Gyanmanjari Innovative University

Syllabus
Gyanmanjari Science College
Semester-3 (M.Sc. MLT)

**Subject:** Practical-MSCMT13518

**Type of course:** Major

**Prerequisite** :- A strong foundation in basic microbiology, clinical biochemistry, and laboratory techniques is essential. This includes understanding how to handle biological specimens, knowledge of microbial pathogens, familiarity with laboratory instruments, and an awareness of infection control practices.

**Rationale** :- These procedures and tests are vital for accurate diagnosis, treatment, and monitoring of diseases. They help identify pathogens, assess organ function, and detect abnormalities in body fluids, thereby guiding clinical decisions and improving patient outcomes. Proper execution also ensures safety and reliability in laboratory results.

**Teaching and Examination Scheme:**

| Teaching Scheme | | | Credits | Examination Marks | | | | | Total Marks |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Theory Marks | | Practical Marks | | CA | |
| CI | T | P | C | ESE | MSE | V | P | ALA | |
| 0 | 0 | 12 | 6 | 00 | 00 | 40 | 80 | 30 | 150 |

*Legends: CI-Class Room Instructions; T – Tutorial; P - Practical; C – Credit; ESE - End Semester Examination; MSE- Mid Semester Examination; V – Viva; CA - Continuous Assessment; ALA- Active Learning Activities.*

3 Credits * 25 Marks = 75 Marks (each credit carries 25 Marks) Theory
1 Credits * 25 Marks = 25 Marks (each credit carries 25 Marks) Practical
SEE 100 Marks will be converted in to 50 Marks
CCE 100 Marks will be converted in to 50 Marks
It is compulsory to pass in each individual component.

**Continuous Assessment:**

| Sr. No | Active Learning Activities | Marks |
|---|---|---|
| 1 | **Journal**<br>Unit wise Practical will be given by faculty and students will prepare Journal for the Practicals. | 30 |
| | **Total** | **30** |

**Suggested Specification table with Marks (Practical):**

| Distribution of Practical Marks (**Revised Bloom's Taxonomy**) | | | | | | |
|---|---|---|---|---|---|---|
| Level | Remembrance (R) | Understanding (U) | Application (A) | Analyze (N) | Evaluate (E) | Create (C) |
| Weightage | 10% | 30 % | 40% | 20% | - | - |

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

**List of Practical:**

| | | |
|---|---|---|
| 1 | To study the different types of human blood cells and identify their morphological characteristics. | 3 |
| 2 | To demonstrate and study Barr bodies in human buccal (cheek) epithelial cells. | 3 |
| 3 | To study the effect of different tonicities (hypotonic, isotonic, and hypertonic solutions) on human red blood cells (RBCs). | 3 |
| 4 | To study somatic cell division (mitosis) in onion root tip cells. | 3 |
| 5 | To estimate the protein concentration in a given sample using the Folin–Ciocalteu (Lowry) method. | 6 |
| 6 | To estimate the DNA content of a given sample using the Diphenylamine (DPA) method. | 6 |
| 7 | To estimate the RNA content of a given sample using the Orcinol method. | 6 |

| | | |
|---|---|---|
| 8 | To study the effect of antibiotics on extracellular protein synthesis in microorganisms. | 6 |
| 9 | To study diauxic growth curves in microorganisms under different carbon source condition | 6 |
| 10 | To study the effect of antibiotics on intracellular protein synthesis in microorganisms. | 6 |
| 11 | To determine the concentration of calcium and magnesium ions in a water sample by EDTA titration | 6 |
| 12 | To prepare buffer solutions of desired pH and measure the pH of given samples. | 3 |
| 13 | To determine the Rf value of amino acids using paper chromatography. | 6 |
| 14 | To determine the Rf value of amino acids using thin-layer chromatography (TLC). | 6 |
| 15 | To determine the concentration of a colored solution using a colorimeter based on light absorbance. | 3 |
| 16 | To study the electrical conductivity of different solutions. | 3 |
| 17 | To study the parts, working principle, and applications of a compound microscope. | 3 |
| 18 | To study the parts, working principle, and applications of a stereomicroscope. | 3 |
| 19 | To study the principle, operation, and applications of phase-contrast microscopy. | 3 |
| 20 | To determine the concentration of sodium and potassium ions using a flame photometer. | 6 |
| 21 | To study the induction of amylase production using different carbon sources. | 6 |
| 22 | To separate and identify sugars present in fruit extracts using thin-layer chromatography. | 6 |
| 23 | To perform qualitative analysis of carbohydrates using standard biochemical tests. | 3 |
| 24 | To perform qualitative analysis of amino acids using standard biochemical tests. | 3 |
| 25 | To estimate the vitamin C content in a given sample. | 3 |
| 26 | To estimate the oil content in a given sample. | 6 |
| 27 | To estimate β-glucosidase enzyme activity in a given sample. | 6 |

| | | |
|---|---|---|
| 28 | To study the effect of substrate concentration on β-glucosidase enzyme activity. | 6 |
| 29 | To study the effect of temperature on β-glucosidase enzyme activity. | 3 |
| 30 | To study the effect of pretreatment methods on the saccharification of lignocellulosic waste. | 3 |
| 31 | To estimate the dissolved oxygen (DO) content of a water sample. | 6 |
| 32 | To estimate the biological oxygen demand (BOD) of a water sample. | 3 |
| 33 | To perform primer designing and analysis using Primer-BLAST. | 6 |
| 34 | To estimate the hemicellulose and lignin content of lignocellulosic biomass. | 3 |
| 35 | To estimate the sulphate content in a given sample. | 6 |
| 36 | To estimate the phosphate content in a given sample. | 3 |
| 37 | To perform multiple sequence alignment (MSA) of biological sequences using bioinformatics tools. | 3 |
| 38 | To perform multiple sequence alignment (MSA) of biological sequences using bioinformatics tools. | 3 |
| 39 | *To isolate and characterize fermentative mutants of Escherichia coli.* . | 6 |
| 40 | To isolate and characterize pigment-deficient mutants of *Serratia marcescens*. | 6 |
| | Total | 180 |

**Instructional Method:**

The course delivery method will depend upon the requirement of content and the needs of students. The teacher, in addition to conventional teaching methods by black board, may also use any tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc.

From the content 10% topics are suggested for flipped mode instruction.

Students will use supplementary resources such as online videos, NPTEL/SWAYAM videos, e-courses, Virtual Laboratory

The internal evaluation will be done on the basis of Active Learning Assignment

Practical/Viva examination will be conducted at the end of semester for evaluation of performance of students in the laboratory.