SRI V.S.SIVALINGAM CHETTIAR GOVERNMENT DEGREE COLLEGE (A)

SULLURPETA-TIRUPATHI DISTRICT

DEPARTMENT OF MLT - POs and COs

PROGRAMME OUTCOMES OF B.VoC (MLT) (MAJOR)

PO 1: Fundamental Knowledge in Medical Laboratory Science

Graduates acquire strong theoretical and practical knowledge in clinical laboratory disciplines such as hematology, microbiology, biochemistry, and pathology.

PO 2: Technical and Analytical Skills

Ability to perform laboratory tests accurately, operate modern diagnostic equipment, and analyze results for disease diagnosis and monitoring.

PO 3: Application of Laboratory Techniques

Capability to apply standard laboratory procedures and techniques in real clinical settings while maintaining precision and reliability.

PO 4: Ethics and Professional Responsibility

Understanding of medical ethics, patient confidentiality, biosafety, and adherence to quality control standards in laboratory practices.

PO 5: Communication and Teamwork Skills

Ability to effectively communicate with healthcare professionals and work collaboratively as part of a multidisciplinary healthcare team.

PROGRAMME SPECIFIC OUTCOMES OF B.VoC (MLT) (MAJOR)

PSO1: Clinical Laboratory Skills

Apply knowledge of clinical laboratory techniques to perform routine and advanced diagnostic tests in hematology, biochemistry, microbiology, and pathology.

PSO 2: Sample Collection and Handling

Demonstrate proficiency in proper collection, labeling, transportation, and storage of biological specimens while maintaining quality and safety standards.

PSO 3: Laboratory Equipment Handling

Operate, calibrate, and maintain laboratory instruments and equipment accurately, ensuring reliability of test results.

PSO 4: Quality Control and Safety Measures

Implement quality assurance protocols and follow biosafety guidelines to ensure accuracy, precision, and safe laboratory practices.

PSO 5: Data Analysis and Reporting

Analyze laboratory results, interpret findings, and assist healthcare professionals in diagnosis by preparing accurate and timely reports.

I-SEMESTER

Course I- INTRODUCTION TO CLASSICAL BIOLOGY

CO 1: Learn the principles of classification and preservation of biodiversity

CO 2: Understand the plant anatomical ,physiological and reproductive processes.

CO 3: Knowledgeonanimalclassification,physiology,embryonicdevelopmentandtheir economic importance.

CO 4: Outlinethecellcomponents,cellprocesseslikecelldivision,hereditvand molecular processes.

CO 5: ComprehendthechemicalprinciplesinshapinganddrivingthemAcromoleculesandlife processes.

I-SEMESTER

Course:2 – INTRODUCTION TO APPLIED BIOLOGY

CO1: Learnthehistory,ultrastructure,diversityandimportanceofmicroorganisms.

CO2: Understand the structure and functions of macromolecules.

CO3: Knowledgeonbiotechnologyprinciplesanditsapplicationsinfoodandmedicine.

CO4: Outline the techniques, tools and their uses in diagnosis and therapy.

CO5: Demonstrate the bioinformatics and statistical tools in comprehending the complex biological data.

SEMESTER-II

Course:3 HUMAN ANOTOMY-I

CO1: Describe the basic structure and organization of the human body, including cells, tissues, and organ systems.

CO2: Explain the anatomy of major body systems such as skeletal, muscular, and nervous

systems.

CO3: Identify and label different anatomical structures using models, charts, and specimens.

CO4: Understand the relationship between structure and function of various organs and systems in the human body.

CO5: Apply anatomical knowledge in clinical and laboratory settings relevant to Medical Laboratory Technology (MLT).

SEMESTER – II

Course:4 HUMANPHYSIOLOGY-I

CO1: Understand basic physiological principles

Explain the fundamental concepts of human physiology and homeostasis in the human body.

CO2: Describe functions of major organ systems

Demonstrate knowledge of the structure and functions of systems such as the circulatory, respiratory, and nervous systems.

CO3: Explain blood and cardiovascular physiology

Analyze the composition and functions of blood, cardiac cycle, and regulation of heart rate and blood pressure.

CO4: Interpret respiratory and nervous system functions

Describe the mechanism of respiration and the role of the nervous system in coordination and control.

CO5: Apply physiological knowledge in laboratory settings

Perform and interpret basic physiological experiments relevant to medical laboratory technology.

SEMESTER-II

Minor Course1:Clinical Laboratory Practices

CO1: Understand the organization, workflow, and safety protocols of a clinical laboratory, including biosafety and waste management practices.

CO2: Perform routine laboratory procedures such as sample collection, handling, processing, and preservation following standard operating procedures (SOPs).

CO3: Apply knowledge of quality control and quality assurance to ensure accuracy and reliability of laboratory test results.

CO4: Operate and maintain basic laboratory instruments and equipment used in hematology, biochemistry, microbiology, and pathology labs.

CO5: Demonstrate proper documentation, reporting, and ethical practices in clinical laboratory settings, including patient confidentiality and data management.

SEMESTER III

MAJOR COURSE 5: HUMAN ANATOMY –II

CO1: Understand regional anatomy:

Describe the structure and organization of major organ systems including cardiovascular, respiratory, digestive, urinary, and reproductive systems.

CO2: Identify anatomical structures:

Recognize and label organs, tissues, and body parts through models, charts, and specimens.

CO3: Explain organ functions and relationships:

Correlate anatomical structures with their physiological functions and interrelationships between different systems.

CO4: Demonstrate practical knowledge:

Perform basic anatomical identification in laboratory settings using specimens, slides, and imaging techniques.

CO5: Apply anatomical knowledge in clinical context:

Relate anatomical concepts to clinical conditions, diagnostic procedures, and laboratory practices relevant to Medical Laboratory Technology (MLT).

SEMESTER III

MAJOR COURSE 6 : HUMAN PHYSIOLOGY II

CO1: Understand advanced physiological mechanisms

Explain the functioning of major body systems such as cardiovascular, respiratory, renal, and endocrine systems.

CO2: Analyze regulation and homeostasis

Describe mechanisms of body fluid balance, acid-base balance, and hormonal regulation maintaining homeostasis.

CO3: Interpret physiological parameters

Correlate normal and abnormal physiological values (e.g., blood pressure, ECG, lung volumes) with clinical conditions.

CO4: Apply knowledge in laboratory investigations

Perform and interpret basic physiological tests relevant to clinical laboratory practice.

CO5: Develop clinical reasoning skills

Relate physiological concepts to disease processes and assist in diagnosis and patient monitoring.

SEMESTER III

MAJOR COURSE 7 : FUNDAMENTALS OF BIOCHEMISTRY

CO1: Understand basic biochemical concepts

Students will be able to explain the structure, properties, and functions of major biomolecules such as carbohydrates, proteins, lipids, and nucleic acids.

CO2: Describe metabolic pathways

Students will gain knowledge of important metabolic processes including glycolysis, Krebs cycle, and lipid and protein metabolism.

CO3: Apply enzyme kinetics and functions

Students will be able to understand enzyme classification, mechanism of action, and factors affecting enzyme activity.

CO4: Interpret biochemical laboratory tests

Students will develop skills to understand the principles and clinical significance of common biochemical tests used in diagnosis.

CO5: Understand clinical relevance of biochemistry

Students will be able to correlate biochemical changes with disease conditions such as diabetes, liver disorders, and metabolic abnormalities.

SEMESTER III

MAJOR COURSE 8: FUNDAMENTALS OF MICROBIOLOGY

CO1: Understand basic concepts of microbiology including classification, morphology, and physiology of microorganisms such as bacteria, viruses, fungi, and parasites.

CO2: Demonstrate aseptic techniques and sterilization methods used in microbiology laboratories to prevent contamination and ensure safety.

CO3: Perform basic microbiological techniques such as staining (Gram staining), culture methods, and microscopic examination of microorganisms.

CO4: Identify common pathogenic microorganisms and understand their role in causing human diseases and infections.

CO5: Apply knowledge of microbial growth and control including the use of disinfectants, antibiotics, and environmental factors affecting microbial growth.

SEMESTER III

MINOR COURSE 2: MEDICAL BACTERIOLOGY AND MYCOLOGY

CO1: Understand Microbial Classification

Explain the morphology, classification, and characteristics of medically important bacteria and fungi.

CO2: Perform Laboratory Techniques

Demonstrate skills in specimen collection, staining (Gram staining, fungal staining), culture, and identification of bacterial and fungal pathogens.

CO3: Identify Pathogenic Organisms

Differentiate between normal flora and pathogenic microorganisms causing bacterial and fungal infections.

CO4: Apply Diagnostic Methods

Interpret culture results, biochemical tests, and microscopy findings for accurate diagnosis of bacterial and mycological infections.

CO5: Practice Infection Control and Safety

Apply biosafety guidelines, sterilization techniques, and infection control measures in microbiology laboratories

SEMESTER-IV

MAJOR COURSE 9: BIO CHEMICAL METABOLISM

CO1: Understand metabolic pathways

Explain the major biochemical pathways of metabolism, including carbohydrate, protein, and lipid metabolism.

CO2: Interpret enzyme functions and regulation

Describe the role of enzymes in metabolic reactions and analyze mechanisms of enzyme regulation in the human body.

CO3: Analyze energy production processes

Illustrate processes such as glycolysis, Krebs cycle, and oxidative phosphorylation in cellular energy generation.

CO4: Correlate metabolism with diseases

Identify metabolic disorders (e.g., diabetes mellitus, inborn errors of metabolism) and relate them to biochemical abnormalities.

CO5: Apply laboratory techniques in metabolism studies

Perform and interpret biochemical tests used in assessing metabolic functions and disorders in clinical laboratory settings.

SEMESTER-IV

MAJOR COURSE 10: CLINICAL MICROBIOLOGY

CO1: Understand the principles of clinical microbiology, including morphology, classification, and identification of microorganisms causing human diseases.

CO2: Perform proper collection, transport, and processing of clinical specimens (blood, urine, sputum, stool, etc.) for microbiological analysis.

CO3: Apply staining techniques (Gram staining, Ziehl-Neelsen staining) and culture methods for isolation and identification of pathogens.

CO4: Conduct antimicrobial susceptibility testing and interpret results to guide appropriate antibiotic therapy.

CO5: Demonstrate laboratory safety, sterilization, and infection control practices while handling infectious materials in a clinical laboratory**.**

SEMESTER IV

MAJOR COURSE 11: GENERAL PATHOLOGY

CO1: Understand basic pathological concepts

Explain the fundamental concepts of disease, including etiology, pathogenesis, and morphological changes in tissues.

CO2: Identify cellular adaptations and injury

Describe and differentiate various cellular adaptations, reversible and irreversible cell injury, necrosis, and apoptosis.

CO3: Analyze inflammation and healing processes

Explain the mechanisms of acute and chronic inflammation, tissue repair, regeneration, and fibrosis.

CO4: Classify and interpret hemodynamic disorders

Understand and interpret pathological conditions such as edema, hemorrhage, thrombosis, embolism, and shock.

CO5: Recognize neoplasia and tumor pathology

Differentiate between benign and malignant tumors, including their characteristics, growth patterns, and basic diagnostic features.

SEMESTER IV

MINOR COURSE 3: PARASITOLOGY

CO1: Understand basic concepts of parasitology

Students will be able to explain the classification, morphology, life cycles, and host–parasite relationships of medically important parasites.

CO2: Identify common human parasites

Students will be able to identify protozoa, helminths, and ectoparasites using microscopic examination of clinical samples.

CO3: Perform laboratory diagnostic techniques

Students will be able to carry out stool examination, blood smear preparation, concentration methods, and staining techniques for detection of parasites.

CO4: Interpret laboratory findings

Students will be able to analyze and interpret results of parasitological investigations for accurate diagnosis of parasitic infections.

CO5: Apply knowledge in prevention and control

Students will be able to describe modes of transmission, preventive measures, and control strategies for parasitic diseases.

SEMESTER IV

MINOR COURSE:4 HEMATOLOGY AND BLOOD BANKING – I

CO1: Understand hematological principles

Explain the structure and function of blood cells, hematopoiesis, and the physiology of blood and its components.

CO2: Perform routine hematological tests

Demonstrate proficiency in laboratory techniques such as hemoglobin estimation, RBC/WBC counts, ESR, hematocrit, and peripheral smear examination.

CO3:Identify hematological disorders

Interpret laboratory findings to diagnose conditions like anemia, leukemia, clotting disorders, and other blood-related diseases.

CO4: Apply blood banking procedures

Understand blood grouping, cross-matching, component preparation, storage, and safe transfusion practices.

CO5: Ensure quality control and safety

Follow standard laboratory protocols, quality assurance measures, and biosafety guidelines in hematology and blood bank laboratories.

SEMESTER V

12A: IMMUNOLOGY

CO1: Understand basic immunological concepts including types of immunity, antigens, antibodies, and the functioning of the immune system.

CO2: Explain immune responses such as humoral and cell-mediated immunity, antigen-antibody reactions, and hypersensitivity reactions.

CO3: Perform common immunological tests like ELISA, agglutination, precipitation, and rapid diagnostic tests used in clinical laboratories.

CO4: Interpret immunological test results for diagnosis of infectious diseases, autoimmune disorders, and immunodeficiency conditions.

CO5: Apply laboratory safety and quality control measures while handling specimens and performing immunological procedures.

SEMESTER V

12B: SEROLOGY

CO1: Understand Principles of Serology

Explain the basic concepts of antigen–antibody reactions and immune response involved in serological testing.

CO2:Perform Serological Tests

Demonstrate proficiency in performing common serological tests such as agglutination, precipitation, ELISA, and rapid diagnostic tests.

CO3:Identify Infectious Diseases

Analyze serological results to aid in the diagnosis of infectious diseases like HIV, hepatitis, dengue, and syphilis.

CO4:Handle and Process Specimens

Apply proper techniques for collection, handling, storage, and processing of blood and serum samples for serological analysis.

CO5:Ensure Quality Control and Safety

Implement laboratory quality control measures and follow biosafety guidelines during serological procedures.

SEMESTER V

13A: HISTOPATHOLOGY

CO1: Understand tissue processing techniques including fixation, dehydration, clearing, embedding, sectioning, and staining methods used in histopathology.

CO2: Perform microtomy and staining procedures such as Hematoxylin and Eosin (H&E) staining and special stains for microscopic examination of tissues**.**

CO3: Identify normal and pathological tissue structures under the microscope, distinguishing between benign and malignant changes.

CO4: Demonstrate knowledge of histopathological laboratory safety and quality control, including proper handling of specimens and chemicals.

CO5: Assist in diagnosis by correlating histological findings with clinical conditions, contributing to accurate disease identification and reporting.

SEMESTER V

13B: CYTO PATHOLOGY

CO1: Understand basic concepts of cytopathology

Students will be able to explain the principles, scope, and significance of cytopathology in disease diagnosis.

CO2: Perform sample collection and preparation

Students will acquire skills in proper collection, fixation, staining (e.g., Pap stain), and slide preparation of cytological specimens.

CO3: Identify normal and abnormal cellular features

Students will be able to differentiate between normal, inflammatory, precancerous, and malignant cells under the microscope.

CO4: Assist in diagnostic cytological procedures

Students will gain practical knowledge to assist in procedures like fine needle aspiration cytology (FNAC) and exfoliative cytology.

CO5: Maintain laboratory safety and quality control

Students will understand and apply standard laboratory safety protocols, quality assurance, and documentation practices in cytopathology labs.

SEMESTER V

14: CLINICAL BIO CHEMISTRY

CO1: Understand biochemical principles

Explain the fundamentals of clinical biochemistry, including metabolism of carbohydrates, proteins, lipids, and enzymes.

CO2: Perform biochemical tests

Demonstrate the ability to carry out routine biochemical investigations such as blood glucose, urea, creatinine, lipid profile, and liver function tests.

CO3: Operate laboratory instruments

Handle and maintain laboratory equipment like spectrophotometers, autoanalyzers, and centrifuges used in clinical biochemistry labs.

CO4: Interpret laboratory results

Analyze and interpret biochemical test results to assist in the diagnosis and monitoring of diseases such as diabetes, renal disorders, and liver diseases.

CO5: Ensure quality control and safety

Apply quality control measures and follow standard laboratory safety protocols to ensure accuracy and reliability of test results.

SEMESTER V

15: PATHOLOGY-II

CO1: Understand basic concepts of pathology including etiology, pathogenesis, and morphological changes associated with diseases.

CO2: Identify and differentiate normal and abnormal tissue structures through gross and microscopic examination.

CO3: Perform routine pathological laboratory techniques such as tissue processing, staining (e.g., H&E), and slide preparation.

CO4: Analyze pathological specimens to assist in the diagnosis of various diseases including inflammatory, neoplastic, and degenerative conditions.

CO5: Maintain laboratory safety and quality control standards while handling biological samples and equipment.

SEMESTER V

PAPER 5: CLINICAL LABORATORY OPERATIONS & LABORATORY ETHICS

CO1: Understand Laboratory Operations

Explain the organization, workflow, and management of clinical laboratory services, including sample collection, processing, and reporting.

CO2: Apply Quality Control Measures

Implement quality assurance (QA) and quality control (QC) practices to ensure accuracy, reliability, and standardization of laboratory results.

CO3: Demonstrate Laboratory Safety Practices

Follow biosafety guidelines, infection control measures, and proper handling of hazardous materials in a clinical laboratory setting.

CO4: Adhere to Professional Ethics

Apply ethical principles such as patient confidentiality, informed consent, and professional conduct in laboratory practice.

CO5: Maintain Documentation and Accreditation Standards

Prepare and manage laboratory records, follow standard operating procedures (SOPs), and comply with accreditation requirements (e.g., NABL guidelines).

SEMESTER V

PAPER 6: ADVANCED BIO CHEMICAL TESTING TECHNIQUES

CO1: Understand advanced biochemical principles

Apply theoretical knowledge of advanced biochemical reactions and analytical methods used in clinical diagnostics.

CO2: Perform specialized biochemical tests

Competently carry out advanced investigations such as enzyme assays, hormone analysis, and electrolyte estimation using automated analyzers.

CO3: Operate and maintain sophisticated instruments

Demonstrate proficiency in handling advanced laboratory equipment like spectrophotometers, auto analyzers, and immunoassay systems.

CO4: Interpret and validate test results

Analyze biochemical test outcomes accurately and correlate findings with clinical conditions for diagnostic significance.

CO5: Ensure quality control and laboratory safety

Implement internal and external quality control measures while adhering to biosafety and standard laboratory protocols.