

CURRICULUM
FOR
DIPLOMA PROGRAMME
IN
MEDICAL LABORATORY TECHNOLOGY
2nd Year
FOR THE STATE OF HIMACHAL PRADESH



N-2022

Prepared by:-

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THREE YEAR DIPLOMA IN MEDICAL LABORATORY TECHNOLOGY

SALIENT FEATURES

Programme	Diploma in Medical Laboratory Technology
Duration	Three years (Six Semesters)
Entry Qualification	As prescribed by H.P. Takniki Shiksha Board /AICTE
Intake	As approved by H.P. Takniki Shiksha Board
Pattern	Semester System

PROGRAM OUTCOMES (POs)

- PO1:** Basic and Discipline Specific Knowledge : Apply knowledge of basic mathematics, science and engineering fundamentals and engineering specialization to solve the engineering problems.
- PO2:** Problem Analysis : Identify and analyze well-defined engineering problems using codified standard methods.
- PO3:** Design/ Development of Solutions : Design solutions for well-defined technical problems and assist with the design of systems components or processes to meet specified needs.
- PO4:** Engineering Tools, Experimentation and Testing : Apply modern engineering tools and appropriate technique to conduct standard tests and measurements.
- PO5:** Engineering Practices for Society, Sustainability and Environment : Apply appropriate technology in context of society, sustainability, environment and ethical practices.
- PO6:** Project Management : Use engineering management principles individually, as a team member or a leader to manage projects and effectively communicate about well-defined engineering activities.
- PO7:** Life-long Learning : Ability to analyze individual needs and engage in updating in the context of technological changes.

PROGRAMME SPECIFIC OUTCOMES

The Programme outcomes are derived from five domains namely Process, Professional Knowledge, Professional Skill, Core Skill, Responsibility, After completing this level, the student will be able to:

PSO1: Acquire knowledge of Basic facts, process and principles related to medical laboratory technology for employment.

PSO2: Demonstrate practical skill in narrow range of medical laboratory technology applications.

PSO3: Perform task under close supervision with some responsibility for own work within defined limit.

HORIZONTAL AND VERTICAL ORGANISATION OF THE SUBJECTS

Sr. No.	Subjects/Areas	Distribution in Hours per week in various Semesters					
		I	II	III	IV	V	VI
1	Clinical Microbiology - III	-	-	7	-	-	-
2.	Haematology - III	-	-	7	-	-	-
3	Clinical Biochemistry- III	-	-	6	-	-	-
4.	Histopathology and cytology - I	-	-	6	-	-	-
5.	Transfusion Medicine (Blood Banking)	-	-	5	-	-	-
6	Employability skills-I	-	-	2	-	-	-
7	Clinical Microbiology - IV	-	-	-	7	-	-
8.	Haematology - IV	-	-	-	7	-	-
9.	Clinical Biochemistry- IV	-	-	-	6	-	-
10	Histopathology and cytology - I	-	-	-	7	-	-
11	Medical Laboratory Management	-	-	-	4	-	-
12	Employability skills-II	-	-	-	2	-	-
13.	Student Centered Activities	-	-	3	3	-	-
Total		-	-	36	36	-	-

DIPLOMA PROGRAMME STUDY AND EVALUATION SCHEME

THIRD SEMESTER

Sr. No.	SUBJECTS (Subject Code)	STUDY SCHEME Periods/Week			Total StudyHrs	Credits	MARKS IN EVALUATION SCHEME									Total Marks
		L	P	DCS (Doubt clearing session)			INTERNAL ASSESSMENT			EXTERNAL ASSESSMENT						
							Th	Pr	Total	Th	Hrs	Pr	Hrs	Total		
3.1	Clinical Microbiology – III (MLT301)	3	3	1	7	3+1.5= 4.5	40	40	80	60	3	60	3	120	200	
3.2	Hematology – III (MLT302)	3	3	1	7	3+1.5= 4.5	40	40	80	60	3	60	3	120	200	
3.3	Clinical Biochemistry – III (MLT303)	2	3	1	6	2 + 1.5= 3.5	40	40	80	60	3	60	3	120	200	
3.4	Histopathology and Cytology –I (MLT304)	2	3	1	6	2 + 1.5= 3.5	40	40	80	60	3	60	3	120	200	
3.5	Transfusion Medicine (Blood Banking) (MLT305)	3	2	-	5	3 + 1 = 4	40	40	80	60	3	60	3	120	200	
3.6	Employability Skills –I (MLT306)	-	2	-	2	0 + 1 = 1	-	40	40	-		60	3	60	100	
	# Student Centered Activities	-	3	-	3	-	-	25	25	-		-		-	25	
	Total	13	19	4	36	13 + 8 = 21	200	265	465	300		360		660	1125	

DIPLOMA PROGRAMME STUDY AND EVALUATION SCHEME

FOURTH SEMESTER

Sr. No	SUBJECTS (Subject Code)	STUDY SCHEME Periods/Week			Total Study Hrs	Credits	MARKS IN EVALUATION SCHEME									Total Marks
		L	P	DCS (Doubt clearing session)			INTERNAL ASSESSMENT			EXTERNAL ASSESSMENT						
							Th	Pr	Total	Th	Hrs	Pr	Hrs	Total		
4.1	Clinical Microbiology – IV (MLT401)	2	4	1	7	$2 + 2 = 4$	40	40	80	60	3	60	3	120	200	
4.2	Hematology – IV (MLT402)	2	4	1	7	$2 + 2 = 4$	40	40	80	60	3	60	3	120	200	
4.3	Clinical Biochemistry – IV (MLT403)	3	3	-	6	$3 + 1.5 = 4.5$	40	40	80	60	3	60	3	120	200	
4.4	Histopathology and Cytology –II (MLT404)	3	3	1	7	$3 + 1.5 = 4.5$	40	40	80	60	3	60	3	120	200	
4.5	Medical Laboratory Management (MLT405)	3	-	1	4	$3 + 0 = 3$	40	-	40	60	3	-	-	60	100	
4.6	Employability Skills –II (MLT406)	-	2	-	2	$0 + 1 = 1$	-	40	40	-	3	60	3	60	100	
	# Student Centered Activities	-	3	-	3	-	-	25	25	-	-	-	-	-	25	
	Total	13	19	4	36	$13 + 8 = 21$	200	225	425	300	300	300	600	1025		

DETAILED CONTENTS 2nd YEAR

Third Semester

Course Code	:	MLT 301
Course Title	:	Clinical Microbiology- III
Number of Credits	:	4.5 (L: 3 T: 0, P: 3 DCS:1)
Prerequisites	:	NIL
Course Category	:	PC

CLINICAL MICROBIOLOGY-III

(Parasitology and virology)

L P D
3 3 1

Course Objectives:

1. The students undergoing training of medical laboratory technology learn the techniques of collection of samples,
2. Sample processing and identification of various pathogens like parasites and viruses by using different techniques.
3. Students are given training in the use of safety measures while handling infected material.
4. The training is aimed at making the students competent to identify the causative parasites and viruses for microbial infections.

DETAILED CONTENTS

Theory

1. Introduction to medical parasitology (04 hrs)
2. General characteristics, morphology, classification (04 hrs)
 - Protozoa
 - Helminthes
3. Laboratory Samples for detection of parasites (06 hrs)
 - Collection, transportation, processing and preservation of samples for routine investigations – Blood, stool
4. Concentration techniques (06 hrs)
 - Principle and application of concentration techniques of stool for demonstration of ova and cysts
5. Giardia and Entamoeba histolytica (06 hrs)
 - Morphology
 - Life cycle
 - Lab diagnosis
6. Ancylostoma and Ascaris lumbricoides (06 hrs)
 - Morphology
 - Life cycle
 - Lab diagnosis
7. T solium, T saginata (06 hrs)
 - Morphology
 - Life cycle
 - Lab diagnosis
8. Malarial Parasite (P. Vivax and P. Falciparum) (06 hrs)
 - Morphology
 - Life cycle
 - Lab diagnosis
9. Virology (06hrs)
 - Introduction- General Characteristics, Classification Structure of viruses.
10. Medically important viruses (08 hrs)

- Pathogenicity, Lab diagnosis and prevention of –
- Rabies
 - Polio
 - HIV
 - HBV (Hepatitis 'B' virus)
 - COVID- 19
11. Virological Samples (06 hrs)
- Collection
 - Transportation
 - Storage

LIST OF PRACTICALS

1. Collection and routine stool examination for detection of intestinal parasites
 - Saline preparation
 - Lugol's Iodine preparation
 - Concentration methods
 - Floatation method (saturated salt solution/zinc sulphate)
 - Sedimentation method (formal ether)
2. Identification of following adult worms/cyst from preserved specimen/slides
 - Tapeworm
 - Roundworm
 - Hookworm
 - Giardia
 - Entamoeba . histolytica, E. coli
3. Preparation of smear and identification of blood parasites
 - Preparation of stains (Leishman, Giemsa, Field)
 - Preparation of thin and thick smears
 - Staining of smears by Leishman, Giemsa, Field
 - Examination of smears for malarial parasite (P. vivax and P. falciparum)
 - Demonstration of various stages of malarial parasite from stained slides

INSTRUCTIONAL STRATEGY

The teacher should lay emphasis on common names, morphology of helminth and blood parasites. The students should be shown diagrams/illustration/permanent fixed slides and audio- visual aids. The students should be made aware about medically important viruses, collection and cultivation of viruses.

RECOMMENDED BOOKS

1. Parasitology by KD Chatterjee; Chatterjee Medical Publishers, Kolkatta
2. Medical Parasitology by Arora & Arora
3. An introduction to Medical Laboratory Technology by FJ Baker; Butterworth Heinemann Oxford
4. Text Book of Medical Microbiology by Satish Gupta; JP Brothers, New Delhi
5. Textbook of Microbiology by Ananthanarayan and Panikar; Orient Longman, Hyderabad
6. Text Book of Medical Laboratory Technology by Praful B Godkar; Bhalani Publishing House; Mumbai
7. Medical Laboratory Manual for Tropical Countries Vol. I and II by Monica Cheesbrough; Cambridge University Press; UK
8. Practical Book of Medical Microbiology by Satish Gupta; JP Brothers, New Delhi
9. Medical Laboratory Science Theory and Practice by J Ochei and A Kolhatkar
10. Medical Laboratory Science by J. Achie and Kolhatkar, Tata McGraw Hill
11. Medical Laboratory Technology by Kanai Lal Mukherjee; Tata McGraw Hill Publishers, New Delhi.

Course Outcomes

After undergoing the subject, the student will be able to:

- 1 Learn the techniques of collection of samples,
- 2 Sample processing and identification of various pathogens like parasites and viruses by using different techniques.
- 3 Use safety measures while handling infected material.
- 4 Identify the causative parasites and viruses for microbial infections.

SUGGESTED DISTRIBUTION OF MARKS		
Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	4	4
2	4	6
3	6	6
4	6	8
5	6	6
6	6	14
7	6	10
8	6	14
9	6	8
10	8	12
11	6	12
Total	64	100

Course Code	:	MLT 302
Course Title	:	Haematology- III
Number of Credits	:	4.5 (L: 3 T: 0, P: 3 DCS:1)
Prerequisites	:	NIL
Course Category	:	PC

HAEMATOLOGY - III

L P D
3 3 1

Course Objectives

1. This subject aims to enable the students to carry out routine clinical laboratory investigation (blood, urine etc).
2. He/she should be able to provide technical help for selected sophisticated hematological techniques
3. The student will have adequate knowledge of various principles of heamatology.
4. The training in laboratory safety is also provided.

DETAILED CONTENTS

Theory

1. Erythrocyte sedimentation rate (ESR) and packed cell volume (PCV) (16 hrs)
 - Introduction
 - Various methods of estimation of ESR and PCV and their merits and demerits
 - Factors involved in ESR
 - Interpretation of results
2. Red Cell Indices – MCV, MCH, MCHC (10 hrs)
Definition, reference range, calculation and interpretation
3. Supravital stain and reticulocyte counting (10 hrs)
 - Introduction
 - Principle and procedure of staining and calculation
 - Reference values and interpretation
 - Variation in Physiological Values such as Hb, PCV, T.L.C. and Platelet count
4. Anemias (16 hrs)
 - Definition and classification
 - Laboratory diagnosis of:
 - (a) Iron deficiency anaemia
 - (b) Megaloblastic anaemia
 - (c) Haemolytic anaemias including sickle cell anaemia thalasseamia
 - (d) Aplastic anaemia
5. Red cell fragility test (12 hrs)
 - Principle and procedure
 - Clinical significance

LIST OF PRACTICALS

1. ESR estimations (wintrobe and westergren) in blood sample
2. Determination of PCV (wintrobe and capillary) in blood by Macro and MicroMethods
3. Counting of Reticulocyte in blood
4. To perform red cell fragility test on blood

5. To perform Sickling test on blood
6. Estimation of foetal haemoglobin by alkali denaturation test
7. Estimation of plasma haemoglobin
8. Estimation of and G6PD by Methylene Blue Reduction Test)

INSTRUCTIONAL STRATEGY

Teachers should lay emphasis on concepts and principles while covering the subject contents. In the practical work, the students should be given the opportunity to do practical work individually but under supervision. Visits to hospital/medical colleges should be planned to demonstrate the processes. It is important to make use of models and audiovisual aids to show specific processes. Experts should be invited to deliver lectures on specific topics and share their experiences.

RECOMMENDED BOOKS

1. Medical Laboratory Technology Vol. 1 by KL Mukherjee; Tata McGraw Hill Publishing Company, New Delhi
2. An Introduction to Medical Laboratory Technology by FJ Baker; Butterworths Heinemann, 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 J.V Decie; ELBS with Churchill Living Stone, UK
6. Medical Laboratory Science Theory and Practical by J. Ochei and Kolhatkar; Tata McGraw Hill Publishing Company Ltd., New Delhi

Course Outcomes

After undergoing the subject, the student will be able to:

1. Carry out routine clinical laboratory investigation (blood, urine etc).
2. Provide technical help for selected sophisticated hematological techniques
3. Have adequate knowledge of various principles of heamatology.
4. Work as trained person with laboratory safety

SUGGESTED DISTRIBUTION OF MARKS		
Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	16	30
2	10	12
3	10	12
4	16	30
5	12	16
Total	64	100

Course Code	:	MLT 303
Course Title	:	Clinical Biochemistry- III
Number of Credits	:	3.5 (L: 2 T: 0, P: 3 DCS:1)
Prerequisites	:	NIL
Course Category	:	PC

CLINICAL BIOCHEMISTRY- III

L P D
2 3 1

Course Objectives

1. The students are imparted basic training of theoretical and practical aspects in the field of clinical biochemistry.
2. The students are made to learn the techniques of collection of clinical samples and their processing along with recording of data.
3. The student will also obtain the basic knowledge of chemistry and metabolism of various metabolites which are routinely estimated in different diseases so that a clear understanding of the different tests is obtained.
4. The students are also given basic training in safety measures, quality control and automation

DETAILED CONTENTS

Theory

1. Serum Bilirubin (06 hrs)
 - Formation of bile pigments
 - Formation and excretion of bilirubin
 - Conjugated and unconjugated bilirubin
 - Principle and procedures of serum bilirubin estimation (Direct & Indirect)
 - Reference values
 - Clinical significance
2. SGOT and SGPT (06 hrs)
 - Principle and procedures of estimation
 - Reference values
 - Clinical significance
3. ALP and ACP (06 hrs)
 - Principle and procedures of estimation
 - Reference values
 - Clinical significance
4. Serum Amylase (03 hrs)
 - Principle and procedures of estimation
 - Reference values
 - Clinical significance
5. Serum Calcium and Phosphorus (04 hrs)
 - Principle and procedures of estimation

- Reference values
- Clinical significance
- 6. Lipid Profile (10 hrs)
 - Formation of cholesterol
 - High density and low density cholesterol
 - Principles and procedures of estimation Reference value
 - Clinical significance
 - Triglycerides, principle and procedure of estimation
 - Importance of various ratios of HDL, LDL and VLDL
- 7. Urinary Proteins and Creatinine (04 hrs)
 - 24 hr. urinary proteins and creatinine estimation
 - Reference values
 - Clinical significance
- 8. Renal Function Tests (Renal clearance Tests) (09 hrs)
 - Urea clearance Test
 - Creatinine clearance test
 - Their Clinical significance

LIST OF PRACTICALS

1. Serum bilirubin estimation
2. Phosphorus estimation
3. Calcium estimation
4. Renal clearance tests
5. SGOT estimation
6. SGPT estimation
7. ALP estimation
8. ACP estimation
9. Total cholesterol estimation
10. Triglyceride estimation
11. Estimation of HDL and calculation of VLDL and LDL
12. Urinary protein and creatinine estimation (24 hr)
13. Estimation of serum amylase

INSTRUCTIONAL STRATEGY

Teachers should lay emphasis on concepts and principles while covering the subject contents. In the practical work, the students should be given opportunity to do practical work individually but under supervision.

RECOMMENDED BOOKS

1. A Procedure Manual for Routine Diagnostic Tests Vol. I, II and III by KL Mukherjee; Tata McGrawHill Publishers, New Delhi
2. Practical Clinical Biochemistry by H. Varley; Heinmann Publishers, Oxford
3. A Text Book of Medical Laboratory Technology by P Godkar; Bhalani Publishers, Mumbai
4. Medical Laboratory Science, Theory and Practice by J Ochaie and A Kolhatkar, Tata McGraw Hill

Course Outcomes

1. Have understanding of basic theoretical and practical aspects in the field of clinical biochemistry.
2. Techniques of collection of clinical samples and their processing along with recording of data.
3. Understanding of chemistry and metabolism of various metabolites which are routinely estimated in different diseases.
4. Clear understanding of the different tests is obtained.
5. Have basic training in safety measures, quality control and automation

SUGGESTED DISTRIBUTION OF MARKS		
Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	6	12
2	6	12
3	6	12
4	3	6
5	4	8
6	10	22
7	4	8
8	9	20
Total	48	100

Course Code	:	MLT 304
Course Title	:	Histopathology and Cytology- I
Number of Credits	:	3.5 (L: 2 T: 0, P: 3 DCS:1)
Prerequisites	:	NIL
Course Category	:	PC

HISTOPATHOLOGY AND CYTOLOGY- I

**LPD
2 3 1**

Course Objectives

1. This part of the subject is aimed at introducing the students to the various types of tissue preparations.
2. Developing expertise in the students to cut very thin tissue sections from tissue blocks.
3. Facilitate visualization using various stains and dyes.
4. Cytology part aims at exposing the students to the latest advancements in cytological investigations.

DETAILED CONTENTS

Theory

1. Introduction and definition of: (01 hr)
 - Histology
 - Histopathology
 - Biopsy
 - Autopsy
 - Autolysis
 - Putrefaction
2. Preparation of Tissue (Different Methods of Preparation of Tissue) (02 hrs)
 - a. Unfixed Tissue preparations
 - Imprint methods – Impression Smears
 - Teased preparation
 - Squashed preparation
 - Frozen section
 - b. Fixed Tissue preparations (introduction only)
 - Paraffin embedding
 - Celloidin embedding
 - Gelatin embedding
3. Reception of Specimen (01 hr)
 - Reception, recording, labeling and preservation of histological specimen
4. Fixation (Histological Specimens) (06 hrs)
 - Classification of fixatives
 - Composition of various fixatives
 - Advantages and disadvantages
5. Processing (by Paraffin Technique) (06 hrs)
 - Dehydration
 - Clearing/Dealcoholization
 - Infiltration and impregnation
 - Paraffin embedding
 - Automation: Histokinete (automatic tissue processor)
 - its types, working, care and maintenance

6. Microtomy (07 hrs)
- a. Microtome
 - Types ,
 - Advantages and disadvantages ,
 - Working principle, care and maintenance
 - b. Microtome Knives
 - Various types of knives
 - Sharpening of knives
 - Honing technique
 - Stropping technique
 - Automation: Automatic knife sharpener – uses, care and maintenance
 - Uses of abrasives and lubricants
 - c. Introduction to disposable blades - their advantages and disadvantages.
 - d. Section Cutting
 - Rough cutting
 - Fine cutting
 - Use of tissue floatation bath
 - Use of various adhesive media and lifting of sections to the slide
 - Errors /cutting faults in sections and their remedies
7. Theory of staining (Routine) (05 hrs)
- a. Principle and mechanism of routine stain (Haematoxylin and Eosin)
 - b. Various steps of staining (Haematoxylin and Eosin)
 - Deparaffinization
 - Hydration
 - Nuclear Staining
 - Differentiation
 - Blueing
 - Counterstaining
 - Dehydration
 - Clearing and Mounting
 - Results
 - c. Automation: Use of automatic stainer and coverslipper
8. Mountants (02 hrs)
- Various types of mounting media (aqueous, resinous)
 - Advantages and Disadvantages
9. Various Terms associated with staining (04 hrs)
- Solvents
 - Mordants
 - Metachromasia
 - Accelerators
 - Progressive and regressive staining
 - Use of controls in staining and their significance
10. Cell (02 hrs)
- Defination and function
 - Structure
 - Multiplication (Mitosis and Meiosis)
11. Exfoliative Cytology (04 hrs)
- a. Introduction
 - b. Preparation of vaginal & cervical smears
 - c. Collection and Processing of specimen for cytology
 - Urine
 - Sputum

- CSF (Cerebro Spinal Fluid)
 - Other fluids
12. Fixation (Cytological Specimen) (02 hrs)
- Definition
 - Various types of Cytological fixatives
 - Advantages and Disadvantages
13. Cytological Staining (0 4 hrs)
- Principle, Technique and interpretation of results in
- Papanicolaou staining
 - May Grunwald & Giemsa staining
 - Haematoxylin and Eosin staining
14. Role of Laminar airflow and cytotechnician in cytology (02 hrs)

LIST OF PRACTICALS

1. Reception of specimen, labeling and preserving the specimen
2. Preparation of various smears by unfixed methods
 - Imprint smears
 - Teased smears
 - Squashed smears
3. Preparation of different fixatives with special emphasis on preparation of formaline based fixatives
4. Preparation of paraffin blocks from various tissue pieces and labeling with emphasis on orientation
5. Handling of microtome
6. Sharpening of microtome knives
7. Preparation of blocks for fine cutting
 - Rough cutting
 - Trimming
8. Practice of fine section cutting
9. Practice of lifting of sections on the slides
10. Performing H&E staining on sections and mounting of tissue sections
11. Demonstration of cell using buccal smear/urine sample
12. Processing of urine samples for malignant cells
13. Processing of sputum sample for malignant cytology
14. To perform PAP stain on given smear
15. To perform MGG stain on given smear
16. To perform H&E on given smear
17. To demonstrate various automation by use of brochures, charts etc.

INSTRUCTIONAL STRATEGY

Teachers should lay emphasis on concepts and principles while covering the subject contents. In practical work, the students should be given the opportunity to do practical work individually. Visits to hospital/medical colleges should be planned to demonstrate the processes. It is important to make use of models and audiovisual aids to show specific processes. Experts should be invited to deliver lectures on specific topics and share their experiences.

RECOMMENDED BOOKS

1. An Introduction to Medical Laboratory Technology by FJ Baker; Butterworths Scientific, London
2. Technico Medical Concepts Histopathology and Cytology I by Dr Ashwani Bhardwaj, Anant Publications.
Carleton's Histological Technique by RAB, Drury, MADM (OXON), FRC Path, Northwick Paru Hospital, Harrow, Middlesex
3. Theory and Practice of Histological Technique by John D. Bancroft, Churchill Livingstone, London

4. Cellular Pathology Techniques by CFA Culling, Butterworths, London
5. Medical Lab Technology by Dr. Ramnik Sood, MD, Maulana Azad College, New Delhi

Course Outcomes:

After undergoing the subject, the student will be able to:

1. Understanding of the various types of tissue preparations.
2. Cut very thin tissue sections from tissue blocks.
3. Visualise various stains and dyes.
4. Have knowledge of latest advancements in cytological investigations.

SUGGESTED DISTRIBUTION OF MARKS		
Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	1	2
2	2	4
3	1	2
4	6	13
5	6	13
6	7	14
7	5	12
8	2	4
9	4	8
10	2	4
11	4	8
12	2	4
13	4	8
14	2	4
Total	48	100

Course Code	:	MLT 305
Course Title	:	Transfusion Medicine (Blood Banking)
Number of Credits	:	4 (L: 3 T: 0, P: 2 DCS:0)
Prerequisites	:	NIL
Course Category	:	PC

TRANSFUSION MEDICINE (Blood Banking)

L P D
3 2 -

Course Objectives

1. Blood transfusion has become a life saving procedure in modern medical sciences. To avoid any mistake, the students must understand to learn the blood bank procedures.
2. ABO & Rh blood grouping concepts.
3. He must also have an adequate knowledge of cross matching both major and minor procedures as well as selection of a suitable donor.
4. He should be competent enough to collect blood and its long-term preservation for safe blood transfusion.

DETAILED CONTENTS

Theory

1. Historical introduction to Transfusion medicine (blood banking) (02 hrs)
2. Antigen and Antibody (03 hrs)
 - Definition of antigen and antibody
 - Classification of antigens and antibodies.
3. ABO Blood Group System (04 hrs)
 - Antigens and antibodies involved
 - Principle and procedure of ABO blood grouping
 - Various blood sub groups (A1,A2, A1B, A2B)
4. The Rh Blood Group System (04 hrs)
 - Antigen and antibody involved
 - Principle and procedure of Rh grouping
 - Variant of D antigen (Du)
5. Anticoagulants used in blood bank (04 hrs)
 - Types and composition of various anticoagulants
 - Advantages and disadvantages of various anticoagulants
6. Criteria for selection of Donor (02 hrs)
7. Blood Collection and storage (03 hrs)
 - Screening of blood donor and characteristics of ideal blood donor.
 - Blood collection procedure
 - Transportation and storage
8. Screening of blood donors for: (10 hrs)
 - MP
 - VDRL
 - HIV
 - HbsAg
 - HCV

- | | | |
|-----|--|----------|
| 9. | Cross Matching | (02hrs) |
| | - Types of cross matching | |
| | - Various methods and their procedures | |
| 10. | Coombs Test | (04 hrs) |
| | - Direct coombs test (principle, procedure, importance and application) | |
| | - Indirect coombs test (principle, procedure, importance and application) | |
| 11. | Various blood components (Packed cells, Fresh frozen plasma, Cryoprecipitate, PRP(Platelet rich plasma)) | (04hrs) |
| | - Preparation | |
| | - Preservation | |
| | - Uses | |
| 12. | Blood Transfusion reactions | (06 hrs) |

LIST OF PRACTICALS

1. Performing ABO blood grouping by following method:
 - Direct
 - Tube Test
 - Indirect (reverse)
 - Subgroup
2. Performing-Rh grouping by following techniques:
 - Slide
 - Tube technique
3. Performance of Coombs Test
 - Direct
 - Indirect
4. Cross Matching (compatibility testing)
 - Major
 - Minor
5. Preparation of anticoagulants
 - ACD (Acid Citrate Dextrose)
 - CPD (Citrate Phosphate Dextrose)
 - CPDA (Citrate Phosphate Dextrose Adenine)
- 6 Malarial Parasite test by Thick and Thin smear preparation
- 7 VDRL Test
- 8 HIV Test
- 9 Hbs Ag Test
- 10 HCV Test
11. Preparation of platelet rich plasma and platelet poor plasma

INSTRUCTIONAL STRATEGY

Teachers should lay emphasis on concepts and principles while covering the subject contents. In the practical work, the students should be given the opportunity to do practical work individually. Visits to hospital/medical colleges should be planned to demonstrate the processes. It is important to make use of models and audiovisual aids to show specific processes. Experts should be invited to deliver lectures on specific topics and share their experiences.

RECOMMENDED BOOKS

1. Introduction to Modern Lab Technology by FJ Baker, Butterworth, Heinemann Publishers Oxford
2. Text book of Modern Lab Technology by Praful and Godker, Bhalani Publisher, Mumbai

3. Modern Lab Technology – A Procedure Manual for Routine Diagnostic Test by Kanai L. Mukerjee, Volume 1, Tata McGraw Hill Publishing, New Delhi
4. Modern Blood Banking and Transfusion Practices by Denise M Harmering, Jay Pee Brothers, New Delhi

Course Outcomes:

After undergoing the subject, the student will be able to

1. Use blood transfusion techniques and understanding of blood bank procedures.
2. Have clear understanding of ABO & Rh blood grouping concepts.
3. Have an adequate knowledge of cross matching both major and minor procedures.
4. Selection of a suitable donor.
5. Able to collect blood and preserve it for long-term safe blood transfusion.

SUGGESTED DISTRIBUTION OF MARKS		
Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	2	4
2	3	6
3	4	8
4	4	8
5	4	8
6	2	4
7	3	6
8	10	22
9	2	4
10	4	8
11	4	8
12	6	14
Total	48	100

Course Code	:	MLT 306
Course Title	:	Employability Skills- I
Number of Credits	:	1 (L: 0 T: 0, P: 2 DCS:0)
Prerequisites	:	NIL
Course Category	:	HS

3.6 EMPLOYABILITY SKILLS – I

L T P
- - 2

Course Objectives

1. The present day world requires professionals who are not only well qualified and competent but also possess good communication skills.
2. Our diploma students not only need to possess subject related knowledge but also soft skills to get good jobs or to rise steadily at their workplace.
3. The objective of this subject is to prepare students for employability in the job market and survive in cut throat competition among professionals.

DETAILED CONTENTS

1. Writing skills (08 hrs)
 - i) Official and business correspondence
 - ii) Job application - covering letter and resume
 - iii) Report writing - key features and kinds
2. Oral Communication Skills (20 hrs)
 - i) Giving advice
 - ii) Making comparisons
 - iii) Agreeing and disagreeing
 - iv) Taking turns in conversation
 - v) Fixing and cancelling appointments
3. Generic Skills (04 hrs)
 - i) Stress management
 - ii) Time management
 - iii) Negotiations and conflict resolution
 - iv) Teamwork and leadership qualities

Course Outcomes:

After undergoing the subject, the student will be able to:

- 1 Have a good professional attitude along with good communication skills.
- 2 Apply knowledge of soft skills to get good jobs or to rise steadily at their workplace.
- 3 Have preparedness for employability in job market and survive among professionals.

DETAILED CONTENTS 2ND YEAR

Fourth Semester

Course Code	:	MLT 401
Course Title	:	Clinical Microbiology- IV
Number of Credits	:	4 (L: 2 T: 0, P: 4 DCS:1)
Prerequisites	:	NIL
Course Category	:	PC

CLINICAL MICROBIOLOGY- IV

(Immunology and Mycology)

L P D
2 4 1

Course Objectives

1. The students undergoing training in medical laboratory technology learn the techniques of collection of samples, their processing.
2. Identification of various fungal infections and diagnosis of microbial infections by serological methods.
3. In addition to the above, students are given training in the use of safety measures while handling infected materials.
4. The training is aimed to make the students competent to isolate and identify fungi and do serological tests for various microbial infections.

DETAILED CONTENTS

Theory

1. Mycology (04 hrs)
 - Characteristics and classification of medically important fungi
2. Fungal Culture media (02 hrs)
 - SDA (Sabouraud's dextrose agar) with and without antibiotics
 - CMA (Corn meal agar)
 - BHI (Brain Heart Infusion)
3. Collection and processing of sample for fungal infection in Skin, Nail and Hair (02 hrs)
 - KOH preparation
 - LCB (Lactophenol cotton blue)
 - India ink
4. Fungal Cultivation (06 hrs)
 - Medically important fungi - Candida & Dermatophytes
 - Laboratory Contaminants – Penicillium, Rhizopus, Mucor, Aspergillus
5. Introduction to Immunology (06 hrs)
 - Immunity:
 - Innate and Acquired
 - Antigens (04 hrs)
 - Definition, types and properties
7. Antibodies (04 hrs)
 - Definition, types and properties
8. Antigen – Antibody Reactions (06 hrs)
 - Principle and applications of agglutination, precipitation and flocculation reactions

- 9 Serological tests (14 hrs)
- a) Principle, techniques and interpretation of
 - Widal - Tube method/ Titre slide method
 - Anti streptolysin O
 - C-reactive protein
 - VDRL/RPR
 - Rheumatoid factor (RF)
 - b) Principle, techniques and application of
 - ELISA (direct and indirect)
 - RT-PCR Test for COVID 19

LIST OF PRACTICALS

1. Preparation of different culture media used in mycology - Sabouraud's dextrose agar with and without antibiotics, Corn meal agar, BHI (Brain, Heart Infusion)
2. To perform wet mount techniques – KOH and LCB
3. To study characteristics of common laboratory fungal contaminants
4. Collection and processing of samples for diagnosis of fungal infections in skin, hair, nail scrapings
5. To perform serological tests
 - Widal test (Both slide and tube method)
 - ASO titre
 - CRP
 - Rheumatoid factor
 - VDRL Test
 - HIV Screening
 - HBsAg Screening
 - RT-PCR Test for COVID 19
 -

INSTRUCTIONAL STRATEGY

The teacher should describe the morphology of important pathogenic and non-pathogenic fungi. The students should be taught to collect and process samples for isolation and identification of fungi. The teacher should emphasize on antigen and antibody tests and quality control in microbiology. The students should be taught with illustrations/audio-visual aids.

RECOMMENDED BOOKS

1. Medical Laboratory Technology by Kanai Lal Mukherjee; Tata McGraw Hill Publishers, New Delhi
2. An introduction to Medical Laboratory Technology by FJ Baker; Butterworth Heinemann Oxford
3. Textbook of Microbiology by Ananthanarayan and Panikar; Orient Longman, Hyderabad
4. Practical Book of Medical Microbiology by Satish Gupta; JP Brothers, New Delhi
5. Text Book of Medical Microbiology by Satish Gupta; JP Brothers, New Delhi
6. Medical Laboratory Manual for Tropical Countries Vol. I and II by Monica Cheesberg; Cambridge University Press; UK
7. Text Book of Medical Laboratory Technology by Praful B Godkar; Bhalani Publishing House; Mumbai
8. Medical Lab Science Theory and Practice by J Ochei and A Kolhatkar
9. Text Book of Medical Microbiology by Greenwood, ELBS

Course Outcomes

After undergoing the subject, the student will be able to:

1. Utilise techniques of collection of samples and their processing.
2. Identify various fungal infections and diagnosis of microbial infections by serological methods.
3. Apply safety measures while handling infected materials.
4. Isolate and identify fungi and do serological tests for various microbial infections.

SUGGESTED DISTRIBUTION OF MARKS		
Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	4	8
2	2	6
3	2	6
4	6	12
5	6	12
6	4	8
7	4	8
8	6	12
9	14	28
Total	48	100

Course Code	:	MLT 402
Course Title	:	Haematology- IV
Number of Credits	:	4 (L: 2 T: 0, P: 4 DCS:1)
Prerequisites	:	NIL
Course Category	:	PC

HAEMATOLOGY - IV

L P D
2 4 1

Course Objectives

1. This subject aims to enable the students to carry out routine clinical laboratory investigation (blood, urine etc).
2. He/she should be able to provide technical help for sophisticated haematological techniques with adequate knowledge of various principles.
3. The training in laboratory safety is also provided.

DETAILED CONTENTS

Theory

1. Introduction to normal haemostasis (22 hrs)
 - Theories of blood coagulation
 - Platelets and their role in haemostasis including count
 - Bleeding disorders and related diseases
 - Principles, clinical importance, reference values and methods of: prothrombin time, prothrombin time index (PTI) International normalized ratio (INR), Activated Partial Thromboplastin time (APTT), Thrombin Time (TT), bleeding time (BT), Hess test, clotting time (CT), and clot retraction test (CRT)
2. Bone – marrow (05 hrs)
 - Composition and function of bone-marrow
 - Aspiration of bone-marrow by various methods
 - Preparation, staining and examination of bone-marrow smears for myelogram including M.E. Ratio
 - Iron staining (Perls' reaction)
 - Significance of bone-marrow examination
3. Leukemia (10 hrs)
 - Definition of leukemias
 - (FAB) Classification
 - Laboratory diagnosis of various leukemias
4. LE Cell phenomenon (03hrs)
 - Phenomenon of LE cell, its differentiation from tart cell
 - Demonstration of LE cell by various methods
 - Clinical significance
5. Semen Analysis in detail (04 hrs)
6. Cell counts of various biological fluids (04 hrs)

LIST OF PRACTICALS

1. Determination of bleeding time by Ivy's and Dukes method
2. Determination of clotting time by Lee and White method
3. Determination of prothrombin time, index and INR (International Normalised Ratio)
4. Determination of Activated Partial thromboplastin time (APTT)

5. Demonstration of Hess test
6. Performance of Clot retraction test
7. Demonstration of LE Cell
8. Cell counts of biological fluids
9. Semen analysis

INSTRUCTIONAL STRATEGY

Teachers should lay emphasis on concepts and principles while covering the subject contents. In practical work, the students should be given the opportunity to do practical work individually. Visits to hospital/medical colleges should be planned to demonstrate the processes. It is important to make use of models and audiovisual aids to show specific processes. Experts should be invited to deliver lectures on specific topics and share their experiences.

RECOMMENDED BOOKS

1. Medical Laboratory Technology Vol. 1 by KL Mukherjee; Tata McGraw Hill Publishing Company, New Delhi
2. An Introduction to Medical Laboratory Technology by FJ Baker; Butterworths Heinemann, Oxford
3. Medical Laboratory Manual for Tropical Countries by Monica Cheesberg; Cambridge University Press; UK
4. Textbook of Medical Laboratory Technology by Praful B Godkar; Bhalani Publishing House, Mumbai
5. Practical Haematology by J.V Decie; ELBS with Churchill Living Stone, UK
6. Medical Laboratory Science Theory and Practical JO Chei and Kolhatkar, Tata McGraw Hill Publishing Company Ltd., New Delhi
7. Haematology for Medical Technologists by Charles F. Seiverd 5th Ed. 1983, Lea & Febigue Philadelphia

Course Outcomes

After undergoing the subject, the student will be able to:

1. Carry out routine clinical laboratory investigation (blood, urine etc).
2. Provide technical help for sophisticated hematological techniques with adequate knowledge of various principles.
3. Use laboratory safety techniques.

SUGGESTED DISTRIBUTION OF MARKS		
Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	22	46
2	5	10
3	10	21
4	3	6
5	4	9
6	4	8
Total	48	100

Course Code	:	MLT 403
Course Title	:	Clinical Biochemistry- III
Number of Credits	:	4.5 (L: 3 T: 0, P: 3 DCS:0)
Prerequisites	:	NIL
Course Category	:	PC

CLINICAL BIOCHEMISTRY- IV

L P D

3 3 –

Course Objectives

1. The students are imparted basic training of theoretical and practical aspects in the field of clinical biochemistry.
2. The students are made to learn the technique of collection of clinical samples and their processing along with recording of data.
3. The student will also obtain the basic knowledge of chemistry and metabolism of various metabolites which are routinely estimated in different diseases so that a clear understanding of different tests is obtained.
4. The students are also given basic training in safety measures, quality control and automation

DETAILED CONTENTS

Theory

1. Urine Analysis (11hrs)
 - Normal composition of urine
 - Clinical importance of urine analysis
 - Qualitative analysis of proteins, sugar, bile salts, bile pigments, urobilinogen and blood.
 - Detailed discussion on glycosuria and albuminuria
 - Ketone bodies
 - Urinary electrolytes estimation (Na, K and Cl)
2. Stool Chemistry (08hrs)
 - Physical characteristics and chemical composition of stool
 - Significance of presence of blood and excess fat in stool
 - Occult blood detection
3. Cerebrospinal Fluid (05hrs)
 - Composition of CSF and its functions
 - Methods of determination of proteins, sugar and chloride in CSF
 - Reference Values
 - Clinical importance
4. Biological fluids (05hrs)

Formation, composition and significance of biological fluids (peritoneal, pleural, synovial, ascetic fluid).
5. Electrophoresis (04hrs)
 - Theory
 - Principle and procedure of paper, gel electrophoresis, method of elution
 - Clinical importance
6. Chromatography (04 hrs)
 - Theory of Chromatography, separation between stationary and mobile phases
 - Principle and procedure of Paper chromatography
 - Importance of chromatography
7. Automation in Biochemistry (05 hrs)
 - Classification and types of Auto analyzers
8. Thyroid function tests (04 hrs)
 - Clinical importance of T3, T4 and TSH
9. Introduction to Tumor markers (02hrs)
 - Commonly used Tumor Markers (Cancer Markers)

LIST OF PRACTICALS

1. Analysis of urine for sugar and proteins (qualitative and quantitative)
2. Detection of ketone bodies in urine
3. Detection of haematuria
4. Detection of bile pigments, bile salts and urobilinogen
5. Occult blood test for stool specimen
6. Estimation of glucose in CSF
7. Estimation of total proteins and globulins in CSF
8. Estimation of chloride in CSF
9. Titration for acidity determination and qualitative analysis of gastric juice
10. Demonstration of electrophoresis (Paper electrophoresis)
11. Demonstration of chromatography (Paper chromatography)

INSTRUCTIONAL STRATEGY

Teachers should lay emphasis on concepts and principles while covering the subject contents. In practical work, the students should be given the opportunity to do practical work individually. Visits to hospital/medical colleges should be planned to demonstrate the processes. It is important to make use of models and audiovisual aids to show specific processes. Experts should be invited to deliver lectures on specific topics and share their experiences.

RECOMMENDED BOOKS

1. A Procedure Manual for Routine Diagnostic Tests, Vol. I, II and III by KL Mukherjee; Tata McGraw Hill Publishers, New Delhi
2. Practical Clinical Biochemistry by Varley; Heinmann Publishers, Oxford
3. A Text Book of Medical laboratory Technology by P Godkar; Bhalani Publishers, Mumbai
4. Medical Laboratory Science Theory and Practice by J Ochaei and A Kolhatkar,

Course Outcomes

After undergoing the subject, the student will be able to:

1. Apply basic training of theoretical and practical aspects in the field of clinical biochemistry.
2. Use collection techniques for clinical samples and their processing along with recording of data.
3. Have basic knowledge of chemistry and metabolism of various metabolites and have clear understanding of different routine tests
4. Understand basics of safety measures, quality control and automation

SUGGESTED DISTRIBUTION OF MARKS		
Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	11	20
2	8	16
3	5	10
4	5	10
5	4	10
6	4	10
7	5	10
8	4	10
9	2	4
Total	48	100

Course Code	:	MLT 404
Course Title	:	Histopathology Cytology- II
Number of Credits	:	4.5 (L: 3 T: 0, P: 3 DCS:1)
Prerequisites	:	NIL
Course Category	:	PC

HISTOPATHOLOGY AND CYTOLOGY - II

L P D
3 3 1

Course Objectives

1. This part of the subject is aimed at exposing the students to the latest advancements and automation in the field of histopathology and cytology.

DETAILED CONTENTS

Theory

1. Light Microscope (1 hrs)
 - Principles of light microscope
 - Various parts of microscope
 - Uses of microscope
 - Cleaning and maintenance of microscope
 - Various attachments of compound microscope (principle only)
 - Polarizing microscopy
 - Dark field microscopy
 - Phase contrast microscopy
 - Fluorescent microscopy
 - Electron microscopy
2. Special stains (12hrs)
 - Principle, significance and interpretation of different types of stains
 - PAS (Periodic Acid Schiff's Reagent)
 - Silver impregnation stain – Reticulin fibre
 - Ziehl Neelson's – for AFB and Leprae
 - Masson's trichrome stain
 - Oil Red O – fat
 - Gram's stain – Gram +ve and Gram –ve
3. Decalcification (06hrs)
 - Process of decalcification
 - Various types of decalcifying methods
 - Their mechanism, advantage, disadvantage and applications
 - Assessment of decalcification
4. Handling of fresh histological tissues (Frozen Section) (07 hrs)
 - a Reception and processing of frozen tissue
 - b Freezing microtome and cryostat
 - c Advantages and dis-advantages of freezing microtome and cryostat
 - d Working, care, maintenance of freezing microtome and cryostat Frozen section cutting
 - e Staining
 - Rapid H&E
 - Fat stain
 - f Mounting of frozen section
5. Museum Techniques (10hrs)
 - Introduction to museum with emphasis on importance of museum

- Reception, fixation and processing of various museum specimens
- Cataloging of museum specimen
- 6. Autopsy (02hrs)
 - Introduction to autopsy technique (Care and maintenance of autopsy area, autopsy instruments, handling of dead bodies),
 - Use of autopsy
- 7. Malignant Cells (02hrs)
 - Characteristics
 - Differences from normal cell
- 8. Hormonal Assessment (02hrs)
 - Importance of HCG
 - Use of Hormonal Assessment (Pregnancy Test)
- 9. Aspiration Cytology (06hrs)
 - a. Principle of FNAC (Fine Needle Aspiration Cytology)
 - b. Indications of FNAC
 - c. Uses of FNAC
 - d. Staining Techniques
 - PAP Stain
 - MGG (May-Grunwald – Giemsa)
 - H&E (Haematoxylin & Eosin Stain)
- 10. Cytological special stains (04hrs)
 - Principle, Technique & Interpretation of :
 - PAS (Periodic Acid Schiff's reagent Stain)
 - Zeihl Neelson's(ZN) Stain (AFB)
- 11. Advancements in Cytology (02hrs)
 - Automation in Cytology, Use of Cytospin

LIST OF PRACTICALS

1. Demonstration of various parts of light microscope (Mechanical & Optical)
2. Demonstration of cryostat (brochures and charts can be used)
3. Processing of tissue for frozen section
4. Staining and mounting of frozen sections using H&E stain (rapid method), Oil Red "O".
5. Preparation of various mounting reagents for museum specimens
6. Demonstration and care of autopsy instruments
7. Demonstration of malignant cell
8. Preparation of dry smear and wet smear
9. To perform Pap stain
10. Fixation of smears and staining with MGG

INSTRUCTIONAL STRATEGY

Teachers should lay emphasis on concepts and principles while covering the subject contents. In practical work, the students should be given the opportunity to do practical work individually. Visits to hospital/medical colleges should be planned to demonstrate the processes. It is important to make use of models and audiovisual aids to show specific processes. Experts should be invited to deliver lectures on specific topics and share their experiences.

RECOMMENDED BOOKS

1. An Introduction to Medical Laboratory Technology by FJ Baker; Butterworths Scientific, London
2. Carleton's Histological Technique by RAB, Drury, MADM (OXON), FRC Path, Northwick Paru Hospital, Harrow, Middlesex
3. Theory and Practice of Histological Technique by John D. Bancroft, Churchill Livingstone, London
4. Cellular Pathology Techniques by CFA Culling, Butterworths, London
5. Medical Lab Technology by Dr. Ramnik Sood, MD, Maulana Azad College, New Delhi

6. Diagnostic Cytology and its Histopathology Basis by Leo Pold G.Koss; JB Lupein, Philadelphia

Course Outcomes

After undergoing the subject, the student will be able to:

1. Exposure to the latest advancements and automation in the field of histopathology and cytology.

SUGGESTED DISTRIBUTION OF MARKS		
Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	11	18
2	12	20
3	6	8
4	7	8
5	10	16
6	2	4
7	2	4
8	2	4
9	6	8
10	4	6
11	2	4
Total	64	100

Course Code	:	MLT 405
Course Title	:	Medical Laboratory Management
Number of Credits	:	3 (L: 3 T: 0, P: 0 DCS:1)
Prerequisites	:	NIL
Course Category	:	PC

MEDICAL LABORATORY MANAGEMENT

L P D
3 - 1

Course Objectives

1. The students are taught techniques of planning a clinical laboratory.
2. They are also supposed to be taught how to procure chemicals, reagents and equipment.
3. The students are imparted special training in maintaining laboratory equipment, the preventive maintenance and daily up keeping.
4. The students are also given training for the maintenance of stocks and inventory.
5. They are also given knowledge of recording results, interpretation, quality control and reproducibility.
6. Students also learn how to communicate effectively.

DETAILED CONTENTS

Theory

1. Introduction, Layout, Facility of clinical Laboratory (08 hrs)
Role of medical laboratory technology in total health care, principles of management, techniques of planning, physical facilities/equipments – layout and design
2. Laboratory Organization and Layout (08 hrs)
 - Laboratory organization, operation, job description, evaluation, performance
 - Layout of clinical laboratories
 - Lay out of Blood Bank
3. Material Required (06 hrs)
Material management, procurement, financial resources, importing, inventory, control and analysis, inspection, storage etc
4. Quality Assurance (10 hrs)
Analytical control, Internal and external quality assurance in clinical laboratories, precision, accuracy, standard deviation as per national standards
5. Safety Precautions (05 hrs)
Safety measures in clinical laboratories (microbiology, haematology, biochemistry, histopathology and cytology, transfusion medicine), Disposal of Biomedical waste.
6. First Aid in Clinical Laboratory: (09 hrs)
 - a) Acid burn/Alkali burn
 - b) Accidental trauma
 - c) Gas/Toxic inhalation
 - d) Spillage
7. Medical Ethics and Code of Conduct (08 hrs)
Ethics and code of conduct - legal aspects – confidentiality malpractice/ negligence; legal implications, law suits, consumer protection and insurance for professional health hazards
8. Laboratory Equipment - Care and Maintenance (05 hrs)
Preventive maintenance and care of various laboratory equipment
9. Role of Computer in Lab services (03 hrs)
Storage and retrieval of laboratory data manually and with help of computers
10. Laboratory Accreditation – Introduction (02 hrs)

INSTRUCTIONAL STRATEGY

Teachers should lay emphasis on concepts and principles while covering the subject contents. In the practical work, the students should be given the opportunity to do practical work individually but under supervision. Visits to hospital/medical colleges should be planned to demonstrate the processes. It is important to make use of models and audiovisual aids to show specific processes. Experts should be invited to deliver lectures on specific topics and share their experiences.

RECOMMENDED BOOKS

1. Medical Laboratory Technology by Praful B Godkar; Bhalani Publishing House, Mumbai (India)
2. Text Book of Medical Laboratory Technology by FJ Baker; Butterworths Heinmann Publishers, Oxford
3. Text Book of Medical Laboratory Technology by KL Mukherjee Vol I, II and III; Tata McGraw Hill Publishers, New Delhi
4. Medical Lab Technology by Ramnik Sood, Jay Pee Brothers, New Delhi
5. District Laboratory Practice in Tropical Countries by Monica Chesbrough, Churchill Livingstone.
6. Laboratory Management by Puthwilliams.

Course Outcomes

After undergoing the subject, the student will be able to:

1. Utilise techniques of planning a clinical laboratory.
2. Procure chemicals, reagents and equipment.
3. Maintain laboratory equipment, preventive maintenance and daily up keeping.
4. Maintain stocks and inventory.
5. Record results with interpretation, quality control and reproducibility. Communicate effectively.

SUGGESTED DISTRIBUTION OF MARKS		
Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	8	12
2	8	12
3	6	10
4	10	14
5	5	8
6	9	16
7	8	14
8	5	7
9	3	5
10	2	2
Total	64	100

Course Code	:	MLT 406
Course Title	:	Employability Skills- II
Number of Credits	:	1 (L: 0 T: 0, P: 2 DCS:0)
Prerequisites	:	NIL
Course Category	:	HS

Employability Skill

L P D

0 2 0

Course Objective

The present day world requires professionals who are not only well qualified and competent but also possess good communication skills.

- 1 Students not only need to possess subject related knowledge but also soft skills to get good jobs or to rise steadily at their workplace.
- 2 The objective of this subject is to prepare students for employability in the job market and survive in cut throat competition among professionals.

DETAILED CONTENTS

1. Oral Practice
 - i) Mock interview (05 hrs)
 - ii) Preparing for meeting (05 hrs)
 - iii) Group discussion (05 hrs)
 - iv) Seminar presentation (05 hrs)
 - v) Making a presentation (12 hrs)
 - a. Elements of good presentation
 - b. Structure and tools of presentation
 - c. Paper reading
 - d. Powerpoint presentation