card, Banking instruments- Cheque, Demand Draft (DD), Banking Services Delivery Channels, Know Your Customer (KYC), Opening of bank account and documents required, Types of bank accounts, Bank's services including remittances, loan, mobile banking, Overdraft, Pension etc; Government scheme, Pradhan Mantri Jan Dhan Yojana (PMJDY), password security and ATM withdrawal, Insurance, Social Security Schemes-Atal Pension Yojana (APY), Pradhan Mantri Suraksha Bima Yojana (PMSBY), Pradhan Mantri Jeevan Jyoti Bima Yojana (PMJJBY), Pradhan Mantri Mudra Yojana (PMMY).

Initiatives by Different Stakeholders, Measurement of financial Literacy, Integrated Dissemination of financial Literacy for encompassing Financial Inclusion, Modes of reaching out Financial Literacy; Information and communication technology (ICT) & financial literacy. Financial Sector Regulators: Reserve Bank of India, Role of RBI, Other Financial Regulators: Introduction of: SEBI, IRDAI, PERDA.

GE – MLT 2.2 : Health and Safety at Workplace

Unit I - Safety Signs &Colour at Work : Safety Signs - Cause for accidents, Safe attitudes; Safety Signs & Colour- Sign categories, Sign types.

First Aid & Artificial Respiration: First Aid - Introduction, First aid and Its aim, Recovery position, Cardiopulmonary resuscitation (CPR), Wound, Shock, Convulsion, Extensive burns, Minor burns and scalds, Chemical burns, Electric shock, Fracture, First–aid box; Artificial Respiration - Respiration, Artificial respiration, Mouth to nose method of artificial respiration, Artificial respiration in case of cardiac arrest, Important points to note after giving artificial respiration to victims.

Unit II - Safe Lifting and Carrying Techniques : Causes of injury, Types of injury and methods to prevent them, Points that make an objects/load difficult to carry, Preparation before lifting or shifting heavy loads, Correct body posture before beginning the lift in kinetic method of lifting , Manual lifting techniques using kinetic method, Shifting of working tables, Shifting of electronic equipment/instruments, Basic steps of safe lifting and handling.

Unit III - Fire and Fire Extinguishers : Fire, Fuel, Heat, Oxygen, Controlled and uncontrolled fire, Controlling and extinguishing fire, Fire extinguishers, Types of fire extinguisher - water-filled

extinguishers, foam, extinguishers, dry powder extinguishers, carbon dioxide type extinguishers, halon extinguishers, General procedure to be adopted in the event of a fire.

Safe Working Measures : Electric shock, action and treatments; Hazard identification, risk assessment and risk control; Workstation layout and ergonomic guidelines.

Unit IV - Managing Health and Safety at Work : Introduction, General office safety, Types of office accidents, Office hazard control, Office environment, Hazards from electrical equipment, Office safety procedures, Emergency action plan.

Personal Hygiene : Introduction, How to maintain good hygiene, How to ensure food safety, Grooming, What are the consequences of not maintaining good hygiene?

Unit V - Public and Home Safety : Introduction, Safety at home, Activities that have a potential for accidents, Things that are normally used at home and have a potential for accidents, Public safety, Prevention.

Common Food Borne Diseases and Infections: Introduction, The Farm – beginning of the food chain, Food processing-preventing food-borne illness and improving quality, Transport and storage–safeguarding food, Food safety and retailing , Food safety in the home, Food borne diseases.

Advanced Diploma in Medical Lab Technician

SEMESTER – III

B VOC - MLT 3.1: Cytology and Transfusion Technology

Unit I : Transfusion Technology

- General introduction to Blood Banking.
- Blood group and its inheritance; Laws of heredity.
- ABO blood group system and its distribution.
- Inheritance and distribution of Rhesus system; General introduction to Rh system.
- Antigen Antibody reactions in immune haematology.
- Naturally occurring and immune antibodies; Complement and blood group antibodies.
- Preparation of grouping sera.
- ABO grouping methods and factors influencing.
- Rh-typing methods (using complete and incomplete anti-D).
- Minor blood group system
- Coombs test
- Compatibility testing
- Antibody Titrations: Basic titration technique
- Screening of Donors anticoagulant solution used in blood transfusion.
- Transfusion reactions, principles and methods of investigating transfusion reactions
- Transmission of diseases by blood transfusion

- Component therapy: Preparation of transfusion of Leucocytes poor blood, red cells concentrate, platelet rich plasma, platelet concentrate, factor VIII concentrate, plasma apheresis, Transfusion in von Willebrand's disease, transfusion of plasma, transfusion of leucocytes/granulocytes, lecopheresis, transfusion of plasma components and preparation of cryoprecipitate, its use and advances
- Automation and recent developments in blood banking

Unit II : Cytology

- Introductions to Cytology
- History, development and scope of cytology.
- Cytopathology Techniques
- Fixation of Cytology specimens – various fixatives, pre fixation, coating and spray fixation, advantages and disadvantages.
  - Staining – Routine cytology stain Pap, MGG, H&E advantages and disadvantages.
  - Collection, preparation of gynaecological and non-gynecological specimens-exfoliative cytology. Gynecological – vaginal, cervical, endocervical, endometrial Non-gynecological – sputum, bronchial, Body fluids (serous effusions), CSF, urine.
  - Concentration technique in cytology - Centrifugation, cyto-centrifugation, membrane filters, cell blocks.
  - Liquid based cytology – monolayer preparation.
- Female Genital Tract Cytology
  - Cervical cytology: Normal cells in cervical smear, inflammatory lesions of the female genital tract – specific and nonspecific inflammation.
  - Hormone cytology.
- Respiratory tract cytology – sputum, bronchial materials.
- Urinary tract cytology – urine.
- Other Body Fluids
  - Serous effusions.
  - CSF
- Gastro Intestinal Tract cytology.
- Fine Needle Aspiration Cytology – Scope, advantages and disadvantages,
- Organization of cytology lab.

B VOC - MLT 3.2: Biochemistry - I

Unit I :

- Enzymes : classification, co- enzymes ,mechanism of enzyme action, factors effecting enzyme action , Isoenzymes in diagnostic biochemistry –cardiac enzymes ,digestive enzymes

Unit II :

- Vitamins : Introduction, fat soluble vitamins , water soluble vitamins, definition, sources, daily requirements, normal value, deficiency disorders and structures
- Minerals : Introduction , sources, daily requirements, normal value ,deficiency disorders
- Lipid profile :Total cholesterol, LDL, HDL, VLDL, Triglycerides

Unit III :

- Carbohydrate metabolism : Introduction, Glycolysis, Gluconeogenesis, Glycogenolysis, glycogenesis, pentosephosphate pathway, fructose metabolism, galactose metabolism ,energy production
- Protein metabolism : Urea cycle
- Fat metabolism : beta oxidation

Unit IV :

- Thyroid function test
- Gastric function test
- Pancreatic function test
- Solutions :solute and solvent ,solution molality ,molarity ,normality

B VOC - MLT 3.3 : Microbiology- I

Unit I :

- **Morphology of Cells -** Prokaryotic and Eukaryotic cells (structure and functions).
- **Nutrients for Microbial Growth**
  - Physical conditions required for bacterial growth- Oxygen, CO_2, Temperature, water, pH, Light, osmotic pressure.
  - Major requirements and common ingredients of culture media.
  - Media for microbial growth – classification of media- Routine laboratory media like
    - Basal - Peptone water, Nutrient broth, Nutrient agar
    - Enriched - Blood agar, Chocolate agar, R.C.M
    - Enrichment - Alkaline- Peptone Water, Selenite F broth
    - Selective - MaC conkey agar, XLD, DCA, TCBSA, L.J.medium
    - Differential - MaC Morphological conkey agar
    - Transport media, Anaerobic media.
    - Principles and method of preparation, sterilization, storage of different types of media.

Unit II :

- **Detailed systemic and diagnostic study of bacteria -** A detailed study of general

characters, classification, different pathogenic species, non-pathogenic (brief account only)., morphology, staining characters, cultural characteristic in different culture media, susceptible to physical and chemical agents, biochemical reactions, antigenic properties, special tests for identification of species, epidemiology, specimens and its collection, lab diagnosis, antibiotic sensitivity of the following bacteria :

- Staphylococci, Streptococci, Corynebacteria, Escherichia, Klebsiella, Enterobacter, Proteus, Salmonella, Shigella, Mycobacteria, Yersinia, Pseudomonas, Spirecheates, Bacillus, Vibrio, Haemophilus, Mycoplasma, Ricketssia, Chalmydia,

- Biochemical tests used for identification of bacteria
  - ➢ Tests for identification of bacteria, detailed study of the principle, preparation of media, reagents used different methods, interpretation and quality control for the following identification tests.
  - ➢ Tests for the metabolism of Carbohydrates- simple sugar media, TSI/KIA, citrate utilization, MR, VP tests
  - ➢ Tests for the metabolism of proteins and Amino acids- Indole, PPA, Gelatin liquefaction, Amino acid metabolism test
  - ➢ Tests for enzymes. - Catalase, Urease, Nitrate reductase, Coagulase, and Oxidase.
- Antimicrobial sensitivity testing and assay methods for body fluids

Unit III : Immunology

- Immune system
- Infection
- Immunity
- Antigen, Antibody
- Antigen –Antibody reaction
- Vaccines

UNIT IV

- Lab, Diagnosis of common bacterial infection - Pyogenic infections, Respiratory tract infections, Meningitis, Diphtheria, Whooping cough, Gas gangrene, Food - poisioning, Enteric fever, Acute diarrhoeal diseases, Cholera, Urinary tract infection, Tuberculosis, Leprosy, Plague, Anthrax, Typhus fever, Syphilis, Gonorrhoea and other STD's,
- Serological Tests: Widal, ASO, CRP, Rosewaller, Brucella agglutination, cold agglutination, VDRL, TPHA, FTA - ABS.

BVOC – MLT 3.4 : Vocational Practical

Practicals will be based on the courses conducted during the semester and will be decided in consultation with Industry Partners/Associations.

GE – MLT 3.1 : Environmental Studies

Unit I

- Scope and importance; Natural resources : Renewable and nonrenewable resources Natural resources and associated problems.
- Forest resources: Use and over-exploitation, deforestation, case studies; Timber extraction, mining, dams and their effects on forest and tribal people.
- Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.

Unit II

- Mineral resources : Use and exploitation, environmental effects of extracting and using mineral resources, case studies.
- Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, waterlogging, salinity, case studies.
- Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources, case studies.
- Land resources : Land as a resource, land degradation, man-induced landslides, soil erosion and desertification.

Unit III

- Role of an individual in conservation of natural resources, Equitable use of resources for sustainable lifestyles.
- Ecosystems: Concept, Structure, Function, Producers, Consumers, Decomposers, Energy flow, Ecological succession, Food chains, Food webs, Ecological pyramids, Introduction, types, characteristic features, structure and function of the forest, grassland, desert and aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries).
- Biodiversity and its Conservation : Introduction, definition, genetic, species & ecosystem diversity and bio-geographical classification of India.
- Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values. Biodiversity at global, national and local levels, India as a mega-diversity nation, hot-sports of biodiversity.
- Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts.
- Endangered and endemic species of India
- Conservation of biodiversity: In-situ and ex-situ conservation of biodiversity

Unit IV

- Environmental Pollution: definition, cause, effects and control measures of (a) Air pollution, (b) Water pollution, (c) Soil pollution, (d) Marine pollution, (e) Noise pollution, (f) Thermal pollution and (g) Nuclear hazards
- Solid Waste Management : causes, effects and control measures of urban and industrial wastes
- Role of an individual in prevention of pollution
- Pollution case studies
- Social Issues and the environment from unsustainable to sustainable development, urban problems related to energy
- Water conservation, rain water harvesting, watershed management.

Unit V

- Environmental ethics: Issues and possible solutions, climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, dies.
- Wasteland reclamation, Consumerism and waste products.
- Environment Protection Act - Air (Prevention and Control of Pollution) Act. Water (Prevention and control of Pollution) Act, Wildlife Protection Act, Forest Conservation Act.
- Issues involved in enforcement of environmental legislation, Public awareness
- Human Population and the Environment : population growth, variation among nations, population explosion, Family welfare programme.
- Environment and human health: Human rights, value education, HIV/AIDS
- Women and Child Welfare. Role of information technology in environment and human health

GE – MLT 3.2: Communication Skills

Unit I : Introduction to Communication Skills - Defining the Term Communication, Types of Communication, Types of communication based on the communication channels used, Verbal Communication, Types of Communication Based on Purpose and Style, Factors to consider when choosing a communication media, Stages in the communication process, Communication cycle, The roles of a sender and receiver, Role of the sender, Role of the receiver, Basic principles of communication, The Purpose for communication, Importance of communication, Barriers to communication, Possible remedies to the barriers.

Unit II : Study Skills- Tips to effective study, Presentation of Work, Planning work, Note-taking during lecture, Challenges of note taking, Formation of discussion groups, Critical Thinking.

Unit III :Listening Skills - What is listening? Things that we listen to actively, Why You Need Good Listening Skills, Reason why we listen, Tips to Effective and Active Listening Skills, How to prepare, Difficulties encountered while listening, Barriers to effective listening, Possible remedies.

Unit IV :Reading Skills - What is reading? Types and methods of reading, Strategies for Reading Comprehension, Why study Reading Skills? Importance of reading &barriers to effective reading.

Unit V :Speaking with Confidence - The importance of public, speaking, enlist the aid of the audience, make your stage fright work for you, how to get prepared, understanding your audience, listener analysis, hook the audience, completing your presentation.

SEMESTER – IV

BVOC - MLT 4.1: Microbiology- II

Unit I :

- **Mycology** - Introduction to Mycology , Brief study of classification of fungi, Morphology of fungus, yeasts, yeast like fungi, Dimorphic fungi, Filamentous fungi.
- **Pathogenic fungi** Candida, Cryptococci, Dermatophytes, Sporotrichoums,

Histoplasma, Blastomyces, Cocciodioides, Paracocciodiodes, Mycetoma, Actinomyces, Nocardia and common laboratory contaminants

Unit II : Virology

- An elementary knowledge of medically important DNA and RNA viruses
- More emphasis should be given to HBV, HIV, Flavi virus and other common viral infection in India.
- Emerging viral diseases in India
- Different staining techniques used in virology

Unit III :

- **Parasitology**: An elementary study of the types of animal associations, parasitism commensalism and Symbiosis.
- Types of parasites; Classification of Protozoa and Helminthes
- Morphology, life cycle and Laboratory diagnosis of malaria parasite ,leishmania, trypanosomes, tissue – Filaria and blood nematodes - Trichinella – Dracuncullus
- Medical Entomology: Basic concept of medical entomology in relation to medical lab technology; Arthropods of medical importance, arthropods borne diseases and their transmission; Principle of arthropods control, Mosquito - Role of this arthropods in disease transmission, disease types and controlling measures; House flies, Role of diseases transmission and controlling measures; Flea: Role of diseases transmission and control measures and itch mite.

Unit IV : Bacteriological examination of water, milk, food and air, Nosocomial infections; Preservation of microbes and Iyophilisation methods, Total and viable counts of bacteria

BVOC - MLT 4.2 : Histopathology

Unit I :

- General understanding of the terms – Histology, Histopathology and Histopathological techniques.
- General organization of a Histopathology laboratory and basic requirements for a histopathology laboratory. Role of Histopathology laboratory in the diagnosis of diseases.
- Fixatives used in cytology and classification of fixatives
- Tissue Processing
  - Dehydration
  - Impregnation
  - Principles, operation, parts and care of automatic tissue processors
  - Special processing techniques: Fixation, processing and section cutting of bones, cartilages, connective tissue, CNS, pancreas, skin, teeth and eyeball.

Unit II :

- Decalcification - Aim of decalcification, selection of tissue, Fixation of tissue, various decalcifying agents used, decalcification techniques – end point determination and qualities of ideal decalcifying agents.
- Embedding
- Casting/Blocking
- Types of moulds used; Technique of casting
- Sectioning
  - Different types of Microtome: - Rocking, Rotary, sledge, sliding and freezing microtome. Their operations and specifications. Different types of microtome knives, knife angle. Choice and care of knives. Sharpening of microtome knives, honing and different types of hone employed and honing technique. Stropping and different types of strops employed and techniques of stropping. Parts care and operation of automatic knives sharpening machine.
  - Cutting of paraffin wax embedded sections
  - Fixation of sections to slides- water bath method, hot stage method and warmed slide method.
  - Preparation and use of albuminised and starched slides.
- Staining
  - Haematoxylin : - composition, preparation, uses, staining results advantages and disadvantages of all the different haematoxylin.
  - Principle, preparation, storage, staining technique observation and interpretation of Haematoxylin and eosin stain.
  - Special staining methods

BVOC - MLT 4.3 : Biochemistry - II

Unit I :

- Colorimetry, Spectrophotometry, Fluorimetry – principle ,definition ,working
- Chromatography :principle and application, types of chromatography
- Absorption chromatography, ion exchange chromatography, gel chromatography, affinity chromatography , paper chromatography , thin layer chromatography gas – liquid chromatography
- Electrophoresis : theory of electrophoresis, methods of electrophoresis, paped and gel electrophoresis.

Unit II :

- Water and mineral metabolism, distribution of fluids in the body, ECF, ICF, water metabolism, dehydration, mineral metabolism
- Blood electrolytes, water electrolyte balance
- Bile pigment metabolism : jaundice, its types and their biochemical findings

Unit III :

- Quality control
- Blood buffers : types and definition

- Safety and First Aid : Understanding and precautions to ensure patient safety, Basics of first aid, Understanding and precautions to ensure self-safety, Understanding and precautions to ensure sample preservation while transporting.

BVOC – MLT 4.4 : Vocational Practical

Practicals will be based on the courses conducted during the semester and will be decided in consultation with Industry Partners/Associations.

GE – MLT 4.1 : Human Values and Ethics

Unit I : Values and Ethics-An introduction, Goal and mission of life.

Unit II : Vision of life, Principles and philosophy, Self-exploration, Self-awareness, Self-satisfaction.

Unit III : Decision making, Motivation, Sensitivity, Success, Selfless service.

Unit IV : Case study of ethical lives, Positive spirit, Body, mind and soul.

Unit V : Attachment and detachment, Spirituality quotient, Examination

GE – MLT 4.2 : Personality Development

Unit I – Leadership and Interpersonal Relations: Leadership **-** Introduction to Leadership, Leadership Power, Leadership Styles, Leadership in Administration; Interpersonal Relations - Introduction to Interpersonal Relations, Analysis of different ego states, Analysis of Transactions, Analysis of Strokes, Analysis of Life position

Unit II - Group Dynamics and Team Building : Importance of groups in organization, Interactions in group, Group Decision Taking, Team Building, Interaction with the Team, How to build a good team?

Unit III - Stress and Conflict Management : Stress Management : Introduction to Stress, Causes of Stress, Impact Stress, Managing Stress; Conflict Management : Introduction to Conflict, Causes of Conflict, Managing Conflict

Unit IV - Performance Appraisal : Introduction to Performance Appraisal, Vertical Appraisal, Horizontal Appraisal, 360º Performance Appraisal, Methods of improving Techniques of Performance Appraisal.

Unit V - Time Management and Motivation : Time Management - Time as a Resource, Identify Important Time Wasters, Individual Time Management Styles, Techniques for better Time Management; Motivation - Introduction to Motivation, Relevance and types of Motivation, Motivating the subordinates, Analysis of Motivation

B. Voc. in Medical Lab Technician

SEMESTER - V

BVOC - MLT 5.1 : Research Methodology

Unit I : Foundations of Research - Meaning, Objectives, Motivation, Utility; Concept of theory, empiricism, deductive and inductive theory; Characteristics of scientific method; Understanding the language of research - Concept, Construct, Definition, Variable; Research process (10%)

Unit II : Problem Identification & Formulation - Research Question - Investigation Question - Measurement Issues - Hypothesis - Qualities of a good Hypothesis - Null Hypothesis & Alternative Hypothesis. Hypothesis Testing - Logic & Importance (10%)

Unit III : Research design; Concept and Importance in Research; Features of a good research design; Exploratory research design - concept, types and uses; Descriptive research designs - concept, types and uses; Experimental design: Concept of independent & dependent variables.

Unit IV : Qualitative and Quantitative Research - Qualitative research, Quantitative research, Concept of measurement, causality, generalization, replication; Merging the two approaches.

BVOC - MLT 5.2 : Cytogenetics

Unit I :

- Human sex chromosomes
- Sampling staining and demonstration of Barr body demonstration
- Demonstration of Y- chromosome

Unit II : Karyotyping

- Methods of chromosome analysis
- Banding techniques
- Chromosome analysis with blood and bone marrow
- Morphology of chromosome and their identification

Unit III : Chromosome Defect

- Clinical manifestation of chromosome disorders
- Philadelphia chromosome
- Turner's Syndrome
- Down's syndrome
- Klinefelter Syndrome

Unit IV : Advanced Methods in Cytogenetics – FISH,SKY

BVOC - MLT 5.3 : Laboratory Organization and Recent Advances in Pathology

Unit I :

- Different levels of laboratories
- Basic requirements and functions of laboratory
- Purchasing of equipments and chemicals
- Open and Closed system analysers
- National and International accreditation of laboratories
- Automation in haematology
- Automation in histopathology
- New generation equipments in blood banks

BVOC – MLT 5.4 : Vocational Practical

Practicals will be based on the courses conducted during the semester and will be decided in consultation with Industry Partners/Associations.

GE – MLT 5.1 : Organizational Behaviour

Unit I - Nature of Organizational Behaviour : Nature of Organizational Behaviour, Definitions of Organizational Behaviour, Features of Organizational Behaviour, Organizational Behaviour as a Science, Organizational Behaviour as Multidisciplinary Behavioural Science, Scope of Organizational Behaviour, Components of Organizational Behaviour, Model of Organizational Behaviour,Approaches to Organizational Behaviour, Emerging Challenges and Opportunities of Organizational Behaviour, Introduction of Human Behaviour, Meaning of Human Behaviour, Factors Affecting Human Behaviour, Understanding Human Behaviour.

Unit II - Nature of Groups : Nature of Group, Importance of Group, Features of Group, Types of Group, Theories of Group Formation, Why Workers Join Group? Meaning of Group Dynamics, Components of Group Dynamics, Meaning of Team, Features of Team, Principles of Efficient Team Working, Different Roles of Team Members, Types of Positive Roles, Types of Negative Roles, Team Building, Team Development Process, Role of Team Builders in Team Development, Qualities of an Efficient Team.

Unit III - Management of Conflict : Introduction, Meaning of Conflict, Roles of Conflict, Types of Conflict, Causes of Conflict, Leadership Theories and Behaviour, Introduction to Leadership, Meaning of Leadership, Features, Qualities and Functions of Leadership.

Unit IV - Inter-personal and Organizational Communication : Introduction, Meaning & Definition of Communication, Feature, Importance, Elements of Communication, Difference Between Formal and Informal Communication, Characteristics of a Good Communication System, Introduction of Organizational Changes.

Unit V - Organizational Development : Introduction and Meaning, Features and Process of Organizational Development, Organizational Development Intervention, Tools of Organizational Development, Benefits or Goals of Organizational Development, Introduction and Meaning of Transactional Analysis, Scope of Transactional Analysis.

Controlling Techniques and Motivation : Introduction, Controlling Techniques, Non-Budgetary Control Devices, Introduction of Motivation, Concept, Meaning & Features of Motivation, Mechanism of Motivation, Types of Motivation, Objective of Motivation, Theories of Motivation, Importance of Motivation.

GE – MLT 5.2 : Business Communication

Unit I - Fundamental of Communication : Definition, Importance, Process, Forms of communication, Dimension of communication, Channels of communication, Barriers of communication, Qualities of good communicator.

Unit II - Verbal and Non-Verbal Communication : Audio/Visual communication, Effective speaking, Interpersonal communication, Non-Verbal communication: Kinesics, Proximics, Paralanguage, Activity: Short Classroom presentation.

Unit III - Listening Skill and Self-Assessment : Definition and Importance, Intelligent listening, Barriers of listening and qualities of overcoming barriers, SWOT analysis,

Unit IV - Writing Skills : Use of grammars, Brief description &detailed illustrations, Business correspondence, Presentations, Report writing, Projects, Notice and Circulars.

Unit V - Effective Uses of Communication Skills (Practical Approach) : Basics of phonetics, Presentation skill, Do's and Dont's**,** Extempore, Debate, Role plays, Interview, Group discussion, Information communication technology.

SEMESTER - VI

B VOC - MLT 6.1 : Quality Management

Unit I : Introduction to Quality Management, Evolution of Quality Management, Concepts of Product and Service Quality Dimensions of Quality, Deming's, Juran's, Crosby's Quality Philosophy, Quality Cost.

Unit II : Introduction to Process Quality, Graphical and statistical techniques for Process Quality Improvement, Graphical tools for data representation, 7 QC tools.

Unit III : Sampling, sampling distribution and hypothesis, Testing Regression, Control charts, Process capability analysis, Measurement system analysis, Analysis of Variance (ANOVA), Design and Analysis of Experiment (DOE), Acceptance sampling plan, TQM, Leadership, Lean and JIT Quality Philosophy, Benchmarking, Process failure mode and effect analysis(PFMEA), Service Quality, Six sigma for Process Improvement, ISO 9001 and QS 9000, Quality Audit, Quality Circles.

Unit IV : Quality Improvement, Quality Function Deployment, Robust Design and Taguchi Method, Design Failure Mode & Effect Analysis, Product Reliability Analysis, Six Sigma in Product Development.

B VOC - MLT 6.2 : General Human Psychology and HR Management

Unit I : Introduction to psychology, Nature of psychology; Basic concepts: Person, States of Consciousness: Sleep and Wakefulness and altered States of Consciousness, Behavior and Experience, II Evolution of the discipline of psychology; Psychology and other disciplines; Linkages across psychological processes

Unit II : Methods of psychology, The bases of human behavior, Evolutionary perspective on human behavior; Biological and cultural roots; Nervous system and endocrine system: Structure and relationship of with behavior and experience; Brain

and behavior, Socialization, Enculturation and Acculturation; Globalization; Diversity and pluralism in the Indian context.

Unit III : Evolution and growth of human resource management (with special reference to Scientific management and Human relations approaches); Role of HR in strategic management; Nature, objectives, scope, and functions of HR management, Challenges of HR (the changing profile of the workforce - knowledge workers, employment opportunities in BPOs, IT and service industries, Flexi options), Workforce diversity (causes, paradox, resolution of diversity by management).

Unit IV : Concepts of line - staff in the structure of human resource department and the role of human resource manager, Manpower planning, Job analysis, Job evaluation.

BVOC – MLT 6.3 : Vocational Practical

Practicals will be based on the courses conducted during the semester and will be decided in consultation with Industry Partners/Associations.

GE – MLT 6.1 : Entrepreneurship Skills

Unit I :

Introduction to Entrepreneurship

- What is Entrepreneurship?
- Role of Entrepreneurship
- Basic Concepts of Entrepreneurship
- Qualities of a Successful Entrepreneur
- Distinguishing Characteristics of Entrepreneurship and Wage Employement
- Types of Business Activities
- Product, Service and Hybrid Businesses
- Entrepreneurship Development Process
- Developing Entrepreneurship/Business Skills

Money Matters

- Personal Finance – Why to Save?: Importance of Saving
- Types of Bank Accounts, Opening a Bank Account: Types of Bank Accounts
- Costs: Fixed vs Variable: What are Fixed and Variable Costs?
- Investment, Insurance and Taxes: Investment
- Online Banking, NEFT, RTGS etc.: What is Online Banking?
- Savings and Investment
- Basics of Taxation

Unit II :

Generating a Business Idea

- What is a business idea?
- What makes a good business idea
- How do people find good business ideas?
- Business ideas information form
- An “IDEA” list

- SWOT Analysis

Developing a Business Plan

- Market analysis
- Financial analysis
- Realistic planning
- Business plan template

Unit III :

Marketing

- Market Study /Market Analysis
- Entrepreneurship Marketing/Marketing for Small Business
- Sales and Negotiation

Costing and Pricing

- Price Setting
- Profit Calculations Concepts
- Budgeting
- Cash Flow Planning and Debt Management

Unit IV :

Operational Management

- General Business Management

Record-Keeping

- Business Record
- Book Keeping

Financial Literacy

- Use of Calculator and mobile phones

Unit V :

Preparing to be an Entrepreneur

- Market Study: Understanding Market Research
- Identifying your Customers and Customer Service Management
- Leadership and Team Building/ Networking
- Business Plan: Why Set Goals?
- Procedure and Formalities for Bank Finance: The Need for Bank Finance
- Business Finance & Financing Opportunities for SMEs
- Enterprise Management - An Overview: How to Manage Your Enterprise?
- 20 Questions to Ask Yourself Before Considering Entrepreneurship
- Risk Management

GE – MLT 6.2 : Project Management

Unit I :

- Definition of a Project, Why Project Management, The Project Life Cycle

- Strategic Management and Project Selection, Project Selection and Criteria, The Nature of Project Selection
- Models, Analysis under Uncertainty, Project Proposal and Project Portfolio Process

Unit II :

- Functions, Roles and Responsibilities of a Project Manager, Delegation of Authority, Building Project Team,
- Project Organisation. Pure Project Organisation, Matrix Organisation, the Project Team and Human Factors
- Generation and Screening of Project ideas – Procedure for Idea Generation, Monitoring the Environment,
- Corporate Appraisal, Project Rating Index

Unit III :

- Market and Demand Analysis, Situational Analysis, Conduct of Market Survey, Demand and Forecasting,
- Technical Analysis, Social Cost Benefit Analysis, Rationale for SBCA, UNIDO Approach, Saving Impact and its
- Values, Little Mirrlees Approach
- Financial Estimates and Projections – Cost of a Project, Means of Finance, Estimates of Sales and Production,
- Working Capital Requirement, Cost of Capital, Projected Cash Flow Statement, Projected Balance Sheet,

Unit IV :

- Financing of a Project, Equity, Debentures, Term Loans, etc.
- Measuring Project Profitability – Payback Period, Accounting Rate of Return, NPV, Internal Rate of Return and
- BCR Method, Assessment of Various Methods
- Project Cash Flow, Elements of a Cash Flow Stream, Cash Flow for a Replacement Project, the Cost of Capital,
- WACC, Optimal Capital Budget
- Need and Importance of Work Break Down Structure, Project Execution Plan (PEP), Network Techniques.

Unit V :

- Project Management, CPM, PERT, Time Estimation
- Conflict and Negotiation, The Nature and Type of Negotiation, Project Review and Administrative Aspects,
- Post Completion Audits, Abandonment Analysis

STUDY MODULES & BOOKS INFORMATION

Semester	Course Code	Subject Name	Suggested Books/Modules
Diploma in Medical Lab Technician			
I	BVOC - MLT 1.1	General Human Anatomy and Physiology	i) Handbook of General Anatomy by B. D. Chaurasia, CBS Publishers and Distributors ii) V 54 : Physiology, AISECT
	BVOC - MLT 1.2	Biomolecules	i) Godkar – I, II, III Edition; Darshan P. Godkar, Bhalani Publisher ii) Medical Biochemistry; A R Aroor; J P Publisher
	BVOC - MLT 1.3	Routine Laboratory Techniques	Textbook of Medical Laboratory; Ramnik Sood; J. P. Brother
	BVOC - MLT 1.4	Vocational Practical	-
	GE – MLT 1.1	Basic Computing Skills	S01,S19,S20,S25 : Fundamentals of Computers and MS Office
	GE – MLT 1.2	English Language	S 68 : Effective Communication
II	BVOC - MLT 2.1	Hematology and Clinical Pathology	
	BVOC - MLT 2.2	Special Laboratory Techniques	Textbook of Medical Laboratory & Technology, Volume I, II, III; Dr. Praful Godkar; House, Mumbai 9.10
	BVOC - MLT 2.3	Fundamentals of Microbiology	
	BVOC - MLT 2.4	Vocational Practical	-
	GE – MLT 2.1	Digital and Financial Literacy	Digital and Financial Literacy, AISECT
	GE – MLT 2.2	Health and Safety at Workplace	S 69 : Safety Practices, Primary Health and Personal Hygiene
Advanced Diploma in Medical Lab Technician			
	BVOC - MLT 3.1	Cytology and Transfusion Technology	i)
	BVOC - MLT 3.2	Biochemistry - I	
	BVOC - MLT 3.3	Microbiology - I	
	BVOC - MLT 3.4	Vocational Practical	-
	GE – MLT 3.1	Environmental Studies	Fundamentals of

			Environmental Studies, Mahua Basu and Xavier Savarimuthu S J
	GE - MLT 3.2	Communication Skills	Communication Skills, AISECT
IV	BVOC - MLT 4.1	Microbiology - II	i)
	BVOC - MLT 4.2	Histopathology	
	BVOC - MLT 4.3	Biochemistry - II	
	BVOC - MLT 4.4	Vocational Practical	-
	GE – MLT 4.1	Human Values and Ethics	Human Values and Ethics, Madhuri Joshi, Kalyani Publishers
	GE – MLT 4.2	Personality Development	Personality Development, AISECT
B. Voc. in Medical Lab Technician			
V	BVOC - MLT 5.1	Research Methodology	
	BVOC - MLT 5.2	Cytogenetic	
	BVOC - MLT 5.3	Laboratory Organization and Recent Advances in Pathology	
	BVOC - MLT 5.4	Vocational Practical	-
	GE – MLT 5.1	Organizational Behaviour	Organizational Behaviour by R. K. Suri and Sanjeev Verma
	GE – MLT 5.2	Business Communication	i) Business Communication by P. K. Agrawal & A. K. Mishra, Sahitya Bhavan Publication ii) Business Communication by Vinod Mishra & Narendra Shukla, SBPD Publishing House
VI	BVOC - MLT 6.1	Quality Management	
	BVOC - MLT 6.2	General Human Psychology and HR Management	
	BVOC - MLT 6.3	Vocational Practical	-
	GE - MLT 6.1	Entrepreneurship Skills	Entrepreneurship Skills, AISECT
	GE - MLT 6.2	Project Management	i) Project Management Edited By Neha Tikoo, Lovely Professional University, Printed by Excel Books Private Limited ii) Fundamentals of Project

			Management by Joseph Heagney, American Management Association