CURRICULUM

FOR THE TRADE OF

CLINICAL MEDICAL LABORATORY TECHNICIAN (PATHOLOGY)

UNDER

APPRENTICESHIP TRAINING SCHEME

सत्यमेव जयते
Government of India

GOVERNMENT OF INDIA
MINISTRY OF SKILL DEVELOPMENT & ENTREPRENURESHIP
DIRECTORATE GENERAL OF TRAINING

CONTENTS

1. ACKNOWLEDGEMENT

We sincerely express appreciation for the contribution of the Industry, which includes various hospitals, pathology labs & diagnostic centers along with, Trade Experts and all others who contributed in designing & continuously improving the curriculum. Special acknowledgement to the following industries/organizations who have contributed valuable inputs in revising the curriculum through their expert members:

1. Godrej Memorial Hospital
2. N.M.Medical (Mumbai)

Special acknowledgement is expended by us to the following expert members who had contributed immensely in this curriculum.

Dr. SuhasGangurde

Prof. Dr. NeelaDabir

Mr. Sumit Kati

Dr. Atisha Kati

Dr. Sheetal Shirke

Dr. ReshmaSahane

Mrs. Sneha Tetame

Mr. Avishesh Jha

Mrs. SushmaShetty

2. BACKGROUND

1.1 Apprenticeship Training Scheme under Apprentice Act 1961

The Apprentices Act, 1961 was enacted with the objective of regulating the programme of training of apprentices in the industry by utilizing the facilities available therein for imparting on-the-job training.

The Act makes it obligatory for employers in specified industries to engage apprentices in designated trades to impart Apprenticeship Training on the job in industry to school leavers and person with 12th Science Pass Certificateto develop skilled manpower for the healthcareindustry**.** There are four categories of apprentices namely**; trade apprentice, graduate, technician and technician (vocational) apprentices.**

Qualifications and period of apprenticeship training of **trade apprentices** vary from trade to trade. The apprenticeship training for trade apprentices consists of basic training followed by practical training. At the end of the training, the apprentices are required to appear in a trade test conducted by TISS (Tata Institute of Social Science) and those successful in the trade tests are awarded the Appropriate Certificate.

Certificates are awarded on completion of training by the Department of Education, Ministry of Human Resource Development.

1.2 Changes in Industrial Scenario

Recently, we have seen huge changes in the Indian industry. The Indian Industry registered an impressive growth during the last decade and half.

The number of industries in India have increased manifold in the last fifteen years especially in services and manufacturing sectors. It has been realized that India would become a prosperous and a modern state by raising skill levels, including by engaging a larger proportion of apprentices, will be critical to success; as will stronger collaboration between industry and the trainees to ensure the supply of skilled workforce and drive development through employment.

Various initiatives to build up an adequate infrastructure for rapid industrialization and improve the industrial scenario in India have been taken.

1.3 Reformation

The Apprentices Act, 1961 has been amended and brought into effect from 22nd December, 2014 to make it more responsive to industry and youth. Key amendments are as given below:

- Prescription of number of apprentices to be engaged at establishment level instead of trade-wise.
- Establishment can also engage apprentices in optional trades which are not designated, with the discretion of entry level qualification and syllabus.

- Scope has been extended also to non-engineering occupations.
- Establishments have been permitted to outsource basic training in an institute of their choice.
- The burden of compliance on industry has been reduced significantly.

3. RATIONALE

[Need for Apprenticeship in Clinical Medical Laboratory Technician (Pathology)]

1. It will enhance the ability of the Technician to take samples and its labeling, record keeping, cleaning, preparation of various stains and reagents while examination of blood, stool, urine, sputum and semen etc.
2. It will enhance the ability of the Technician to work safely in a lab without harming the patients and causing cross infection,
3. It will enhance the ability of the Technician to manage different kinds of Bio-medical Waste with its various Disposal methods.
4. It will enhance the ability of the Technician to organize blood donation camp, donor motivation and screening, quality control, maintenance of blood bank and safety.
5. It will enhance the ability of the Technician to understand various chemical agents, equipment used and perform various tests under clinical biochemistry, Serology and Histopathology.
6. It will enhance the ability of the Technician to understand hazards of microbes and safe handling of microbial organism.
7. It will enhance the ability of the Technician to maintain Laboratory equipment and to keep quality control.
8. It will enhance the ability of the Technician to follow all acts and regulations including safety protocols, confidentiality Protocols and home visit protocols
9. It will enhance the ability of the Technician to perform all routine as well as special haematological Tests for the accuratelaboratory diagnosis.
10. It will enhance the ability of the Technician to understand the drug dosages &its effects as well as the intensity of its effect, their metabolism and excretion of drugs as well as monitoring of individual drug concentration.
11. It will enhance the ability of the Technician to understand various tumour& cancer markers as well as chromosomal studies.

4. JOB ROLES

Brief description of Job roles:

Clinical Medical Laboratory Technician (Pathology):-

- Arranges and sets various instruments and apparatus in clinical laboratory for conducting various pathological and bacteriological study
- Conducts routine tests of blood, urine, sputum etc. for medical purposes and for diagnosis of diseases.
- Sets in position required apparatus and equipment and makes necessary electrical connections.
- Prepares standard solutions, reagents, media for culture etc. by weighing, grinding, mixing and dissolving prescribed proportion of sample or chemical in water or other liquids etc. collects samples such as water, urine, blood, sputum etc. in clean and sterile containers or slides for bacteriological, pathological or biological study.
- Assists in conducting routine test of urine, stool, sputum or blood to determine sugar content, germs or worms or blood groups as required.
- Mounts and prepares slides with specimens for microscopic study by physicians and specialists.
- Washes, cleans and dries apparatus and equipment after use and maintains them in proper working condition.
- Keeps required chemicals and solutions readily available and replenishes stock from stores.
- Maintains laboratory in clean and tidy condition.
- May maintain record of types of tests performed and stock in laboratory.

5. GENERAL INFORMATION

1. **Name of the Trade** **: Clinical Medical Laboratory Technician (Pathology)**

2. **Duration of Apprenticeship Training (Basic Training + Practical Training):** 2 years
   Duration of Basic Training: - 06 months

3. **Duration of Practical Training (On -job Training): -** 18 months

4. **Entry Qualification** : Passed 12th Class Examination under (10+2) System of Education with Physics, Chemistry & Biology.

5.Selection of Apprentices : The apprentices will be selected as per Apprentices Act amended time to time.

Note: *Industry may impart training as per above time schedule, however this is not fixed. The industry may adjust the duration of training considering the fact that all the components under the syllabus must be covered. However the flexibility should be given keeping in view that no safety aspect is compromised and duration of industry training to be remained as 1 year.*

6. SYLLABUS

6.1 BASIC TRAINING

DURATION: 6 months

GENERAL INFORMATION

1) **Name of the Trade** : **ClinicalMedical Laboratory Technician (Pathology)**
2) **Batch size** : 20
3) **Examination** : The internal assessment will be held at appropriate intervals by TISS (Tata Institute of Social Science).
4) **Instructor Qualification** :

i)	MD Pathology
	OR
ii)	DNB Pathology
	OR
iii)	M.B.B.S. / B.A.M.S. / B.H.M.S.
	OR
iv)	BSC MLT Trained Staff with one year experience

5) **Tools, Equipment & Machinery required** : - As per Annexure – I

6.1 DETAIL SYLLABUS OF BASIC TRAINING

6.1.1 DETAIL SYLLABUS OF PROFESSIONAL SKILLS & PROFESSIONAL KNOWLEDGE

Basic Training

Blocks	Syllabus of Professional Skills & Professional Knowledge
Block – I	**Anatomy-1** **Main Concepts:** Anatomy of Head, Neck & Face, Surface Markings and Clinical Anatomy of Head, Neck& Face, Anatomy of Upper limb, Surface Markings and Clinical Anatomy Anatomy of Upper Limb, Anatomy of Thorax.
	Physiology-1 **Main Concepts:** Introduction to physiology, Structure of Cell, Composition & Functions of Blood, Lymphatic System, Cardiovascular System
	Phlebotomy **Main Concepts:** Training for Withdrawing Blood - Safety & Infection Control Measures, Bio-Medical Waste Management, Interpreting Investigation Slips, Equipment & Supplies required, Assisting Patient, Locating Appropriate site for Obtaining Blood Samples, Drawing Blood Specimen from Patients, Labeling the Samples, Portering the Samples, Updating the Patient Record
	Basic Concepts in MLT-1 **Main Concepts:** Basic Laboratory Principles and Procedures, Glassware, Solutions and Reagents, Equipment& Instruments
	Bio-Medical Waste Disposal-1 **Main Concepts:** Introduction to Bio-medical Waste Management, Categorizing Biomedical Waste, Appropriate Disposal of Urine and Stools, Disposal of Infectious Waste, Disposal of Hazardous Waste, Protocol to be followed in case of Exposure to Infectious or Hazardous Waste
Block II	**Anatomy-2** **Main Concepts:**Abdominal Part of Oesophagus and Stomach, Anatomy of Abdomen, Anatomy of Pelvis, Anatomy of Lower Limb, Contents of Vertebral Canal, Surface Markings & Clinical Anatomy of Lower Limbs
	Physiology-2 **Main Concepts:**Physiology of Respiratory System, Physiology of Digestive System, Physiology of Excretory System, Physiology of Nervous System, Physiology of Skin, Physiology of Muscular System
	Basic Concepts in MLT-2 &Lab Management and Ethics **Main Concepts:** Maintaining Equipment and Quality Control, Acts and Regulations including Safety Protocols, Confidentiality Protocols and Home Visit Protocols, Training the Technician, Guidelines for Good Clinical Laboratory Practices.
	Clinical Biochemistry-1

	Main Concepts: Human Nutrition, Carbohydrate Metabolism, Protein Metabolism, Lipid Metabolism, Water Metabolism, Mineral Metabolism, Haemoglobin Metabolism.
	Bio-Medical Waste Disposal-2 **Main Concepts:** Disposal of Laboratory Wastes, Bio-medical Waste Management System, Importance of Occupational Safety and Health, Radioactive Waste Management ,Genotoxic / Cytotoxic Waste Management, Legal Regulations for Biomedical Waste Management & Radioactive Waste Regulation Laws.
Block III	**Clinical Biochemistry-2** **Main Concepts:** Renal Function Tests, Chemical Tests in Renal Disease, Gastric Function Test, Liver Function Tests, Cardiac Profile Tests, Acid base balance concepts & disorders, Phosphorylation, Enzymes, Vitamins, Milk & Composition of Milk, Interpretative Clinical Chemistry.
	Microbiology-Bacteriology **Main Concepts:** Clinical Microbiology, Clinical Bacteriology Laboratory, Staining Methods & Aseptic Techniques, Culturing Microorganisms, Identification of Bacteria, Study of Gram Negative Bacteria, Study of Gram Positive Bacteria, Automation, Collection, Transport & Examination of Specimen.
	Haematology& Coagulopathies-1 **Main Concepts:** Introduction to Haematology**,** Haematological Diseases**,** Haemostasis, Coagulation and Routine Coagulation Tests.
	Immunology & Diagnostic Serology-1 **Main Concepts:** Introduction to Immunology, Clinical Immunology, Factors influencing Immunity Immunological Reactions & Related Terms, Antibodies & Immunoglobulin Classes, Role of Antibodies in Diagnostic Applications, Research Applications of Antibodies, Antigen-Antibody Interactions, Serological Diagnosis of Microbial Diseases, Principles of Serodiagnostic Tests.
	Histopathology & Personality Development: Patient and Relatives Communication **Main Concepts:** Histopathology Techniques and Laboratory Requirements &Personality Development: Patient and Relatives Communication.
Block IV	**Clinical Pathology-1 (General Pathology)** **Main Concepts:** General Pathology, Techniques for the Study of Pathology, Cell Injury and Cellular Adaptations, Immunopathology including Amyloidosis, Derangement of Homeostasis and Haemodynamics, Inflammation and Healing, Infectious and Parasitic Diseases, Neoplasia.
	Microbiology-Virology **Main Concepts:** Introduction to Virus, Virus Classification, General Characteristics common to Virus, Cultivation of Viruses, Reaction to Physical & Chemical Agents, Methods of Inactivation of Viruses, DNA containing Viruses, RNA containing Viruses, General Transmission Routes for Viruses, Interferons, Laboratory Diagnosis of all Important Viruses.

	Haematology& Coagulopathies-2 **MainConcepts:**Haematology&Lymphoreticular Tissues—Pathology, Routine HaematologicalTests,SpecialHaematological Tests
	Immunohematology, Blood Banking Techniques and Transfusion Methods **Main Concepts:** Immunohematology, Blood Banking Techniques and Transfusion Methods, Human & Rhesus Blood Group Systems, Other Blood Group Systems, Rh and Pregnancy, Inheritance of Blood Group System Genetics, Blood Transfusion, Collection of Blood from the Donor, Instruction to the Donor after Blood Donation, Storage of Blood, Blood Transfusion Reactions, Quality Control in Blood Bank Procedures, Blood Preservation, Biochemical Changes During Storage of Donor Blood Preparation and Selection of Blood Components, Protocol for Producing Blood Components, Selection of Blood Components, Techniques Used for Separation of Blood Components, Blood and Blood Components Transfusion, Blood Transfusion Alternatives
	Mycology & Cytology **Main Concepts:**Details of Mycology - Parasitic Fungi, Laboratory Diagnosis of Mycotic Infections, Laboratory Culture, Detection and Identification of Fungi by PCR Technology, Differentiation between Normal and Abnormal Cells, Sampling Techniques in Cytology, Various types of Specimens and Requirements for Cytological Studies, Various Cytological Tests, Fixation of Cytological Smears Importance of Cyto-Centrifuge in Cytology, Liquid Based Cytology (LBC)

6.1.2 EMPLOYABILITY SKILLS

GENERAL INFORMATION

1) **Name of the subject** : **EMPLOYABILITY SKILLS**

2) **Examination** :The examination will be held at appropriate Intervalsby TISS (Tata Institute of Social Science).

3) **Instructor Qualification** :

i)	**MBA/BBA with two years of experience in Employability skill**
	OR
ii)	**Any graduate with two years of experience and must have studied in English/Communication Skill and Basic Computer at 12th /diploma level**
	OR
iii)	**ANM Nurse /GNM Nurse with two years of experience in Employability skill and must be good in Communication Skills.**
	OR
iv)	**B.Sc Nursing Staff /Mentor with a year of experience and must be good in Communication Skills.**

6.2 PRACTICAL TRAINING (ON-JOB TRAINING)

DURATION: 18 months

GENERAL INFORMATION

1) **Name of the Trade** **: Clinical Medical Laboratory Technician (Pathology)**

2) **Batch size** :Maximum 20 candidates

3) **Examination** : The internal assessment will be held at appropriate intervals by TISS (Tata Institute of Social Science).

4) **Instructor Qualification** :

i)	MD Pathology OR
ii)	DNB Pathology OR
iii)	M.B.B.S. / B.A.M.S. / B.H.M.S. OR
iv)	BSC MLT Trained Staff with one year experience

5) **Infrastructure for On-Job Training** : - As per Annexure – II

6.2.1 BROAD SKILL COMPONENT TO BE COVERED DURING ON- JOB TRAINING

1. **Safety and best practices (5S, KAIZEN etc.)**
2. **Record keeping and documentation**

Blocks	List of Practical Skills to be Covered During on- Job Training (VOCATIONAL PRACTICAL)
Block - I	**Assessment Tasks:** ❖ Demonstration of Anatomical Structures of Head, Neck & Face. ❖ Demonstration of the Surface Markings and Clinical Anatomy of Head, Neck & Face. ❖ Demonstration of Anatomical Parts of Upper Limbs. ❖ Demonstration of Surface Markings and Clinical Anatomy of the Upper Limb. ❖ Demonstration of the Anatomy of Heart. ❖ Demonstration of the Anatomy of Pectoral Region. ❖ Demonstration of the Anatomy of Lungs. ❖ Demonstration of the Anatomy of Trachea, Oesophagus and Thoracic Duct. ❖ Demonstration of the Structure of Cell. ❖ Demonstration of different Cell Organelles. ❖ Demonstration of different Components of Blood. ❖ Demonstration of structure & function of Lymph Nodes. ❖ Demonstration of different kinds of Immune Cells. ❖ Demonstration of Location of Lymph Nodes. ❖ Demonstration of Normal Functioning of cardio-vascular system. ❖ Demonstrate the various ways of assisting the patient before, during and after the tests. ❖ Demonstration on how to locate appropriate site for obtaining blood samples. ❖ Demonstrate the correct way of drawing blood from patients ❖ Demonstration on preparing, labelling and dispatching the blood samples. ❖ Demonstration on the best procedures to store and transfer the blood samples. ❖ Demonstration on how to update patient records. ❖ Demonstration on how to work safely in a lab without cross infection. ❖ Demonstration on how to manage bio-medical waste in the workplace. ❖ Demonstration on how to Interpret investigation slips. ❖ Identify and explain about the necessary laboratory equipment and supplies. ❖ Demonstration of Various Laboratory Equipment & Instruments ❖ Demonstration on the Care & Maintenance of Glassware ❖ Demonstration on the Different Laboratory Solutions and Reagents. ❖ Demonstration of the Preparation of Reagents. ❖ Demonstration of the Various Laboratory Procedures. ❖ Demonstration of Various Types of Bio-medical waste. ❖ Demonstration of the Protocol to be followed in case of Exposure to Infectious or Hazardous Waste. ❖ Demonstration of Appropriate Disposal of Urine and Stools. ❖ Demonstration of Appropriate Disposal of Infectious Waste. ❖ Demonstration of Appropriate Disposal of Hazardous Waste. ❖ Demonstration of Communication Skills.

Block II	**Assessment Tasks:-** ❖ Demonstration of the Anatomy of Abdominal Part of Oesophagus and Stomach. ❖ Demonstration of the Anatomy of Pelvis ❖ Demonstration of the Anatomy of Lower Limb. ❖ Demonstration of the Surface Markings & Clinical Anatomy of Lower Limbs. ❖ Describe the Equipment, Reagents and other Laboratory materials ❖ Demonstration of the Specimen collection ❖ Demonstration of how to provide Requisition form & Accession list ❖ Demonstration on how to maintain Laboratory Equipment ❖ Demonstration of Training the Technician ❖ Demonstration of record keeping of rejected Specimen. ❖ Demonstration of Data management in Laboratory. ❖ Describe the Equipment, Reagents and other Laboratory materials ❖ Demonstration of the Specimen collection ❖ Demonstration of how to provide Requisition form & Accession list ❖ Demonstration on how to maintain Laboratory Equipment ❖ Demonstration of Training the Technician ❖ Demonstration of record keeping of rejected Specimen. ❖ Demonstration of Data management in Laboratory. ❖ Demonstrate how to calculate BMR, Energy & Nutritional Requirements of Human Body. ❖ Demonstration of Blood Glucose & G6PD Deficiency. ❖ Demonstration of Blood Urea Nitrogen, Serum Ammonia & Ammonium Salts. ❖ Demonstration of Lipid Profile ❖ Demonstration of Different Constituents of Bile. ❖ Demonstration of Serum Electrolytes. ❖ Demonstration of Communication Skills
Block III	**Assessment Tasks:** ❖ Demonstration of the Renal Function Tests ❖ Demonstration of other Chemical Tests in Renal Disease ❖ Demonstration of the Gastric Function Tests ❖ Demonstration of the Liver Function Tests ❖ Demonstration of the Cardiac Profile Tests ❖ Demonstration of the Staining Methods & Aseptic Techniques ❖ Demonstration of the Culturing Microorganisms ❖ Demonstration of the Collection & Transport of Specimen. ❖ Demonstration of the Identification of Bacteria ❖ Demonstration of the Study of Gram Negative Bacteria ❖ Demonstration of the Study of Gram Positive Bacteria ❖ Demonstration of the Automation process. ❖ Demonstration of Identification of various kinds of Haematological Disease Conditions. ❖ Demonstration of the Bleeding Disorders and Routine Coagulation Tests. ❖ Demonstration of Serological Diagnosis of Various Microbial Diseases such as Hepatitis & Tuberculosis, Syphilis, Enteric Fever. ❖ Demonstration of Screening Tests for Rheumatic Fever & Acute Glomerulonephritis. ❖ Demonstration of Determination of Antibodies. ❖ Demonstration of various Serodiagnostic Tests like ELISA, VDRL, WIDAL,C-Reactive Protein Test, Immunologic Pregnancy Test, detection of Hepatitis B

	Surface Antigen, Detection of Dengue Fever IgM&IgG. ❖ Demonstration of the Histopathological Examination of Tissues ❖ Demonstration of Various Types of Fixatives ❖ Demonstration of Freeze drying ❖ Demonstration of the Gross Examination of Specimen ❖ Demonstration of Preparation of Paraffin Sections ❖ Demonstration of Embedding. ❖ Demonstration of Various Methods of Preparation of Tissue sections. ❖ Demonstration of General Staining Procedure. ❖ Demonstration of Communication Skills.
Block IV	**Assessment Tasks:** ❖ Demonstration of the RNA & DNA containing Viruses. ❖ Demonstration of the Methods of Inactivation of Viruses. ❖ Demonstration of Routine Haematological Tests ❖ Demonstration of Special Haematological Tests ❖ Demonstration of various Blood Banking Techniques and Transfusion Medicine ❖ Demonstration of Collection of Blood from the Donor ❖ Demonstration on how to instruct to the Donor after Blood Donation ❖ Demonstration on how to store Blood after Collection. ❖ Demonstration of identification of Human Blood Groups ❖ Demonstration of identification of Rhesus blood groups ❖ Demonstration of identification of Other Blood Groups ❖ Demonstration of identification of Rh and Pregnancy test ❖ Demonstration of Preparation and Selection of Blood Components ❖ Demonstration of Protocol for Producing Blood Components ❖ Demonstration of Blood Transfusion Reactions ❖ Demonstration of Techniques Used for Separation of Blood Components ❖ Demonstration of Transfusion methods of Blood & Blood Components. ❖ Demonstration of Laboratory Diagnosis of Mycotic Infections ❖ Demonstration of Laboratory Culture ❖ Demonstration of how to Detect and Identify Fungi by PCR Technology ❖ Demonstration of how to Differentiate between Normal and Abnormal Cells ❖ Demonstration of how to perform Sampling Techniques in Cytology ❖ Demonstration of Fixation of Cytological Smears. ❖ Demonstration of Communication Skills

7. ASSESSMENT STANDARD

7.1 Assessment Guidelines:

a) Assessment Units:-

Each course of study, credited or non-credited, theory or practical related, will be assessed through the following assessment unit types with prescribed weightages, as per a pre-defined schedule, which is provided at the commencement of a semester.

These may involve individual or group work:

- Assignments/Projects which are held in the course of the semester, conducted as individual or group assessments.
- Assessment of Participant's Workbook by the faculty.
- Viva/oral test or examination.
- Vocational Practical examination.
- A student has to attempt each mode of assessment independently.
- Non-submission of assignment/Project will be treated as failed in the course and student will be given supplementary for that course after completion of all modes of assessment.

Due consideration to be given while assessing for team work, avoidance/reduction of scrape/wastage and disposal of scarpe/wastage as per procedure, behavioral attitude and regularity in training.

b) Grading Scheme:-

An eleven point grading scheme from 0-10 is used for grading all assessment units.
The following is the scheme of letter grades, equivalent grade point and qualitative description of the same.

Letter grade	Grade points (for GPA)	Qualitative description of letter grade
A+	10	Outstanding performance.
A	9	Excellent: demonstrating mastery of all learning or assessment situations.
A-	8	Very good: demonstrating mastery of most learning or assessment situations.
B+	7	Demonstrating thorough competence in most situations.
B	6	Demonstrating moderate competence in most situations.
B-	5	Acceptable: showing moderate competence in some situations, minimal competence in others.
C+	4	Minimally acceptable: demonstrating minimal competence in

		most situations, while showing considerable capacity for improvement.
C	3	Not passing, but still showing capacity for improvement or development.
C-	2	Unsatisfactory performance, marked by lack of engagement or inability to apply concepts.
D	1	Complete lack of engagement or comprehension; also, frequent absence.
F &ab	0	Non-completion of assignments or 'blank' responses on a test indicated as Not Passing -F. Absence or withdrawal from a course is indicated by 'ab'.

The grade point of a course is computed by taking the weighted average of the grade point received on each assessment unit.

A student must receive a minimum grade of C+ equivalent to 4 points, to be considered pass in any given course.

c) **Programme Completion/Credit Requirements Fulfillment:-**

- The Cumulative Grade Point Average (CGPA) is computed as the credit-weighted average over all courses undertaken over previous and current semesters, of all credits accumulated until that assessment period.
- A student must maintain a CGPA of 4 (equivalent to C+) in each semesters, in order to remain in the programme.
- A student must satisfactorily complete all compulsory requirements, and accumulate the requisite credits of a particular programme in order to become eligible for the degree.
- The programme requirements include credited and non-credited activities.
- A student must receive a CGPA of 4 points (equivalent to C+) to be considered that She / hehas completed the programme successfully.

d) Attendance:-

- Every student is expected to maintain regularity and 100% attendance for all programme requirements: classroom/theory courses, practical & On-Job Training.
- A minimum of 75% attendance is required for all theory as well as practical courses.

e) Credit Requirements Fulfillment:-

- The grade earned by a given course will be credited to the student only if he/she has the requisite attendance.
- Students with less than the required attendance will be considered as failed and will be

assigned a zero grade point in the course, even if assignments have been submitted and tests have been taken. Students will have to repeat the course in the future semester.

- Any course may be assessed by a variety of assessment units.
- All assignments must be completed and submitted as per the predefined schedule.
- No assignment submissions are permitted beyond the assignment closure date, as prescribed by each programme.

f) Supplementary and Improvement:-

Supplementary and Improvement assessment will be announced along with the declaration of semester results.

g) Re-evaluation:-

A student, who desires to have a re-evaluation of his/her answer papers or On – Job Training performance, shall be required to apply for re-evaluation within 10 working days after the declaration of results of the semester, by paying the requisite fees.

Assessment

After end of apprenticeship training, apprentices will appear in All India Trade Test Conducted by National Council for Vocational Training

8. FURTHER LEARNING PATHWAYS

1. Graduation/ B.Voc / B.Sc./ Masters in MLT
2. Advance Courses in Medical Field

Employment opportunities:

On successful completion of this course, the candidates shall befullyemployed in the following industries:

1. Hospitals
2. Pathology Lab
3. Diagnostic Centres
4. Forensic Lab

ANNEXURE – I

TOOLS & EQUIPMENT FOR BASIC TRAINING

INFRASTRUCTURE FOR PROFESSIONAL SKILL & PROFESSIONAL KNOWLEDGE

TRADE: CLINICAL MEDICAL LABORATORY TECHNICIAN (PATHOLOGY)

LIST OF TOOLS & EQUIPMENTS FOR 20 APPRENTICES

A: TRAINEES TOOL KIT:-

Sl. No.	Name of the items	Quantity (indicative)
1.	Tourniquet	As required
2.	Lab coat	As required

B: TOOLS INSTRUMENTS AND GENERAL SHOP OUTFITS

Sr. No	Name of the Items	Approximate Quantity (per Batch)
1.	Disposable Syringe with needle- 2 ml	300 per batch
2.	Disposable Syringe with needle- 5 ml	300 per batch
3.	Disposable Syringe with needle- 10 ml	300 per batch
4.	Cotton Balls	5 packs per batch
5.	Butterfly needle	500 per batch
6.	Spirit	1 bottle per batch
7.	Examination slides	1 pack per batch
8.	Vaccutec containers	1 pack per batch
9.	Cotton Sticking	5 per batch
10.	Paper sticking	5 per batch
11.	Test tubes	1 pack per hub
12.	Blotting paper	2 packs per hub
13.	Capillaries	2 packs per hub
14.	Urine Containers (Plain)	2 packs per hub
15.	Urine Containers (with Reagent)	2 packs per hub
16.	Stool container	2 packs per hub
17.	Disposable gloves	5 per student
18.	Reagents	2 bottles per hub
19.	Disposable masks	5 per student
20.	Wooden Spatulas	1 pack per hub
21.	Cotton buds	2 packs per hub
22.	Glucometer Strips	1 bottle per hub
23.	Urine Pregnancy Kit	10 per hub
24.	HIV kit	10 per hub
25.	Disposable Apron	1 pack per hub
26.	Surface Sanitizer	1 bottle per hub
27.	Vacuette Serum Gel (Red Top with Yellow Ring)/	200 bottles per hub

	Vacutainer SST Gel (Yellow Top)	
28	Vacuette Plain Tube without Gel(Red top with black ring)/ Vacutainer SST Gel (Red Top)	200 bottles per hub
29.	Vacuette/ Vacutainer Glucose (EDTA K3 + Flouride) (Grey Top)	200 bottles per hub
30.	Vacuette/ Vacutainer EDTA K2 (Lavender Top)	200 bottles per hub
31.	Vacuette/ Vacutainer Coagulation Sod. Citrate - 3.2% (Blue top)	200 bottles per hub
32.	Vacuette/ Vacutainer Sodium Heparin (Green Top)	200 bottles per hub
33.	Multipurpose Vial Screw Capped	5 per hub
34.	Vacuette/ Vacutainer ACD Tube	10 per hub
35.	Plastic Can (Plain) - 5 l (24 hrs urine collection)	10 cans per hub
36.	Plastic Screw Cap Container	20 per hub
37.	Sterile Culture Container	20 per hub
38.	Urine C/S Kit Vacuette	40 per hub
39.	Aerobic Culture C/S Bottle (BD) – Adult	40 per hub
40.	Aerobic Culture C/S Bottle (BD) –Paediatric	40 per hub
41.	Myco-Lytic Blood C/S bottle (BD)	40 per hub
42.	Sterile Swab with Amies Transport Media for C/S	2 bottle per hub
43.	Litmus paper	2 bottle per hub
44.	Topfers Reagent	2 bottle per hub
45.	Bromphenol Blue	1 bottle per hub
46.	Methyl Orange	1 bottle per hub
47.	Methyl Red	1 bottle per hub
48.	Hydrochloric Acid	1 bottle per hub
49.	Sulphuric Acid	1 bottle per hub
50.	Nitric Acid	1 bottle per hub
51.	Acetic Acid	1 bottle per hub
52.	Oxalic Acid	1 bottle per hub
53.	Ammonium Hydroxide	1 bottle per hub
54.	Calcium Hydroxide	1 bottle per hub
55.	Sodium Carbonate	1 bottle per hub
56.	Plastic droppers	1 bottle per hub
57.	Anti A Reagent	1 bottle per hub
58.	Anti B Reagent	1 bottle per hub
59.	Anti AB Reagent	1 bottle per hub
60.	Anti D Reagent	1 bottle per hub
61.	HBs Ag Kit	10 per batch
62.	HCV kit	10 per batch
63.	Rapid Test for Malaria	10 per batch
64.	VDRL Kit	10 per batch

Note:- Please note that these are approximate quantities which will vary according to batch size and hub requirements.

C: GENERAL MACHINERY INSTALLATIONS:-

Sl. No.	Name & Description of Machines	Quantity (indicative)
1.	Centrifuge table top	2 nos.
2	Auto pipette 10-1000 µl (variable volume)	4 nos.
3	Microscope	1 per 5 trainee
4	Needle burner	2 nos.
5	Calorie meter	2 nos.
6	Fridge	01 no.

Note: In case of basic training setup by the industry the tools, equipment and machinery available in the industry may also be used for imparting basic training.

ANNEXURE – II

INFRASTRUCTURE FOR ON-JOB TRAINING

TRADE: CLINICAL MEDICAL LABORATORY TECHNICIAN (PATHOLOGY)

For Batch of 20 APPRENTICES

Actual training will depend on the existing facilities available in the establishments. However, the industry should ensure that the broad skills defined against On-Job Training part are imparted. In case of any short fall the concern industry may impart the training in any other industry.

ANNEXURE-III

GUIDELINES FOR INSTRUCTORS AND PAPER SETTERS

1.Due care to be taken for proper & inclusive delivery among the batch. Some of the following methods of delivery may be adopted:

A) LECTURE
B) LESSON
C) DEMONSTRATION
D) PRACTICE
E) GROUP DISCUSSION
F) DISCUSSION WITH PEER GROUP
G) PROJECT WORK
H) INDUSTRIAL VISIT

2. Maximum utilization of latest form of training viz., audio visual aids, integration of IT, etc. may be adopted.

3. The total hours to be devoted against each topic may be decided with due diligence to safety & with prioritizing transfer of required skills.