



# VANANCHAL COLLEGE OF SCIENCE

(Run by - Vananchal Educational & Welfare Trust®)

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## **A. Program/Course Outcomes for B. Sc. MLT (Medical Laboratory Technology): -**

**PO1:** Medical Laboratory Technology, clinical laboratory science helps diagnose, treat and prevent disease through clinical laboratory tests. It is complementary to medical science. It involves analysis of body matter such as fluid, tissue, and blood. It also covers micro-organism screening, chemical analyses, and cell count. These professionals, **medical lab technicians and technologists**, play an important role in collecting information, sampling, testing, reporting and documenting medical investigations.

### **PO2: Medical Technologist work covers areas such as:**

- Blood banking
- Clinical Bio-Chemistry (Bio-chemical analysis of body fluids)
- Haematology (blood related)
- Immunology (study of immune system)
- Microbiology (study of Micro Organisms)
- Cytotechnology (study of human tissue)
- Phlebotomy
- Urine analysis
- Coagulation
- Parasitology
- Blood Sample Matching
- Serology
- Cell Biology

### **PO3: Medical Laboratory Technology Skills and Attributes**

- A Medical Laboratory Technologist should be disciplined and attentive. As fire is a bad master, likewise the chemicals in the laboratory are good servants but very bad masters. A Medical Laboratory Technologist should also have the ability to conduct research,

finish tasks with speed as well as with accuracy, to handle stress, make analytical judgment, interpreting technical/scientific data, knowledge of laboratory instrumentation, mechanical ability and the ability to use computers.

- The career prospects in this field depend on the academic and technical skills of the technologist/technician. Initially he/she joins any laboratory as a certified medical laboratory technician. These days with the growth in the private sector there are so many private hospitals, nursing homes, blood banks, pathology laboratories etc. the demand for laboratory technicians is on the up-swing.
- With adequate knowledge and experience, Medical Laboratory Technologists can advance to supervisory or management positions in laboratories and hospitals. They can also work as Laboratory manager/Consultant/supervisor, health care Administrator, Hospital Outreach coordination, laboratory information system Analyst/Consultant, educational consultant / coordinator etc.
- The Bachelor of Medical Lab Technology is one of the most preferred courses. Most of the student option for this course. In this course student can get specialization in number of areas. Some of the area of specialization is – Microbiology, Hematology, Clinical Chemistry, Clinical Bio-Chemistry, Clinical Pathology, Immune Pathology, Immunology and Immunological Techniques, Parasitology, Biochemical Techniques, Serology, Phlebotomy, Urine analysis, Coagulation, Bacteriology, Histopathology, Virology.

**PO4:** A common laboratory in both urban and rural areas of our country or abroad helps in diagnosis of patient in better manner. So that patient can get better treatment by the new technology of diagnosis process.

**PO5:** Histopathology section deals with various cytology techniques FNAC, histopathology techniques, routine and special types of staining methods (H&E stain, PAP stain and Gram's stain etc.).

**PO6:** Immunology is one of the latest branch of life science. It deals the physiological functioning of the immune system in both healthy and diseased condition. Immunology we focus on their introduction, branches, history and whole immune system.

**B. Student Outcomes of this Course: -**

**StOs1:** Students will be able to assist his doctor after completion of this Course and can get lucrative job in Medical Science.

**C. Subject Outcomes of this Course: -****SOs1: Biochemistry**

➤ Biochemistry is a term related to the Subject Biology. The tools for research in all the branches of medical science are mainly biochemical in nature. The study of biochemistry is an essential to understand the terms:

- Glassware.
- Solution & reagents.
- Equipments & instruments of biochemical test etc.

The students will understand all the basic techniques:

- Principles of laboratory.
- Preparation of reagents.
- Use & Operations of various instruments (Like: Autoanalyzers, Venipuncture, Specimen Collection and Transportation etc.).
- Acid base balance.
- All metabolic Processes of Carbohydrates, Fats, Protein, nucleic acid and Protein biosynthesis.

**SOs2: Cell Biology**

- It is one of the youngest branches of the life science. It was recognized as a separate discipline by the end of the last century.
- Cell biology approaches the problem of the cell at all level of the organization from molecular structure on. Cell biology is therefore the modern science in which genetics, physiology and biochemistry coverage.
- Modern Cell biologist, without losing sight of the cell as a morphologic and functional unit within the organism must be prepared to use all the methods, techniques. But there is no other way to proceed. If the life of the cell and of the Organisms is to be interpreted mechanistically, i.e. on the basis of combination and association of atoms and molecules.

**SOs3: Computer – Student will study about:**

- Basic Concepts and Operations of Computer.

- Internet and its different terminologies (Like: Email, LAN, MAN, WAN, Websites, Search Engines, Web Browsers, Web Server etc.)
- MS-Office Package (Includes: - MS-Word, MS-Excel, MS-Power point etc.)
- After Studying this subject student will able to prepare the test report, maintaining database of patients, most of the equipments today used in Laboratories are computerized and therefore the subject is helpful in understanding the machines and knowledge of Computer make a friendly environment to work with new invented technology of different test procedures.

#### **SOs4: Maths**

This subject includes the topic:

- Set Theory.
- Differentiation.
- Integration.
- Logarithm.
- Probability & Statics.

Which intend to prepare a test report on the concept of statics?

#### **SOs5: Anatomy**

- Anatomy is a branch of biology concerned with the study of the structure of organisms and their parts. Anatomy is characterized by a progressive understanding of the functions of the organs and structures of the human body.

##### **Students of B. Sc. MLT study:**

- The cardiovascular Systems (Heart – its positions, structure, conduction system, Blood vessels, Blood Circulation, Respiratory system).
- Skeletal system.
- Axial skeleton.
- Appendicular Skeleton.
- Muscles.
- Digestive Organs.
- Excretory digestive system.
- Excretory Organs.
- Endocrine System.
- Nervous System.

- Reproduction System.
- Surface Anatomy of human body.

**SOs6: Physiology**

- Physiology is the science of life. The discipline of Physiology is nothing but one of several foundational disciplines that describe the elements that compose the body and mind.
  1. How those elements function.
  2. How that function is regulated to maintain health.

**These disciplines further prepare the student to understand:**

- How that regulation is disrupted by disease.
- When effectively integrated with all the traditional disciplines.
- Physiology provides needed insight into the underlying mechanisms of both structure and regulation that occur at the cellular, tissue, organ, and whole system level.
- Effective integration requires attention to content, proper scaffolding of that content through increasing levels of complexity, and stage appropriate application to clinical problem solving.
- The latter represents systems or integrative physiology. There has been an exponential increase in the scientific knowledge that a technician must understand and apply to diagnose through different tests. Physiology play that role in Bachelor of Medical Laboratory Technician (BMLT) courses is to introduce and aware about normal functioning of human body. The subject also gives brief ideas of standard value of secretion from different organs or glands and their abnormal behaviours, when body is not functioning properly. Thus Physiology is all about what makes our bodies work – how the organs – including the brain – function, how we grow and develop, how we sustain our bodily functions and what happens to these processes during disease and ageing.
- The ultimate goal of all of the physiology is to prepare the student to take the greatest advantage of clinical experience available in their training. Regardless of their separate venues, physiological knowledge and clinical training are characterized by an extensive interdependency. This provides a high quality learning experience when they are correlated with clinical problem solving challenges.
- Applied Physiology deals with horizontal integration across organ systems and vertical integration from molecule to cell to organ. Applied Physiology also has strong inherent

adaptations such as those related to development, aging, and pathophysiological conditions and adaptations to the external environment such as those occurring with exercise, microgravity, hypoxia, hypo- and hyperbaria, and hypo- and hyperthermic conditions. In all areas of applied physiology, the use of cutting-edge techniques including molecular and cellular biology is strongly encouraged.

### **SOs7: Microbiology**

- Microbiology is the study of microscopic organisms, such as bacteria, fungi and protists. It also includes the study of viruses, which are not technically classified living organisms but do contain genetic material. Microbiology research encompasses all aspects of these microorganisms such as their behavior, evolution, ecology, biochemistry and physiology, along with the pathology of diseases that they cause.

#### **Importance of Microbiology:**

- Antibiotics were discovered through microbiology, as were vaccines and other therapeutics. Other applications of microorganisms include industries (like: - mining, pharmaceuticals, food and beverages, and genetics). Microorganisms are important model organisms for studying principles of genetics and biochemistry.
- Microbiology is more relevant than ever in today's world.
- Infectious diseases are a leading health-related issue, especially in a society where the elderly population is increasing.
- New infectious diseases continue to emerge and be identified all the time.
- Microbiology impacts every facet of daily life.
- The purpose of the specialty of microbiology is to provide diagnostic testing for and optimum management of infectious disease in patients and to prevent the spread of infection to other individuals. Testing shall include procedures performed to culture, isolate, identify and determine the susceptibility of microbes. Testing also encompasses direct examination and microbial antigen detection methods. The term microbes include bacteria, fungi, mycobacteria, viruses, parasites and emerging, unclassified infectious agents.

**Microbiology careers**

- Most jobs in microbiology require at least a bachelor's degree. With a bachelor's degree, one can become employed as a research technician in an academic or industry and provide technical support. One could also become a quality assurance technician in the food, environmental, pharmaceutical, biotechnology industries training, become a medical technologist.

**Resources (methods of teaching)**

- The Microbiology department produces a range of resources for teaching microbiology across the key stages:
  - Power point lectures
  - Study guide
  - Class note articles
  - Practice test and review questions
  - Microbiology reading recommendations
  - Exercises and assignments
  - Microbiology laboratory materials
  - Microbiology videos and photos
  - Animations and movies
  - Links to other microbiology resources

**SOs8: Serology/Immunology**

- The purpose of the specialty of serology/immunology is to detect and quantitative antibodies to infectious agents as well as microbial and non-microbial antigens. The specialty encompasses:
  - All the serological techniques (except those specific to immunohematology) used to detect the interaction of antigens with antibodies for evaluation of the consequences of the immune response.
  - The specialty also encompasses all laboratory procedures performed in the specialty of Histocompatibility as defined in subsection.

**SOs9: Hematology****The purpose of the specialty of hematology is to quantitatively and qualitatively evaluate:**

- Cells in peripheral blood and bone marrow, their production, maturation and release; their morphology, chemistry and function; and diagnostic testing for optimum management of primary and secondary hematological disorders.
- Testing in this specialty also encompasses all the routine and special procedures, except those specific to cytology, performed to evaluate the numbers, morphology and function of cells in body fluids including urine and the evaluation of hemostasis and thrombosis and the management of anticoagulant therapy.
- Testing in this specialty may also encompass urine chemistries specific to routine urinalysis.
- The purpose of the specialty of immunohematology is to insure the best possible outcomes of blood or blood component and aphaeresis by the accurate performance of all pre-transfusion testing; to prevent transfusion transmitted infections; and to investigate and evaluate post-transfusion reactions.
- The specialty also encompasses all laboratory procedures performed in the specialty of Histocompatibility as defined in subsection.

**SOs10: Clinical Biochemistry**

- The purpose of the specialty of clinical chemistry is to perform qualitative and quantitative analysis on:
  - body fluids such as blood.
  - Urine.
  - spinal fluid.
  - Feces.
  - Tissue.
  - Calculi and other materials to measure the chemical constituents.

**SOs11: Blood Banking**

The purpose of the specialty of blood banking is to perform all testing identified as being within the scope of the specialty of immunohematology as well as testing within the scope of

- clinical chemistry.
- Hematology.



- serology/immunology that pertains strictly to the processing of donor blood and blood products.

**This subject deals the following topics:**

- Antigen Antibody reaction.
- Blood Groups – ABO and Rh.
- Other Blood Groups.
- Anti globulin Test.
- Selection of Donor
  - Criteria for Blood donation.
  - Detail Procedure.
  - Precautions.
- Compatibility Testing.
- Processing and Storage of blood.
- Antibody Screening and identification.
- Blood Transfusion.

**SOs12: Histopathology**

The student will understand the methods of preservation of;

- Biopsy tissue specimen along with fixation.
- Processing.
- Block making.
- Section Cutting and staining of tissue to observe the tissue under the microscope for the final diagnosis of the lesion.

**SOs13: Immunology**

In the study of immunology students understand the component of immune system such as:

- Adaptive immune system.
- Innate immune system.
- Organs, Cells, tissues and Immunological Bio-molecules.

They also understand about diseases and disorders of immune system like:

- Rheumatoid arthritis.
- Systemic lupus etc.

Students also aware about health maintenance such as exercises, Nutrition and immunological medicine as well.

**SOs14: Botany**

Botany is the study of physiology, pathology, structure, ecology, genetics, classification and economic importance of plants.

Student study about:

- General microbiology which includes general account of microbiology and its scope as well as introduction, structure and economic importance of bacteria, virus and mycoplasma.
- In medical Science people can diagnose many diseases if they have studied about microbes.
- In industry, they can produce many drugs and vitamins in large amount with the help of microbes.
- Botany also deals about cryptogams and phanerogams, Thallophyta, Bryophyta and pteridophyta lies in cryptogams.
- Thallophyta includes some algae like Nostoc, Chara, Volvox etc. they are used as food supplement and indicator of pollution.
- In phanerogames, students deals about Gymnosperms and angiosperms. In this, student can understand about higher plants and their importance in MLT, Research and for human welfare. We can grow large amount of all those plants which have long dormancy periods.

**SOs15: Zoology**

- Our prime objective would be to see that the subject Zoology is the subsidiary would cover the syllabi of MLT student. The student to be a true literate in Zoology subject. They should be in a position to use their knowledge and training in their life and profession.
- It is hoped the instead of more cramming of the products, the student will learn the process involved in it. Such training would develop in their mind a sense of love and appreciation about the subject.
- The most important theme of subject Zoology today's – **“Unity and Diversity in living Organism”**. The subject with the idea of **“Unity”** the understanding of which can only help the student as well as teacher to realize the guiding Principles involved in the production and maintenance of the enormous array of **“diversity”**.

- The first parts of B. Sc. MLT student syllabi- Unity in the living world and Non-chordates animals as the example of diversity are included character.
- The second part of B. Sc. MLT syllabi included character and classification. Other types and general topics of vertebrates, Introduction to the Chordates, Embryology, Endocrinology etc. of vertebrates.
- The curriculum of Zoology not only in the modern but also more useful and meaningful. It is hoped, the student as well as teacher will find in the subject helpful and stimulating.

**Thank you.**