Curriculum for

Diploma Programme in

MEDICAL LAB TECHNOLOGY

For

Mahagyani Rishi Ashtavakra Kendra

Prepared by:

Haryana State Board of Technical Education
Bays 7-12, Sector 4
Panchkula-134 112

STUDY AND EVALUATION SCHEME FOR DIPLOMA PROGRAMME IN MEDICAL LABORATORY TECHNOLOGY

FIRST SEMESTER

Sr. No	Subject	STUDY SCHEME Hrs/week L	T	P	Credits	EVALUATION SCHEME Internal Assessment Theory Max. Marks	Internal Assessment Practical Max. Marks	External Assessment (Examination) Written Paper Max. Marks	Written Paper Hrs	Practical Max. Mar	Practical Hrs	Total Marks
1.1	*English & Communication Skills – I	3	-	2	4	25	25	100	3	50	3	200
1.2	Basic Chemistry	2	-	2	3	25	25	100	3	50	3	200
1.3	Anatomy and Physiology-I	3	-	2	4	25	25	100	3	50	3	200
1.4	Basic Microbiology	2	-	4	4	25	25	100	3	50	3	200
1.5	Introduction to Haematology	3	-	4	5	25	25	100	3	50	3	200
1.6	Fundamentals of MLT	3	-	2	4	25	25	100	3	50	3	200
# Student Centered Activities		-	-	3		-	25	-	-	-	-	25
Total		16	-	19	24	150	175	600	-	300	-	1225

***** Common with other diploma programmes

Student Centred Activities will comprise of co-curricular activities like extension lectures, library studies, games, hobby clubs e.g. photography, painting, singing, seminars, declamation contests, educational field visits, N.C.C., NSS, Cultural Activities, Civil Defence/Disaster Management activities etc.

FIRST SEMESTER

1.1 COMMUNICATION SKILLS – I

L	T	P
3	-	2

RATIONALE

Language as the most commonly used medium of self-expression remains indispensable in all spheres of human life –personal, social and professional. This course is intended to break fresh ground in teaching of Communicative English as per the requirements of National Skill Quality Framework.

LEARNING OUTCOMES

After undergoing this course, the students will be able to:

- Understand the nuances of Communication, both Oral and Written.
- Acquire enhanced vocabulary and in-depth understanding of Grammatical Structures and their usage in the communication
- Use Communication Skills for developing more productive interpersonal relationships
- Converse in English language with appropriate and acceptable articulation and pronunciation.
- Write paragraph, précis, demi-official and personal letters
- Become more self-sufficient and confident so that they can embark on an entrepreneurial journey or take up employment in the existing job-market

DETAILED CONTENTS

UNIT I

Reading

- Techniques of reading: Skimming and Scanning
- Extensive and Intensive Reading
  i. My struggle for An Education- Booker T Washington
  ii. The Bet - by Anton Chekov
  iii. Homecoming – R.N. Tagore
  iv. Life Sketch of Sir Mokshagundam Visvesvarayya
  v. Learning from the West**:** Mr Narayan Murthy's Speech at LBSNA, Dehradun
  vi. Daffodils – William Wordsworth
  vii. Stopping by Woods on a Snowy Evening – Robert Frost

UNIT II

Fundamentals of Communication

Concept and Process of Communication,

- Types of Communication (Formal and Informal, and Verbal and Non-verbal)
- Modern means of Communication (Video Conferencing, e- mail, Teleconferencing)
- Barriers to Communication
- Effective Communication Skills: 7 C's of Communication
- Non-verbal Communication – Significance, Types and Techniques for effectiveness

UNIT III

Listening and Speaking Skills

- Significance, essentials, barriers and effectiveness in Speaking
- Significance, essentials, barriers and effectiveness in Listening

UNIT IV

Grammar and Usage

Identification of different parts of speech

- Articles
- Tenses
- Change of Voice: Active- Passive
- Prepositions.
- Modals
- Punctuation
- Correction of in-correct sentences

UNIT V

Writing Skills

Significance, essentials and effectiveness in writing

- Paragraph Writing
- Demi official letters/ Personal letters
- Abbreviations used in Letter-Writing
- The Art of Précis Writing
- Netiquettes

PRACTICAL AND LAB ACTIVITIES

Reading

- The Stick – Justice Surinder Singh
- Ozymandias – P.B. Shelley
- The Stick – Justice Surinder Singh
- A Cup of Tea'by Katherine Mansfield
- The Judgement Seat of Vikramaditya' by Sister Nivedita
- Swami Vivekananda's Speech at Chicago in 1893
- Dr Kiran Bedi's Speech at IIM Indore 2007 Leadership Concepts
- Tiger by Keki Daruwalla
- 'Mending Wall' by Robert Frost
- 'Goodbye Party for Miss Pushpa T.' by Nissim Ezekiel
- Reading Practice of the above lessons in the Lab Activity classes.
- Comprehension exercises of unseen passages along with the above lessons.
- Vocabulary enrichment and grammar exercises based on the above selective readings.
- Poetry recitation
- Reading aloud Newspaper headlines and Important articles.

Fundamentals of Communication

- Teachers will help students learn the use of communication by giving them real-life examples in the class.
- Use of Online Videos and educational portals.
- Acquainting the skill to host Online Video-meetings on various platforms like Zoom, Google Meet, WebEx and Microsoft Teams etc. will be encouraged
- Knowledge of the Security features and Host Controls on Online Meeting Platforms will also be practised.

Listening and Speaking Skills

- Using pre-recorded flash drives(portable Hard Drives) with pre-listening exercise to prepare students about what they are going to hear and comprehension based on the

audio. The pre recorded flash drives may contain short conversations , documentaries on nature, science etc and famous speeches

- Note-taking
- Listening for the main ideas
- Assessing listening proficiency through "Talk after Listening"
- Articulation, Pronunciation and Intelligibility using pocket or mobile phone dictionary, especially speaking dictionaries and Online support available for improving Pronunciation.
- Use of Intonation in Connected speech
- Commonly Mispronounced Words
- Introduction to phonetics (Dictionary: meaning and pronunciation of words as given in the standard dictionary using symbols of phonetics)
- Greetings for different occasions
- Introducing oneself, others and leave taking(talking about yourself)
- Just a minute (JAM) sessions: Speaking extempore for one minute on given topics
- Paper reading before an audience (reading unseen passages)
- Situational Conversation/role-playing with feedback, preferably through video recording
- Improving pronunciation through tongue twisters

Grammar and Usage

- Written and Oral Drills will be undertaken in the class to facilitate a holistic linguistic competency among learners.
- Exercises on the above grammar topics.

Writing Skills

- Students should be given Written Practice in groups so as to inculcate team-spirit and collaborative learning
- Group exercises on writing paragraphs on given topics
- Vocabulary of commonly used words
- Pair of words (Words commonly confused and misused)
- Opening an email account, receiving and sending emails

RECOMMENDED BOOKS

1. Text Book of English and Communication Skills Vol – 2, By Alvinder Dhillon and Parmod Kumar Singla; Published by: M/S Abhishek Publications, Chandigarh
2. Spoken English (2nd Edition) by V Sasikumar & PV Dhamija; Published by Tata MC Graw Hills, New Delhi.
3. Spoken English –A foundation course (Part-I & Part-II) By Kamlesh Sdanand & Susheela Punitha; Published by Orient Black Swan, Hyderabad
4. Practical Course in English Pronunciation by J Sethi, Kamlesh Sadanand& DV Jindal; Published by PHI Learning Pvt. Ltd; New Delhi.
5. A Practical Course in Spoken English by JKGangal; Published by PHI Learning Pvt. Ltd; New Delhi.
6. English Grammar, Composition and Usage by NK Aggarwal and FT Wood; Published by Macmillan Publishers India Ltd; New Delhi.
7. Business Correspondence & Report writing (4th Edition) by RC Sharma and Krishna Mohan; Published by Tata MC Graw Hills, New Delhi.
8. Professional Communication by KavitaTyagi& Padma Misra; Published by PHI Learning Pvt. Ltd; New Delhi.
9. Communication Skills for professionals by NiraKonar; Published by PHI Learning Pvt. Ltd; New Delhi.
10. Developing Communication Skills (2nd Edition) by Krishna Mohan & Meera Banerji; Published by Macmillan Publishers India Ltd; New Delhi.
11. Effective Technical Communication By M .Ashraf Rizwi; Published by Tata MC Graw Hills, New Delhi.
12. Basic Communication Skills for Technology by Andrea J Rutherfoord; Published by Pearson Education, New Delhi
13. English & Communication Skills for students of Science & Engineering by SP Dhanavel; Published by Orient BlackSwan, Hyderabad.
14. Technical Communication- Principles & Practices by Meenakshi Raman &Sangeetha Sharma; Published by Oxford University Press, New Delhi.

Note: This is a skill based subject and topics taught in the class should be practiced in the Lab regularly for development of required skills in students. This subject contains five units of 20 % equal weight age with more than 60% hands on practice for skill development

1.2 BASIC CHEMISTRY

L	T	P
3	-	2

RATIONALE:

Diploma holders in Medical Laboratory Technology are supposed to know about the chemical basis of life, chemical components facilitating the existance of life, basic principles involved in their identification and quantification. This will help them to so that the derangents of these can be correlated in disased state.

LEARNING OUTCOMES:

After undergoing this subject , the students will be able to:

- Identify the elements performing essential work in humans.
- Identify macro- molecules of importance in humans.
- Prepare necessary standards to perform the biochemical analysis.
- Understand the principle behind colorimetric analysis.
- Understand the various hazards possible while performing work in lab.

DETAILED CONTENTS

UNIT I

1. Biologically important elements, study of their atomic number, mass number, atomic mass, equivalent weight & molecular weight. Importance of Basic chemistry in medical laboratory technology.
2. Importance of Water quality and Glasswares in clinical laboratory: different types of glassware's, use, cleaning, standardization of volumetric glassware & maintenance. Pipettes - various types and different pipetting techniques.
3. Biochemical importance of distilled water and deionised water in clinical analysis. Solution and colloids. Surface tension, osmosis and viscosity their importance in biological system.

UNIT II

Definition of organic and inorganic compounds. Importance of organic compounds – in Biological system. Basic chemistry of carbohydrates, proteins and lipids - Their nutritional effect in humans.

UNIT III

Physiological importance of Acid & Bases and role of pH in human system. Oxidation and Reduction reactions –Definition. Preparation of various standard solutions – definition of primary & secondary standards, SI units and their uses.

UNIT IV

Principles of photometry, Laws of photometry and their importance. Principles used in determining concentration of molecules with no known weight - prepration of standard graph.

UNIT V

Blood collection for biochemical analysis, changes occurring in blood after collection, management of its disposal. Different types of Hazards- Biological, Chemical, fire, apparatus. Safety measures needed in Basic chemistry and clinical biochemistry laboratory. Assuring Good Laboratory Practices (GLP) in Basic chemistry.

LIST OF PRACTICALS

UNIT I

a) Glassware Identification - different types, cleaning and preparation of cleaning solution.
b) Standardization, rechecking of volumetric glasswares.

UNIT II

c) Determination of pH of different solutions.
d) Titration of Acid and Base.

UNIT III

e) Performing confirmatory tests for
   a) Carbohydrate –Molisch,
   b) Protein- Biuret.

UNIT IV

f) Identification of Parts of Colorimeter & Spectrophotometer.
g) Preparation of different types of standards solution.

UNIT V

h) Determination of Absorption maximum of a coloured solution.

RECOMMENDED BOOKS

1. A Procedure Manual for Routine Diagnostic Tests Vol. I and III by KL Mukherjee; Tata McGraw Hill Publishers, New Delhi
2. A Textbook of Medical Laboratory Technology by P Godkar; Bhalani Publishing House, Mumbai
3. Engineering Chemistry by Shashi Chawla.
4. Progressive Applied Chemistry – I by Dr. G.H. Hugar Eagle Prakashan Jalandhar

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	08	15
2	06	15
3	08	20
4	08	20
5	08	20
Total	**38**	**100**

1.3 ANATOMY & PHYSIOLOGY -I

L	T	P
3	-	2

RATIONALE:

The students of Medical Laboratory Technology (MLT) dealt with the life of human body either by direct contact or indirect contact, either through blood or other body fluids. They come in direct contact with patients a number of times and occasions. Hence they are supposed to have the basic knowledge of different parts of human body, their anatomical parts, structures and physiological functions.

LEARNING OUTCOMES:

After undergoing this subject , the students will be able to:

- Identify basic tissues of the body
- Explain skeletal system in humans.
- Understand the muscular system.
- Understand the cardiovascular system and respiratory system.

DETAILED CONTENTS

UNIT 1

GENERAL ANATOMY

1.1 Introduction to Anatomy & Physiology.

-Levels of organization, parts of human body

1.2 Basic tissues of the body (Gross structure and functions)

a) Epithelial tissue

b) Connective tissue

c) Muscular tissue

d) Nervous tissue

UNIT 2

SKELETAL SYSTEM

2.1 Gross structure, function and classification.

2.2 Bones of appendicular and axial skeleton

a) Bones of Pectoral girdle and upper limbs.

b) Bones of Pelvic girdle and lower limbs.

2.3 Joints & Articulations: Types of joints (Structural and functional classification).

UNIT 3

MUSCULAR SYSTEM

3.1 Properties of muscular tissue.

3.2 Classification, structure and functions of muscles.

- Skeletal muscle

- Smooth muscle

- Cardiac muscle

UNIT 4

CARDIOVASCULAR SYSTEM

4.1 Anatomy of heart:External & Internal features of heart, Chambers of heart.

4.2 Blood vessels attached to various chambers of heart, Coronary vessels & Major arteries and Veins of body.

4.3 Circulation of Blood: Pulmonary, Coronary and Portal circulation.

4.4 Blood Pressure: Definition of blood pressure, various terms used in Blood pressure, Factors affecting& controlling Blood pressure.

4.5 Methods and Apparatus for recording blood pressure.

4.6Introduction to ECG: Basic principles, normal electrocardiogram& grids of ECG paper, electrographic leads,cardiac cycle and Junctional tissues.

4.7 Patient preparation for ECG recording &care and maintenance of ECG machine.

UNIT 5

RESPIRATORY SYSTEM

5.1 Organs of respiration: Upper and lower respiratory tract.

5.2 Functions and mechanism of Respiratory system

5.3 Gas exchange in lungs.

5.4 Control of respiration.

5.5 Basal Metabolic Rate (BMR)

5.6 Respirometery: Procedure, clinical applications &Importance

LIST OF PRACTICALS

1 Demonstration of different parts of body

1.1 Cranial cavity (Brain) 1.2 Thoracic cavity (Heart and lungs) 1.3 Abdominal cavity (Liver, Gallbladder, spleen, kidney, stomach & intestines) 1.4 Pelvic cavity (Reproductive organs)

2. Demonstration of basic tissues of the body

2.1 Epithelial tissue 2.2 Connective tissue 2.3 Muscular tissue 2.4 Nervous tissue

3. Demonstration of various parts of bones

3.1 Bones of upper limb - Humerus, radius, ulna, fibula and articulated hand - Scapula and clavicle 3.2 Bones of lower limb - Pelvic/hip bone and femur, tibia, fibula and articulated foot. 3.3 Bones of Skull and mandible 3.4 Sternum and ribs 3.5 Bones of vertibral column

4. Demonstration of major joints of the body

4.1 Joints of upper limb - Shoulder joint - Elbow joint - Wrist joint

4.2 Joints of lower limb - Hip (pelvic) joint - Knee joint - Ankle joint 4.3 Intervertibral joints

5. Demonstration of structural differences between: - Skeletal muscle - Smooth muscle and - Cardiac muscle

6. Demonstration of heart

7. Demonstration of Radial pulse examination.

8. Demonstration of Blood pressure Estimation

9. Demonstration of ECG recording

10. Demonstration of various parts of respiratory system

NOTE: 1. There should be Anatomy & Physiology lab. Human skeleton (articulated or disarticulated), Anatomical Charts and models should be there for demonstration purposes.

2. Apparatus, instruments and relevant equipment must be there for recording Blood pressure as well as ECG machine for demonstration of ECG recording.

3. Anatomy musuem should be set up.

RECOMMENDED BOOKS

1. Anatomy and Physiology by Pears; JP Brothers, New Delhi
2. Anatomy and Physiology by Sears; ELBS, London
3. Tutorial Human Anatomy and Physiology by Dr Pramila Singh; Tutor Trait, Ambala
4. Ross and Wilson Anatomy and Physiology by Anne Waugh and Kathleen JW Wilson; Churchill Living Stone; London

1.4 BASIC MICROBIOLOGY

L T P
2 - 4

RATIONALE:

The candidates undergoing training in Clinical Microbiology are made to learn the basic techniques of microbial culture, preliminary processing, examination and identification of various pathogens like bacteria etc.

LEARNING OUTCOMES:

After undergoing this subject , the students will be able to:

- Explain Microscopy and staining techniques
- Identify and use Culture Media and culture techniques
- Understand the principle of Morphology and physiology of Bacteria
- Perform sterilization work in lab.

DETAILED CONTENTS

1. Introduction to Microbiology with special reference to medical microbiology. (06 Hrs)
   Definition, history, relationship of micro organisms to man.
   i. Safety guideline in a microbiology laboratory. Universal precautions.
   ii. Bio-safety cabinets : principle, types of bio-safety cabinets and their applications.

2. Morphology and physiology of Bacteria (08 Hrs)

   A. Classification of micro-organisms
   B. Morphology of Bacteria
   i. Bacterial cell wall
   ii. Cell wall structures
   C. Physiology of bacteria
   i. Bacterial growth and nutrition

3. Sterilization- definition and types of sterilization. (08 Hrs)
   i) Physical methods of sterilization: Equipments used for sterilization, operation of autoclave and hot air oven, sterilization control and sterilization indicators. Sterilization by radiation and filtration (membrane).

ii) Chemical methods of Sterilization: Antiseptics and disinfectants- Definition, types, properties and uses of common disinfectants and disinfectants (e.g. Formaldehyde, Ethylene oxide, phenol compounds, Alcohol, hypochlorite). Definition of Phenol coefficient and determination Phenol coefficient by Rideal Walker method.

4. Microscopy and staining techniques : (08 Hrs)

i. Handling of a compound microscope. Care and maintenance of different parts of a compound microscope. Principle of working of fluorescent microscope.

ii. Staining techniques : Method of smear preparation. Differential staining methods: Gram staining, AFB staining, Albert's staining, staining of capsule. Preparation of staining solutions and their storage.

5. Culture Media and culture techniques: (08 Hrs)

i. Definition, synthetic and non synthetic media. Types of culture media: liquid, and solid media, routine laboratory media (Basal. Enriched, selective, enrichment, indicator, transport, and storage) with two examples of each type.

ii. Different types of inoculating loops, different types of swabs and their uses. Types of bacterial culture: broth culture, stab culture, slant culture. Culture techniques: streak plate, pour plate, spreading/ lawn culture, .Aerobic and anaerobic culture, Isolation of pure cultures and disposal of cultures.

LIST OF PRATICALS

UNIT I

1. Demonstration of safety rules (Universal precautions) in a microbiology laboratory.

2. Preparation of cleaning agents and techniques of cleaning glasswares.

UNIT II

3. Preparation of materials for sterilization in an autoclave and hot air oven.

4. Sterilization in autoclave and hot air oven and placing of the sterilization indicators.

UNIT III

5. Sterilization by filtration by membrane method.

6. Handling and care of different types of microscopes.

UNIT IV

7. Staining techniques: Gram , Albert's staining, Ziehl Neelson staining, Capsule and bacterial spore staining**.**

8 Demonstration of bacterial motility by hanging drop technique.

UNIT V

9. Preparation of culture media : Nutrient agar, blood agar, chocolate agar, MacConkey agar, DCA, XLD and Peptone water. Inoculation of bacteria on these culture media by aerobic / anaerobic culture method.

10. Isolation of organisms in pure culture, study of colony characteristics and demonstration of haemolysis on blood agar.

RECOMMENDED BOOKS

1. Textbook of Medical Microbiology by Satish Gupta; JP Brothers, New Delhi
2. Practical Book of Medical Microbiology by Satish Gupta; JP Brothers, New Delhi
3. An Introduction to Medical Laboratory Technology by FJ Baker; Butterworth – Heinemann; Oxford
4. Textbook of Medical Laboratory Technology by Praful B Godkar; Bhalani Publishing House, Mumbai
5. Medical Laboratory Technology by Kanai Lal Mukherjee; Tata McGraw Hill, New Delhi
6. Medical Laboratory Manual for Tropical Countries Vol. I and II by Monica Cheesbrough; Cambridge University Press; UK
7. Text Book of Microbiology by Ananthanarayan and Paniker; Orient Longman, Hyderabad
8. Text book of Medical Microbiology by Cruckshiank Vol. I
9. Textbook of Medical Microbiology by Greenwood, ELBS
10. Medical Laboratory Science by Jockie and Kolhatkar, Tata McGraw Hill.
11. Text book of Microbiology by A. Chakraborty

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	06	20
2	08	20
3	08	20
4	08	20
5	08	20
Total	**38**	**100**

1.5 INTRODUCTION TO HEMATOLOGY

L	T	P
3	-	4

RATIONALE:

The training in this subject is imparted to enable the students to carry out routine clinical laboratory investigations. He/she should be able to provide technical head for selected sophisticated hematological techniques with adequate knowledge of various principles. The training in laboratory safety is also provided.

LEARNING OUTCOMES:

After undergoing this subject, the students will be able to:

- Understand the principle of blood Composition
- Collection of blood samples.
- Identify and use various Anticoagulants
- Identify and use various stains.

DETAILED CONTENTS

Theory

1. Introduction to haematology**.** **(06 Hrs.)**

1.1 Various glassware/plastic-ware used in Haematology Labs. (Hb. Tube, Hb. Pipette, RBC Pipette, WBC Pipette).

2. Introduction to blood. **(16 Hrs.)**

2.1 Definition & Composition

2.1.1 Cells-WBC (Granulocytes-Neutrophils, Eosinophils & Basophils), (Agranulocytes-Lymphocytes & Monocytes), RBC, Platelets.

2.1.2 Plasma & its components

2.2 Function-cell functions & plasma functions .

2.3 Formation of blood (Erythropoiesis, Leukopoiesis & Thrombopoiesis)

3. Anticoagulants. **(08 Hrs.)**

3.1 Definition

3.2 Various types along with their mode of action, merit and demerit its of each

3.3 Anticoagulant vials

3.4 Difference between Plasma and serum

4. Collection of blood **(10 Hrs.)**

4.1 Venous blood collection

4.1.1 Venipuncture : materials and equipment required for venipuncture

4.1.2 Preparation of patients for venipuncture

4.1.3 Applying tourniquet

4.1.4 Selection and preparing the venipuncture site

4.1.5 Performing venipuncture

4.1.6 Care of venipuncture site

4.1.7 Disposable of blood, syringes, needle and lancets.

4.2 The capillary puncture

4.2.1 Capillary puncture site

4.2.2 Materials and equipment required for capillary puncture site

4.2.3 Selecting and preparing the puncture site

4.2.4 Techniques performing the puncture site

4.2.5 Collection of blood sample

4.2.6 Care of the capillary puncture site

4.3 Vacutainer system for blood collection

5. Romanowsky stains (Leishman, Giemsa) **(08 Hrs.)**

5.1 Preparation and theory

5.2 Choice of slide and spreader

5.3 Preparation of blood film

5.4 Characteristics of good blood smear

5.5 Examination of blood smear

5.6 Identification of blood cell

List of Practicals

UNIT-1

1. Parts of microscope (Monocular & Binocular): Its function and care.
2. Parts of centrifuge: Its function and care.
3. Parts of Blood Mixer: Its function and care
4. Cleaning and drying of glassware.

UNIT-2

5. Estimation of Differential Leukocyte count.

UNIT-3

6. Preparation of various anticoagulants.

UNIT-4

7. Collection of blood sample by venipuncture.
8. Collection of blood sample by capillary puncture

UNIT-5

9. Preparation of peripheral blood film (PBF).
10. Preparation of stain.

RECOMMENDED BOOKS

1. Medical Laboratory Technology Vol. 1 by KL Mukherjee; Tata McGraw Hill Publishers, New Delhi
2. An Introduction to Medical Laboratory Technology by FJ Baker; Butterworth Heinmann, Oxford
3. Medical Laboratory Manual for Tropical Countries by Monica Cheesbrough; Cambridge University Press, UK
4. Textbook of Medical Laboratory Technology by Praful B Godkar; Bhalani Publishing House, Mumbai
5. Practical Haematology by JV Decei; ELBS with Curchill Living Stone; UK
6. Medical Laboratory Science Theory and Practical by J Ochei and A Kolhatkar, Tata McGraw Hill Publishing Company Ltd., New Delhi 2000 Ed.

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time allotted (Hrs)	Marks Allotted (%)
1	06	10
2	16	32
3	08	18
4	10	22
5	08	18
Total	**48**	**100**

Sr. No.	Unit	E-Link
1	Unit- 1	https://www.slideshare.net/rajud521/introduction-to-hematology
		www.fch.vut.cz/~fiserova/down/laboratory%20equipment.ppt
2	Unit – 2	www.biologydiscussion.com/hematology.../laboratory-hematology.../equipments-used
3	Unit – 3	https://www.slideshare.net/rimbiosraju/haemopoiesis-45250369
4	Unit – 4	https://www.slideshare.net/peddanasunilkumar/anticoagulant
5	Unit – 5	https://www.slideshare.net/globalsoin/blood-collection-and-preservation
		https://www.slideshare.net/kps_senthil/rbcwbc-count
		https://www.youtube.com/watch?v=-tzNsaCrUMw

1.6 FUNDAMENTALS OF MLT

L	T	P
3	-	2

RATIONALE:

In Medical laboratory many types of equipments are used for analysis of samples. Students of MLT are required to learn the proper handling of various equipments. In addition they need to be made aware of risk involved and safety precautions to be followed.

LEARNING OUTCOMES:

After under going this subject,t the students will able to :

- Select appropriate equipment for a given type of analysis.
- Operate various equipments following standard operating procedures.
- Maintain various equipments in functional condition.

DETAILED CONTENTS:

1. **Basic** Training of laboratory technicians **(12 Hrs.)**

1.1 Basic ethics of Medical laboratory Technology

1.2 Training of clinical laboratory technicians.

1.3 Medical laboratory professional - professionalism in laboratory workers,
1.4 code of conduct and communication between physician and lab technician

Common Lab accidents and ways for its prevention

1.5 First aid in the clinical laboratory

1.6 Storage and handling of dangerous chemicals

1.7 Common Laboratory hazards
1.8 Color coding of various Waste disposal containers in the labs

2. Introduction to Instrumentation in a Medical Laboratory **(06 Hrs.)**

2.1 Introduction to Basic Equipments in MLT

2.2 Different types of syringes used for blood collection.

3.3 Basic requirements of blood collection.

3. Principle, Care, Procedure and Application of the Basic Instruments Part-I **(12 Hrs.)**

3.1 Centrifuge (routine - low and high speed -table top)

3.2 Water Bath

3.3 Hot Air Oven

3.4 Incubator

3.5 Colorimeter

3.6 Compound Microscope (Monocular and Binocular)

4. Principle, Care & Safe Operating Procedure and Application of the Basic **(10 Hrs.)**

Instruments Part-II

4.1 pH Meter

4.2 Distillation unit

4.3 Balance (Physical and chemical)

4.4 Micro tome

4.5 Microbe filters (Seitz, Glass Scintered & Membrane)

5. Principle, Care, Procedure and Application of the Advanced Instruments **(14 Hrs.)**

5.1 Refrigerated Centrifuge

Ultra Centrifuge

5.2 Specialised Incubator

B.O.D. Incubator

5.3 Special Microscopes

1 Dark Field Microscope

2 Phase Contrast Microscope

3 Florescence Microscope

4 Electron Microscope

5.4 Tissue Processing Unit

5.5 Biochemistry Analyzer

5.6 Laminar Air Flow Hood & their Different Types

5.7 Haematology Cell Counter

LIST OF PRACTICALS

1. The Principal and procedure of autoclave and identify their parts –
   water bath,
   hot air oven,
   incubator
2. To demonstrate basic internal organization & identify their parts.
   Centrifuge
   colorimeter
3. To demonstrate basic internal organization of compound microscope & identify their parts.
4. To demonstrate basic internal organization of identify their parts.
   pH meter
   chemical balance
5. To demonstrate basic internal organization & identify their parts.
   Microtome

Tissue Processing Unit

Haematology Cell Counter

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time allotted (Hrs)	Marks Allotted (%)
1	12	10
2	06	32
3	12	18
4	10	22
5	14	18
Total	**44**	**100**