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MINISTRY OF LABOR AND SKILLS

ጤና ሚኒስቴር - ኢትዮጵያ
MINISTRY OF HEALTH-ETHIOPIA

MEDICAL LABORATORY TECHNIQUES LEVEL IV

TVET CURRICULUM

Based on version-4

Occupational Standard (OS)

February 2022

Adiss Ababa

Preface

The reformed TVET-System is an outcome-based system. It utilizes the needs of the labor market and occupational requirements from the world of work as the benchmark and standard for TVET delivery. The requirements from the world of work are analyzed and documented taking into account international benchmarking as occupational standards (OS).

In the reformed TVET-System, curricula and curriculum development play an important role with regard to quality driven TVET-Delivery. Curricula help to facilitate the learning process in a way, that trainees acquire the set of occupational competences (skills, knowledge and attitude) required at the working place and defined in the occupational standards (OS)..

This curriculum has been developed by a group of experts from different Regional TVET-Authorities based on the occupational standard for Medical Laboratory Techniques Level IV. It has the character of a model curriculum and is an example on how to transform the occupational requirements as defined in the respective occupational standard into an adequate curriculum.

The curriculum development process has been actively supported and facilitated by the Ministry of Health and Ministry of labor and skill.

TVET-Program Design

1.1. TVET-Program Title: Medical Laboratory Techniques Level IV

1.2. TVET-Program Description

The Program is designed to develop the necessary knowledge, skills and attitude of the learners to the standard required by the occupation. The contents of this program are in line with the occupational standard. Learners who successfully completed the Program will be qualified to work as a Medical Laboratory Technician with competencies elaborated in the respective OS. Graduates of the program will have the required qualification to work in the health sector in the field of Medical Laboratory.

The prime objective of this training program is to equip the learners with the identified competences specified in the OS. Graduates are therefore expected to Perform Hematological Tests, Perform Microbiological, Use Info-technology Devices in the Workplace, Perform Serological Tests, Perform Clinical Chemistry Tests, Perform Immuno-Haematological Tests, Implement Laboratory Quality Assurance, and Prepare Histopathological Samples for Examination, Manage Community Health Service, Prevent and Eliminate MUDA in accordance with the performance criteria described in the OS.

1.3. TVET-Program Learning Outcomes

The expected outputs of this program are the acquisition and implementation of the following units of competence:

HLT MLT4 01 1121 Use Info-technology Devices in the Workplace
HLT MLT4 02 1121 Perform Microbiological
HLT MLT4 03 1121 Perform Hematological Tests
HLT MLT4 04 1121 Perform Serological Tests
HLT MLT4 06 1121 Perform Clinical Chemistry Tests
HLT MLT4 05 1121 Perform Immuno-Haematological Tests
HLT MLT4 07 1121 Prepare Histopathological Samples for Examination
HLT MLT4 08 1121 Implement Laboratory Quality Assurance
HLT MLT4 09 1121 Manage Community Health Service
HLT MLT4 10 1121 Prevent and Eliminate MUDA

1.4. Duration of the TVET-Program

The Program will have duration of 1658 hours including the on-the-job practice or cooperative training time .

s.no	Unit competency	On school training		Cooperative training	Total hours	Remarks
		Theory	Practical			
1.	Use Info-technology Devices in the Workplace	40	30	-	70	
2.	Perform Microbiological	200	70	80	350	
3.	Perform Hematological Tests	120	70	60	250	
4.	Perform Serological Tests	100	50	50	200	
5.	Perform Clinical Chemistry Tests	120	70	60	250	
6.	Perform Immuno-Haematological Tests	90	40	50	180	
7.	Prepare Histopathological Samples for Examination	80	40	20	140	
8.	Implement Laboratory Quality Assurance	50	20	20	90	
9.	Manage Community Health Service	32	-	40	72	
10.	Prevent and Eliminate MUDA	24	16	16	56	
11.	Total hours	856	406	396	**1658**	

1.5. Qualification Level and Certification

Based on the descriptors elaborated on the Ethiopian National TVET Qualification Framework (NTQF) the qualification of this specific TVET Program is “Level IV”.

The learner will not be awarded any certificate before completion of all the modules that are designed for the exit in level IV.

1.6. Target Groups

Any citizen who meets the entry requirements set by the concerned organization for the academic year and capable of participating in the learning activities is entitled to take part in the Program.

1.7 Entry Requirements

The prospective participants of this program are required to possess the requirements or directive of the ministry of labor and skill.

1.8 Mode of Delivery

This TVET-Program is characterized as a formal Program on middle level technical skills. The mode of delivery is co-operative training. The TVET-institution and identified companies have forged an agreement to co-operate with regard to implementation of this program. The time spent by the trainees in the industry will give them enough exposure to the actual world of work and enable them to get hands-on experience.

The co-operative approach will be supported with school-based lecture-discussion, simulation and actual practice. These modalities will be utilized before the trainees are exposed to the industry environment.

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1.9. TVET Program Structure

Unit of Competence	Module Code & Title		Learning Outcomes	Duration (In Hours)
Use Info-technology Devices in the Workplace	HLT MLT4 M01 0222	Using Info-technology Devices in the Workplace	• Identify info Techniques systems • Access and operate computer-based equipment and systems • Store and present files/data • Implement work place procedure for management and security of data. • Shut down computer	70
Perform Microbiological Tests	HLT MLT4 M02 0222	Performing Microbiological Tests	• Identify concept of microbiology • Receive samples and process associated request forms • Prepare for safe microbiological work and aseptic technique applications • Prepare and perform direct examination • Perform examination of stained samples	350

			• Prepare culture media • Sterilize media • Pour, label and store media • Perform quality control checks • Maintain records of laboratory work	
Perform Hematological Tests	HLT MLT4 M03 0222	Performing Hematological Tests	• Identify concept of hematology • Process samples and associated request details • Perform basic hematology tests • Maintain a safe environment • Maintain laboratory records	250
Perform Serological Tests	HLT MLT4 M04 0222	Performing Serological Tests	• Identify concept of immunology and serology • Process samples • Perform tests • Maintain laboratory records • Maintain a safe environment	200

Perform Clinical Chemistry Tests	HLT MLT4 M05 0222	Performing Clinical Chemistry Tests	• Identify concept of clinical chemistry • Review test requirements • Process samples • Check equipment before use • Perform Clinical Chemistry Tests • Process and interpret data • Maintain laboratory records • Maintain a safe work environment	250
Perform Immuno Haematological Tests	HLT MLT4 M06 0222	Performing Immuno Haematological Tests	• Identify concept of Immunohematology • Process samples and associated request forms • Perform tests • Maintain a safe environment • Maintain laboratory records	180

Prepare Histopathological Samples for Examination	HLT MLT4 M07 0222	Preparing Histopathological Samples for Examination	• Assemble equipment and materials • Process tissue • Stain sections • Maintain a safe work environment	140
Implement Laboratory Quality Assurance	HLT MLT4 M08 0222	Implementing Laboratory Quality Assurance	• Identify the Concept quality assurance • Prepare document and record • Implement quality Pre-analytic process • Implement quality analytic process • Implement quality post- analytic process • Conduct Process improvement activities	90

Manage Community Health Service	HLT MLT4 M09 0222	Managing Community Health Service	• Follow organizational guidelines, understand health policy and service delivery system • Plan, manage, monitor and evaluate health system • Lead and build individual's and team's capacity	72
Prevent and Eliminate MUDA	HLT MLT4 M10 0222	Preventing and Eliminating MUDA	• Prepare for work. • Identify MUDA and problem • Analyze causes of a problem • Eliminate MUDA and Assess effectiveness of the solution. • Prevent occurrence of wastes and sustain operation.	56

*The time duration (Hours) indicated for the module should include all activities in and out of the TVET institution.

1.10 Institutional Assessment

Two types of evaluation will be used in determining the extent to which learning outcomes are achieved. The specific learning outcomes are stated in the modules. In assessing them, verifiable and observable indicators and standards shall be used.

The ***formative assessment*** is incorporated in the learning modules and form part of the learning process. Formative evaluation provides the trainee with feedback regarding success or failure in attaining learning outcomes. It identifies the specific learning errors that need to be corrected, and provides reinforcement for successful performance as well. For the teacher, formative evaluation provides information for making instruction and remedial work more effective.

Summative Evaluation the other form of evaluation is given when all the modules in the program have been accomplished. It determines the extent to which competence have been achieved. And, the result of this assessment decision shall be expressed in the term 'competent or not yet competent'.

Techniques or tools for obtaining information about trainees' achievement include oral or written test, demonstration and on-site observation.

1.11 TVET Teachers Profile

The teachers conducting this particular TVET Program are A Level and have satisfactory practical experiences or equivalent qualifications.

LEARNING MODULE 01
TVET-PROGRAMME TITLE: **Medical Laboratory Techniques IV**
MODULE TITLE : **Using Info-Techniques Devices in the Workplace**
MODULE CODE : **HLT MLT4 M01 0222**
NOMINAL DURATION : 70 Hours
MODULE DESCRIPTION : This module covers the knowledge, skills and attitude required to use devices in the workplace including identifying info Techniques equipment and systems ; setting up and shutting down equipment for use ; and inputting, retrieving and presenting files/data in accordance with work requirements.
LEARNING OUTCOMES At the end of the module the learner will be able to: **LO1.** Identify info Techniques systems **LO2.** Access and operate computer-based equipment and systems **LO3.** Store and present files/data **LO4**. Implement work place procedure for management and security of data. **LO5.** Shut down computer
MODULE CONTENTS: **LO1. Identify info Techniques systems** 1.1. Identifying types of info Techniques equipment 1.2. Identifying functions of equipment, component parts and accessories 1.3. Interpreting applications for workplace activities of the different info Techniques equipment and systems 1.4. Identifying routine faults in operating systems, software applications and operator errors 1.5. Identifying sources of information on rectifying/reporting faults with operating equipment, systems and application **LO2. Access and operate computer-based equipment and systems** 2.1. Adjusting work environments 2.2. Accessing and checking systems for viruses 2.3. Setting up equipment for work requirements 2.4. Using operating manuals and/or help screens for info Techniques equipment and software 2.5. Selecting and Accessing software packages and accessories

2.6. Identifying required file and/or data to be accessed

2.7. Filling files/data

2.8. Following Shut-down procedures for files, applications and equipment

LO3. Store and present files/data

3.1. Entering data using appropriate equipment

3.2. Confirming accurate input

3.3. Accessing files

3.4. Manipulating data and checking for accuracy

3.5. Accessing saved files through relevant directories

3.6. Storing information and disk(s)

3.7. Presenting and saving information

LO4. Implement work place procedure for management and security of data.

4.1. Following security procedures

4.2. Following precautions against the loss or corruption of data

LO5. Shut down computer

5.1. Closing all open applications

5.2. Shutting down computer

Learning Methods:

- Interactive lecture
- Group discussion
- Demonstration
- Simulation
- Group assignment
- Individual assignment

Assessment Methods:

- Continuous assessments (quiz, assignment, tests etc.).
- Oral questioning
- Skill check out
- Final written exam

Assessment Criteria

LO1. Identify info Techniques systems

- Types of info Techniques equipment used in the work area are identified
- Functions of equipment, component parts and accessories are identified
- Applications for workplace activities of the different info Techniques equipment and systems are interpreted
- Routine faults in operating systems, software applications and operator errors are identified
- Sources of information on rectifying/reporting faults with operating equipment, systems and application are identified

LO2. Access and operate computer-based equipment and systems

- Work environments and equipment are adjusted to meet ergonomic requirements and workplace policy and procedures
- Systems are accessed and checked where required for viruses
- Equipment are set up for work requirements in accordance with workplace procedures and manufacturers guidelines
- Operating manuals and/or help screens for info Techniques equipment and software are used to inform work practices
- Software packages and accessories for required application are selected and accessed
- Required file and/or data to be accessed is identified
- Files/data are filed according to workplace
- Shut-down procedures for files, applications and equipment are followed

LO3. Store and present files/data

- Data is entered using appropriate equipment, keyboard/mouse, bar code reader, touch screen or other system
- Accurate input is confirmed
- Files are accessed in accordance with workplace procedures
- Data is manipulated to suit work requirements and checked for accuracy
- Saved files are accessed through relevant directories
- Information and disk(s) are stored where appropriate
- Information is presented using computerized projection saved where necessary.

LO4. Implement work place procedure for management and security of data.

- Security procedures are followed in accordance with workplace procedures
- Precautions against the loss or corruption of data are followed in accordance with workplace procedures

LO5. Shut down computer

- All open applications are closed.
- Computer is shut down according to user procedures.

Annex: Resource Requirements

HLT MLT 4 M01 0222 Using Info-Techniques Devices in the Workplace				
Item No.	Category/Item	Description/ Specifications	Quantity	Recommended Ratio (Item: Learner)
A.	**Learning Materials**			
1.	TTLM	• Flip chart • Posters • Job aids	25	1:1
2.	Textbooks	• Training modules • Text books	25	1:1
3.	Reference Books		10	1:3
4.	Journals/Publication/Magazines			
B.	**Learning Facilities & Infrastructure**			
1.	Lecture Room	5*5m	1	1:25
2.	Library	Standard (colleges library)	1	
	Computer library	Standard		
	Internet service	Standard		
C.	**Consumable Materials**			
1.	Paper and Check list	Standard	5rim	1:5
2.	Pen	Standard	As required	
3	Pencil and rubber	Standard		
4	Graph paper	Standard		
5	Bucher paper	Standard	10	1:3
6	Art line marker	Standard	12 per pack	
7	Printer ink	HP Laser Jet	4	
8	White board marker	6 per pack	15	
9	Plaster	Rol3		
D.	**Tools and Equipments**			
1.	Computer	Lap top	1	1:25
2.	LCD projector	LCD Projector	1	1:25
3.	Printer	Standard	1	1:25
4	Photocopy machine	Standard	1	1:25
5	Scanner	Standard	1	1:25
6	Back up	Standard	1	1:25
7	White board	110X80mm	1	1:25
8	Slide projector	Standard	1	1:25
9	Audio-Visual materials	Standard	1	1:25

LEARNING MODULE 02
TVET-PROGRAMME TITLE: Medical Laboratory Techniques level IV
MODULE TITLE : **Performing Microbiological Tests**
MODULE CODE : **HLT MLT 4 M02 0222**
NOMINAL DURATION : 350 Hours
MODULE DESCRIPTION : This module covers knowledge, skills and attitude required to identify microorganisms such as bacteria, fungi, and viruses using staining techniques and direct examination procedures, and to prepare culture media for culture, isolation and identification of micro-organisms in order to investigate the physiology and pathology of human.
LEARNING OUTCOMES At the end of the module the learner will be able to: **LO1.** Identify concept of microbiology **LO2.** Receive samples and process associated request forms **LO3.** Prepare for safe microbiological work and aseptic technique applications **LO4.** Prepare and perform direct examination **LO5.** Perform examination of stained samples **LO6.** Prepare culture media **LO7.** Sterilize media **LO8.** Pour, label and store media **LO9.** Perform quality control checks **LO10**. Maintain records of laboratory work

MODULE CONTENTS:

LO1. Identify concept of microbiology

1.1. Identifying concept of microbiology

1.2. Identifying classification of microorganisms and effects of microorganisms

1.3. Identifying testing methodology of microbiology examinations

1.4. Identifying Microscope set up and use

LO2. Receive samples and process associated request forms

2.1. Accepting check samples and request form details

2.2. Returning samples and request forms that do not comply with requirements

2.3. Logging samples and chain of custody

2.4. Distributing and dispatching samples

2.5. Storing samples appropriately

LO3. Prepare for safe microbiological work and aseptic technique applications

3.1. Selecting work area and required equipment

3.2. Wearing Protective apparel

3.3. Applying correct disinfection procedures

3.4. Locating relevant emergency equipment

3.5. Applying standard precautions

3.6. Minimizing the production and release of aerosols using biological safety cabinets

3.7. Cleaning and reporting spills

3.8. Washing hands before and after laboratory work

3.9. Ensuring safe disposal of biohazardous materials and other laboratory wastes

LO4. Prepare and perform direct examination

4.1. Preparing liquid films (wet mount) of specimens

4.2. Preparing samples for microscopy

4.3. Performing wet film examination

4.4. Recording results

4.5. Verifying results

4.6. Storing unused sample or sample components for retesting

LO5. Perform examination of stained samples

5.1. Selecting staining techniques

5.2. Preparing films/smears of samples for staining

5.3. Staining prepared films

5.4. Performing examination of stained smears

5.5. Recording results

5.6. Verifying results

5.7. Storing unused sample or sample components for future reference and retesting

LO6. Prepare culture media

6.1. Preparing mixture of media and solvent

6.2. Labeling media

6.3. Using large vessel for mixing and heating of the media

6.4. Dispensing media into vessels

LO7. Sterilize media

7.1. Loading the sterilizer

7.2. Placing a sterilization indicator

7.3. Operating sterilization cycle

7.4. Cooling the media

LO8. Pour, label and store media

8.1. Adding heat labile constituents

8.2. Ensuring even mixing of additives and media

8.3. Dispensing media

8.4. Labeling media

8.5. Storing media

8.6. Dating batch media

8.7. Incubating control plates

LO9. Perform quality control checks

9.1. Inspecting media

9.2. Checking usability of selective media

9.3. Checking stored stocks

LO10. Maintain records of laboratory work

10.1. Making entries on report forms or into computer systems accurately calculating, recording or transcribing data

10.2. Maintaining instrument logs

10.3. Maintaining Security and confidentiality

Learning Methods:

- Interactive lecture
- Group discussion
- Demonstration
- Group assignment
- Individual assignment

Assessment Methods:

- Continuous assessments (quiz, assignment, tests etc.).
- Oral questioning
- Skill check out
- Final written exam

Assessment Criteria

LO1. Identify concept of microbiology

- Concept of microbiology is identified
- Classification microorganisms and effects of microorganisms are identified
- Testing methodology of microbiology examinations is identified
- Microscope set up and use are identified

LO2. Receive samples and process associated request forms

- Check samples and request form details before they are accepted
- Samples and request forms that do not comply with requirements to source are returned with reasons for non-acceptance
- Samples, recording details that allow accurate tracking and chain of custody are logged
- Distribute samples for local testing or dispatch samples to other testing facilities
- Samples are stored appropriately where testing or transport is to be delayed

LO3. Prepare for safe microbiological work and aseptic technique applications

- Work area and equipment required for the safe handling of materials that may contain micro-organisms of specified risk groups are selected
- Protective apparel is worn by replacing it when contamination is suspected
- Correct disinfection procedures are applied to work areas before and after use
- Relevant emergency equipment are located for timely response to microbiological accidents
- Standard precautions are applied when handling biological materials
- The production and release of aerosols are minimized using biological safety cabinets where necessary
- Spills are cleaned, and all spills and suspected incidents reported to supervisor
- Hands are washed before and after laboratory work
- The safe disposal of biohazardous materials and other laboratory wastes are ensured in accordance with enterprise procedures

LO4. Prepare and perform direct examination

- Liquid films of specimens are prepared for direct observation for motility or cell structure
- Samples are prepared to concentrate material for subsequent microscopy
- Examination wet film is performed using microscopy for identification of micro-organisms
- All results, noting any phenomena that may be relevant to the interpretation of results are recorded
- Results are verified before releasing for clinician/client
- Unused sample or sample components are stored for possible future reference, under conditions suitable to maintain viability
- Tested sample or sample components are stored according to organizational sample retention policy for retesting when requested

LO5. Perform examination of stained samples

- Staining techniques are selected to demonstrate required cellular characteristics
- Films/Smears of samples for subsequent staining are prepared to enable microscopic identification of cells
- Prepared films are stained to demonstrate diagnostically useful characteristics

- Examination stained film is performed using microscopy for identification of micro-organisms
- All results, noting any phenomena that may be relevant to the interpretation of results are recorded
- Results are verified before releasing for clinician/client
- Unused sample or sample components are stored for possible future reference, under conditions suitable to maintain viability
- Tested sample or sample components are stored according to organizational sample retention policy for retesting when requested

LO6. Prepare culture media

- Mixture of media and solvent are prepared to ensure solution and even settling of heat soluble materials
- Media is labeled to allow tracking in subsequent processes
- A vessel large enough is used to endure adequate mixing and heating of the media
- Media is dispensed into vessels for sterilization, leaving room for expansion during heating and cooling

LO7. Sterilize media

- The sterilizer is load in keeping with maximum permitted loads and appropriate positioning of materials
- Ensure a sterilization indicator is correctly placed with the load to monitor sterilization process
- Sterilization cycle is operated in accordance with manufacturer's requirements to achieve sterilization at the required settings
- Media cooled to the temperature specified in the media formulation procedures

LO8. Pour, label and store media

- Labile constituents are added where necessary, under conditions that will not lead to their denaturation or contamination of media
- Even mixing of additives and media is ensured before dispensing
- Media is aseptically dispensed to minimize occurrence of procedural contamination
- Media is labeled to allow for selection, avoiding areas of the culture vessel required for

examination of colony growth

- Media is stored to maximize shelf life and minimize contamination
- Batch media is dated to ensure correct batch rotation
- Control plates are incubated as a sterility check

LO9. Perform quality control checks

- Media is inspected for any evidence of possible contamination or problems with structure or sterilization
- Usability of selective media is checked by growth of expected organism
- Stored stocks are checked at regular intervals for conformance to required standards

LO10. Maintain records of laboratory work

- Entries on report forms or into computer systems are made accurately calculating, recording or transcribing data, as required
- Instrument logs are maintained as required by accreditation checklists
- Security and confidentiality of all clinical information, laboratory data and records are maintained

Annex: Resource Requirements

HLT MLT 4 M02 0222 **Performing Microbiological Tests**				
Item No.	Category/Item	Description/ Specifications	Quantity	Recommended Ratio (Item: Learner)
A.	**Learning Materials**			
1.	TTLM	• Flip chart • Posters • Job aids	25	1:1
2.	Textbooks	• Training modules • Text books	25	1:1
2.1	Text book Microbiology and Immunology T	Subhash Chandra Parija. 2nd Edition; 2012		
3.	Reference Books		10	1:3
3.1.	Essentials of Medical Microbiology	Rajesh Bhatia. fourth edition;2013	5	1:5
3.2.	District Laboratory Practice in Tropical Countries Part 2	Monica Cheesbrough. Second Edition; 2009		
3.3.	Medical Microbiology	Jawetz, Melnick, & Adelberg's.Twenty six edition; 2010		
4.	Journals/Publication/Magazines		10	1:3
B.	**Learning Facilities & Infrastructure**			
1.	Lecture Room	5*5m	1	1:25
2.	Library	Standard	1	1:25

3	Demonstration room	5*10	1	1:25
4	Transportation service			
C.	**Consumable Materials**			
1.	Paper and Check list	Standard	5rim	1:5
2.	Lens paper or soft tissue paper	Standard		
3	Filter paper	Standard		
4	Pen	Standard	As required	
5	Tissue labeling material	Standard		
6	Pencil and rubber	Standard		
7	Graph paper	Standard		
8	Bucher paper	Standard	10	1:3
9	Art line marker	Standard	12 / pack	
10	Printer ink	Standard	4	1:25
11	White board marker	Standard	15	
12	Plaster	Standard	2 roll	1:13
13	immersion oil	Standard	2 bottles	1:13
14	normal saline	Standard	2 bottles	1:13
15	Droppers/pipette	Standard		
16	Indian Ink reagent	Standard	2 bottles	1:13
18	70% Alcohol	Standard	2 bottles	1:13
17	KOH reagent	Standard	2 bottles	1:13
18	Crystal Violet	Standard	2 bottles	1:13
19	Iodine	Standard	2 bottles	1:13
20	Acetone	Standard	2 bottles	1:13
21	Safranin	Standard	2 bottles	1:13
22	Carbol-fuchsin	Standard	2 bottles	1:13
24	Acid-Alcohol	Standard	2 bottles	1:13
25	Methylene blue/Malachite green	Standard	2 bottles	1:13
26	Sterile cotton wool swab	Standard		
27	Different conc. Of alcohol	Standard	2 bottles	1:13
28	Wooden tongue blades	Standard		
29	Sterile gauze and Dressing pack	Standard		
30	Water and soap	Standard		

31	Laboratory request form	Standard		
32	Culture media (different types)	Standard	1 tin each	
33	Applicator stick	Standard		
34	PAS reagents	Standard	2 bottles	1:13
35	Lacto phenol cotton blue	Standard	2 bottles	1:13
36	Acridine orange	Standard	2 bottles	1:13
36	Potassium per manganet	Standard	2 bottles	1:13
37	Bleach	Standard	2 bottles	1:13
D.	**Tools and Equipments**			
1.	Computer	Lap top	1	1:25
2.	LCD projector	LCD Projector Sony	1	1:25
3.	light Microscopes	Standard	12	1:2
4.	Funnels	Standard	6	1:4
5.	Forceps	Standard	12	1:2
6.	Bunsen burner	Standard	5	1:5
7.	Droppers/pipette	Standard	25	1:1
8.	Wide-necked, leak-proof containers	Standard	12	1:2
9.	Plastic containers for waste disposal	Standard	5	1:5
10.	Wire loop	Standard	6	1:4
11.	Petri dish	Standard	10	1:3
12.	Surgical blade	Standard	5	1:5
13.	Staining rack	HP Laser Jet	1	1:25
14.	Autoclaves	Canon	1	1:25
15.	Incubator	Smart	1	1:25
16.	Water bath	Smart	1	1:25
17.	Micro radiation chemical treatments	110X80mm	1	1:25
18.	Balance	Standard	1	1:25
19.	Audio-Visual materials	Standard	1	1:25
20.	Volumetric glass wares	Standard	12	1:2
21.	Laboratory coat	Standard	25	1:1
22.	Apron	Standard	25	1:1
23.	Basins dust bin	Standard	5	1:5
24.	Masks	Standard	25	1:1
25.	Sharp containers	Standard	5	1:5
26.	Refrigerators	Standard	1	1:25
27	LED Microscope	Standard	6	1:4

LEARNING MODULE 3
TVET-PROGRAMME TITLE: Medical Laboratory Techniques level IV
MODULE TITLE : Performing Hematological Tests
MODULE CODE : HLT MLT4 M03 0222
NOMINAL DURATION : 250 Hours
MODULE DESCRIPTION : This module covers knowledge, skills and attitude required to identify concepts of physiology and anatomy of human hematopoietic organs, function, activity and interactions of cellular and plasma components of blood, and principle of testing methodology, and prepares samples for basic hematological tests.
LEARNING OUTCOMES At the end of the module the learner will be able to: **LO1.** Identify concept of hematology **LO2.** Process samples and associated request details **LO3.** Perform basic hematology tests **LO4.** Maintain a safe environment **LO5.** Maintain laboratory records
MODULE CONTENTS: **LO1. Identify concept of hematology** 1.1. Identifying concepts of hematology 1.2. Identifying process of blood cells production 1.3. Identifying classification blood cells 1.4. Identifying Testing methodology of hematological tests 1.5. Identifying Microscope set up and use **LO2. Process samples and associated request details** 2.1. Accepting samples and request details 2.2. Sorting specimens 2.3. Returning samples and request forms that do not comply with requirements with reasons for non-acceptance 2.4. logging acceptable samples and request forms 2.5. Processing samples as required by requested tests 2.6. Storing samples and sample components appropriately

2.7. Preparing blood film for hematological tests

2.8. Processing different staining procedures required in hematological tests

LO3. Perform basic hematology tests

3.1. Selecting authorized tests procedure

3.2. performing Complete Blood Count (CBC) (Manual and Automated method)

3.3. Conducting Hemoglobin (Hg)test

3.4. Caring out Hematocrit (HCT) determination

3.5. Determining Erythrocyte Sedimentation Rate (ESR)

3.6. Calculating Red Blood Cell (RBC) indices

3.7. Interpreting and reporting test results

3.8. Looking for advice of colleague when result interpretation is outside unusual

3.9. Recording results.

3.10. Verifying results

3.11. Performing communication of test results

3.12. Retaining tested sample or sample components

LO4. Maintain a safe environment

4.1. Using established Occupational Health Safety (OHS)

4.2. Cleaning up Spills

4.3. Minimizing generation of wastes

4.4. Ensuring safe disposal of biohazardous materials and other laboratory wastes

LO5. Maintain laboratory records

5.1. Making entries on report forms or into computer systems, calculating accurately, recording or transcribing required data

5.2. Updating instrument maintenance logs

5.3. Maintaining security and confidentiality

LEARNING METHODS:

- Lecture
- Demonstration
- Simulation
- Exercise
- Individual assignment

ASSESSMENT METHODS:

- Interview
- Written test
- Demonstration/Observation

ASSESSMENT CRITERIA:

LO1. Identify concept of hematology

- Concept of hematology is identified
- Process of production of blood cells is identified
- Classification blood cells are identified
- Testing methodology of hematological tests are identified
- Microscope set up and use are identified

LO2. Process samples and associated request details

- Check samples and request details are accepted
- Specimens are sorted according to tests requested, urgent status and volume
- Samples and request forms that do not comply with requirements to their source are returned with reasons for non-acceptance
- Acceptable samples and request forms are logged by applying required document tracking mechanisms
- Samples are processed as required by requested tests
- Samples and sample components are stored appropriately until ready for testing
- Blood film is prepared for hematological tests
- Different staining procedures required in hematological tests are processed

LO3. Perform basic hematology tests

- Authorized tests procedure that are indicated for the requested investigations is selected
- Complete Blood Count (CBC)is performed (Manual and Automated method)
- Hemoglobin (Hg)test is conducted
- Hematocrit (HCT) determination is carried out
- Erythrocyte Sedimentation Rate (ESR) is determined
- Red Blood Cell (RBC) indices are calculated
- Tests results ,noting any phenomena that may be relevant to the interpretation of results are interpreted and reported

- Advice of section head or other responsible colleague is sought when result interpretation is outside parameters of authorized approval
- All results are recorded on laboratory log books and/or laboratory information system soft ware's
- Results are verified before releasing for clinician/client
- Communication of test results is performed
- Tested sample or sample components are stored according to organizational sample retention policy for retesting when requested

LO4. Maintain a safe environment

- Established Occupational Health Safety (OHS)work practices and personal protective equipment are used to ensure personal safety and that of other laboratory personnel
- Spills are cleaned up using appropriate techniques to protect personnel, work area and environment from contamination
- The generation of wastes is minimized
- Ensure the safe disposal of biohazardous materials and other laboratory wastes in accordance with enterprise procedures

LO5. Maintain laboratory records

- Make entries on report forms or into computer systems, accurately calculating, recording or transcribing required data as required
- Instrument maintenance logs are updated as required by accreditation requirements
- Security and confidentiality of all clinical information, laboratory data and records are maintained

Annex: Resource Requirements

HLT MLT 4 M03 0222 Performing Hematological Tests				
Item No.	**Category/Item**	**Description/ Specifications**	**Quantity**	**Recommended Ratio (Item: Learner)**
A.	**Learning Materials**			
1.	TTLM	• Flip chart • Posters • Job aids	25	1:1
2.	Textbooks	• Training modules • Text books		
2.1	Wintrobe's Clinical Hematology	John P. Greer et al. Fourteen edition; 2018	5	1:5
3.	Reference Books	•		
3.1	Williams Hematology	Kenneth Kaushansky et al. Ninth Edition; 2015	5	1:5
3.2	Clinical Laboratory Hematology	Shirlyn B. McKenzie, J. Lynne Williams. Third Edition; 2014		
3.3	Clinical Hematology Theory and Procedures	Mary Louise Turgeon. Sixteen edition; 2018		
3.4	Hematology for Medical Laboratory Technology students Lecture note series	Sahile Mariam Z; 2007		
4.	Journals/Publication/Magazines		10	1:3
B.	**Learning Facilities & Infrastructure**			
1.	Lecture Room	5*5m	1	1:30
2.	Library	Standard	1	

3.	Demonstration room	Standard	1	1:6
C.	**Consumable Materials**			
1.	Paper	Standard	5rim	1:5
2.	Pen	Standard		
3	Pencil and rubber	Standard		
4	Graph paper	Standard		
5	Bucher paper	Standard	10	1:3
6	Marker	Standard	12 per pack	
7	Printer ink	Standard	4	
8	White board marker	Standard	15	
9	Laboratory reagents	Standard		
10	Cotton	Standard	2 roll	
11	Plaster	Standard	2 roll	
12	Sodium citrate	powder	1 tin	
13	Masks	Standard	25	1:1
14	Test tubes	Standard	25	1:1
15	WBC diluting fluid	Standard	2 bottle	1:13
16	Slide	Standard	50 pk of 50 pcs	
17	Distilled water	Standard	2 bottle	1:13
18	Romanowsky stains	Standard	2 bottle	1:13
19	1% ammonium oxalet	Standard	2 bottle	1:13
20	Paster pipette	Standard	25	1:1
21	Trisodium citrate, 3.8g/l	Standard	2 bottle	1:13
22	Oil immersion	Standard	2 bottle	1:13
23	Sealant	Standard	1	1:25
24	0.1%HCL	Standard	2 bottle	1:13
25	Anticoagulants	Standard	1	1:
D.	**Tools and Equipment**			
1.	Computer	Lap top	1	1:25
2.	LCD projector	LCD Projector	1	1:25
3.	Printer	Laser Jet	1	1:25
4	Photocopy machine	Standard	1	1:25

5	Scanner	Standard	1	1:25
6	Back up	Standard	1	1:25
7	White board	110X80mm	1	1:25
8	Microscope	Standard	12	1:2
9	Haematology analyser	Standard	1	1:25
10	Laboratory glass wares	Standard	25	1:1
11	General Centrifuge	Standard	3	1:8
12	Microscopic mirror	Standard	3	1:9
13	Balances	Standard	5	1:5
14	Water bath	Standard	2	1:10
15	Laboratory Coat	Standard	25	1:1
16	Goggle	Standard	25	1:1
17	Apron	Standard	25	1:1
18	Basins	Standard	4	1:6
19	Dust bin	Standard	5	1:5
20	sharp container (safety box)	Standard	10	1:2
21	Auto clave	Standard	1	1:25
22	Analytical balance	Standard	1	1:25
23	Flasks	Standard	10	1:3
24	Hemocytometer	Neubauer	10	1:3
25	hemocytometer cover slide	Standard	10	1:3
26	micropipette	Standard	15	1:2
27	Westergren-Katz tube:	Standard	25	1:1
28	Westergren rack / stand	Standard	5	1:5
29	Rubber teat or pipette filler	Standard	25	1:1
30	Hemo meter	Sahli Helge	10	1:2
31	Hot air oven	Standard	1	1:25
32	Timer	Standard	10	1:3
33	Staining rack	Standard	2	1:12
34	Capillary tube	Standard	5	1:5
36	PCV reader	Standard	5	1:5
37	Microhematocrit centrifuge	Standard	2	1:12

LEARNING MODULE 04

TVET-PROGRAMME TITLE: Medical Laboratory Techniques Level IV

MODULE TITLE : Performing Serological Tests

MODULE CODE : HLT MLT4 M04 0222

NOMINAL DURATION : 200 Hours

MODULE DESCRIPTION : This module covers the knowledge, skills and attitude required to identified concepts of immunology, serology, perform different serological tests and procedures.

LEARNING OUTCOMES

At the end of the module the learner will be able to:

LO1. Identify concept of immunology and serology

LO2. Process samples

LO3. Perform tests

LO4. Maintain laboratory records

LO5. Maintain a safe environment

MODULE CONTENTS:

LO1. Identify concept of immunology and serology

1.1 Identifying concepts of antigen and antibody

1.2 Identifying principle of antigen and antibody reaction

1.3 Identifying factors affecting antigen and antibody reaction

1.4 Identifying methodology of serological tests

LO2. Process samples

2.1. Checking and matching samples and request forms.

2.2. Returning samples and request forms that do not comply with requirements

2.3. Logging acceptable samples

2.4. Processing samples

2.5. Storing sample components.

LO3. Perform tests

3.1. Selecting tests

3.2. Conducting serological tests.

3.3. Recording and interpreting serological test results.

3.4. Discussing result interpretation

3.5. Verifying results

3.6. Storing tested sample

LO4. Maintain laboratory records

4.1. Making entries on report forms or into computer systems/laboratory information system

4.2. Maintaining instrument logs

4.3. Maintaining records of samples received.

4.4. Maintaining security and confidentiality

LO5. Maintain a safe environment

5.1. Using established work practices and PPE

5.2. Minimizing waste generation

5.3. Ensuring the safe disposal of biohazard materials and other laboratory wastes.

Learning Methods:

- Interactive lecture
- Group discussion
- Demonstration
- Group assignment
- Individual assignment

Assessment Methods:

- Continuous assessments (quiz, assignment, tests etc.).
- Oral questioning (Interview)
- Skill check out (Demonstration/Practical)
- Final written exam

Assessment Criteria

LO1. Identify concept of immunology and serology

- Concept of antigen and antibody are identified
- Principle of antigen and antibody reaction are identified
- Factors affection antigen and antibody reaction are identified
- Methodology of serological tests are identified

LO2. Process samples

- Samples and request forms are checked and matched before they are accepted.
- Samples and request forms that do not comply with requirements are returned to their source with reasons for non-acceptance.
- Acceptable samples are logged by applying required document tracking mechanisms.
- Samples are processed as required by requested tests.
- Sample components are stored appropriately until required for testing

LO3. Perform tests

- Authorized tests that are indicated for the requested investigations are selected.
- Individual serological tests are conducted according to documented methodologies, applying required quality control procedures.
- All results, noting any phenomena that may be relevant to the interpretation of results are recorded.
- When result interpretation is outside parameters of authorized approval is discussed with colleague
- Results are verified before releasing for clinician/client
- Tested sample or sample components are stored according to organizational sample retention policy for retesting when requested

LO4. Maintain laboratory records

- Entries on report forms or into computer systems/laboratory information system are made accurately, recording or transcribing required data as required.
- Instrument logs are maintained as required.
- Records of urine received are maintained.
- Security and confidentiality of all clinical information, laboratory data and records are maintained

LO5. Maintain a safe environment

- Established work practices and PPE are used to ensure personal safety and that of other laboratory personnel.
- Spills are cleaned up using appropriate techniques to protect personnel, work area and environment from contamination.
- The generation of wastes is minimized.
- The safe disposal of biohazard materials and other laboratory wastes is ensured in accordance with enterprise procedures.

Annex: Resource Requirements

HLT MLT4 M04 0222 **Performing Serological Tests**				
Item No.	**Category/Item**	**Description/ Specifications**	**Quantity**	**Recommended Ratio (Item: Learner)**
A.	**Learning Materials**			
1.	TTLM	• Prepared by the trainer	25	1:1
2.	Textbooks	-		
2.1	Immunology &Serology in Laboratory Medicine	Mary Louise Turgeon. Fifth edition; 2014	5	1:5
3.	**Reference books**			
3.1.	Basic Immunology: Functions and Disorders of the Immune System	Abul K. Abbas, H. Lichtman and Massachusetts Shiv Pillai. Fifth edition; 2016	5	1:5
3.2.	Immunology and Serology, for medical lab. Tech. Studies, Lecture Note series	Selamawit Debebe, , Alemaya, 2002		
3.3.	Basic Serological Testing	Rowa Yousef Alhabbab. 2018		
3.4.	Clinical Immunology Serology: A Laboratory perspective	Christine Dorresteyn Stevens.Third edition; 2010		
4.	**Learning Facilities & Infrastructure**	• Health Indicators/latest • EDHS,2016 • Fact sheets • Standard formats	10	1:3
B.	**Learning Facilities &**			

	Infrastructure			
1.	Lecture Room	5*5m	1	1:25
2.	Library	Standard	1	
3.	Demonstration room	5*10m	1	1:25
C.	**Consumable Materials**			
1.	Paper	Standard	5rim	1:5
2.	Pen	Standard		
3	Pencil and rubber	Standard		
4	Graph paper	Standard		
5	Bucher paper	Standard	10	1:3
6	Marker	Standard	12 per pack	
7	Printer ink	Standard	4	
8	White board marker	Standard	13	1:2
9	Plaster	Standard	1 roll	
10	Gloves	Standard	1 pack	1:1
11	VDRL Reagent	Standard	1 pak	1:1
12	RPR reagent	Standard	1 pak	1:1
13	Syphilis rapid test kit	Standard	1 pak	1:1
14	Widal test reagent	Standard	1 pak	1:1
15	Weil-felix test reagent	Standard	1 pak	1:1
16	HCG kit	Standard	1 pak	1:1
7	HIV kit	Standard	1 pak	1:1
18	HBSAg kit	Standard	1 pak	1:1
19	CRP kit/reagent	Standard	1 pak	1:1
20	ASO test reagent	Standard	1 pak	1:1
21	Test for RF	Standard	1 pak	1:1
12	70% alcohol	Standard	1 bottle	1:1
13	Disinfectant solution	Standard	1 bottle	1:1
14	Serological pipettes	Standard	25	1:1
15	Test tubes	Standard	25 pc	1:1
16	Anticoagulants	Standard	1 bottle	1:1
17	Needle with syringes	Standard	1 pak	1:1
18	HCV kit	Standard	1 pak	1:1

19	H.paylory Ag kit	Standard	1 pak	1:1
20	H.paylory Ab kit	Standard	1 pak	1:1
D.	**Tools and Equipment**			
1.	Computer	Lap top	1	1:25
2.	LCD projector	LCD Projector	1	1:25
3.	Printer	Laser Jet	1	1:25
4	Photocopy machine	Standard	1	1:25
5	Scanner	Standard	1	1:25
6	Back up	Standard	1	1:25
7	White board	110 x80mm	1	1:25
8	LCD projector	Standard	1	1:25
9	Microscope	Standard	1	1:25
10	Fluorescent microscope	Standard	1	1:25
11	Centrifuge	Standard	1	1:25
12	Water bath	Standard	1	1:25
13	ELISA with reader	Standard	1	1:25
14	Incubator	Standard	1	1:25
15	Shaker	Standard	1	1:25
17	Refrigerator	Standard	1	1:25
18	Glass wares	Standard	1	1:25
19	Autoclave	Standard	1	1:25
20	UV/VIS spectrophotometer	Standard	1	1:25
21	Rotator	Standard	1	1:25
22	Serological pipettes	Standard	5	1:5
23	Water bath	Standard	1	1:25

LEARNING MODULE 5
TVET-PROGRAMME TITLE: Medical Laboratory Techniques Level IV
MODULE TITLE: Performing Clinical Chemistry Tests
MODULE CODE: HLT MLT4 M05 0222
NOMINAL DURATION: 250 Hours
MODULE DESCRIPTION: This module covers the knowledge, skills and attitude required to identify concepts of human physiology, anatomy of organs, clinical chemistry, and principle of testing methodology. In addition, interpret clinical chemistry test requirements, prepare samples, conduct pre-use and calibration checks on equipment and perform routine chemical tests/procedures, including data processing and interpretation of results and tracking of obvious test malfunctions where the procedure is standardized.
LEARNING OUTCOMES At the end of the module the learner will be able to: **LO1.** Identify concept of clinical chemistry **LO2.** Review test requirements **LO3**. Process samples **LO4**. Check equipment before use **LO5**. Perform Clinical Chemistry Tests **LO6**. Process and interpret data **LO7.** Maintain laboratory records **LO8.** Maintain a safe work environment
MODULE CONTENTS: **LO1. Identify concept of clinical chemistry** 1.1. Identifying concept of physiology and anatomy of organs 1.2. Identifying Chemical principles and concepts 1.3. Identifying factors affecting chemical reaction 1.4. Identifying testing methodology **LO2. Review test requirements** 2.1. Reviewing test request 2.2. Identifying hazards 2.3. Planning work sequences

LO3. **Process samples**

3.1. Checking samples and request forms

3.2. Returning samples and request forms that do not comply with requirements

3.3. Logging acceptable samples

3.4. Processing samples

3.5. Storing sample components

LO4. **Check equipment before use**

4.1. Setting equipment/instruments

4.2. Performing pre-use and safety checks

4.3. Identifying faulty or unsafe components

4.4. Checking equipment calibration

4.5. Identifying out of calibration equipment/instruments

4.6. Ensuring availability of reagents.

LO5. **Perform Clinical Chemistry Tests**

5.1. Selecting authorized tests

5.2. Conducting blood sugar tests

5.3. Conducting liver panel tests

5.4. Conducting renal panel tests

5.5. Conducting lipid panel test

5.6. Recording all results.

5.7. Discussing with colleague for panic results

5.8. Verifying results before releasing

5.9. Storing tested samples or sample components

LO6. **Process and interpret data**

6.1. Recording test data

6.2. Conducting and computing calibration graphs

6.3. Calculating consistency of values

6.4. Recording results

6.5. Estimating and documenting uncertainty of measurements

6.6. Reporting out of specification or atypical results

6.7. Identifying faulty procedure or equipment problems

LO7. Maintain laboratory records

7.1. Entering approved data into laboratory information system

7.2. Maintaining security and confidentiality

7.3. Maintaining equipment and calibration logs

LO8. Maintain a safe work environment

8.1. Using safety work practices and PPE

8.2. Minimizing generation of wastes and their environmental impacts

8.3. Ensuring safe collection of laboratory and hazardous wastes

8.4. Storing equipment and reagents

LEARNING METHODS:

- Lecture
- Demonstration
- Group discussion
- Exercise
- Individual assignment

ASSESSMENT METHODS:

- Written exam/test
- Practical assessment
- Questioning or interview
- Oral examination

ASSESSMENT CRITERIA:

LO1. Identify concept of clinical chemistry

- Concept of physiology and anatomy of organs is identified
- Chemical principles and concepts are identified
- Factors affection chemical reaction are identified
- Testing methodology of clinical chemistry is identified

LO2. Review test requirements

- Test request are reviewed to identify samples to be tested, test method and equipment/instruments involved
- Hazards and enterprise control measures are identified associated with the sample, preparation/test methods, reagents and/or equipment
- Work sequences are planned to optimize testing of multiple samples

LO3. Process samples

- Samples and request forms are checked and matched before they are accepted.
- Samples and request forms that do not comply with requirements are returned to their source with reasons for non- acceptance.
- Acceptable samples are logged, applying required document tracking mechanisms.
- Samples are processed as required by requested tests.
- Sample components are stored appropriately until required for testing

LO4. Check equipment before use

- Equipment/Instruments are set up in accordance with test method requirements
- Pre-use and safety checks are performed in accordance with relevant enterprise and operating procedures
- Faulty or unsafe components and equipment are identified and report to appropriate personnel
- Equipment calibration is checked using specified standards and procedures
- Out of calibration equipment/instruments are identified
- Availability of reagents in sufficient quality and quantity is ensured.

LO5. Perform Clinical Chemistry Tests

- Authorized tests that are indicated for the requested investigations are selected.
- Blood sugar tests are conducted according to documented methodologies, applying required quality control procedures.
- Liver panel tests are conducted according to documented methodologies, applying required quality control procedures
- Renal panel tests are conducted according to documented methodologies, applying required quality control procedures
- Lipid panel test is conducted according to documented methodologies, applying

required quality control procedures

- All results, noting any phenomena that may be relevant to the interpretation of results are recorded.
- When result interpretation is outside parameters of authorized approval is discussed with colleague
- Results are verified before releasing for clinician/client
- Tested sample or sample components is/are stored according to organizational sample retention policy for retesting when requested

LO6. Process and interpret data

- Test data are recorded by noting atypical observations
- Calibration graphs are constructed, and results for samples computed from these graphs when appropriate.
- Consistency of calculated values is ensured with expectations
- Results are recorded and reported in accordance with enterprise procedures
- Uncertainty of measurement is estimated and documented in accordance with enterprise procedures
- Out of specification or atypical results are reported promptly to appropriate personnel
- If faulty procedure or equipment problems have led to atypical data or results is/are identified

LO7. Maintain laboratory records

- Approved data are entered into laboratory information management system
- Confidentiality and security of enterprise information and laboratory data are maintained.
- Equipment and calibration logs are maintained in accordance with enterprise procedures

LO8. Maintain a safe work environment

- Established safety work practices and PPE are used to ensure personal safety and that of other laboratory personnel OHS
- The generation of wastes and environmental impacts are minimized
- Safe collection of laboratory and hazardous waste is ensured for subsequent disposal (hazard control measures)
- Equipment and reagents are stored with care as required

Annex: Resource Requirements

HLT MLT3 M05 0222 Performing Clinical Chemistry Tests				
Item No.	**Category/Item**	**Description/ Specifications**	**Quantity**	**Recommended Ratio (Item: Learner)**
A.	**Learning Materials**			
1.	TTLM	• Prepared by the trainer	25	1:1
2.	Textbooks	-		
2.1	Tietz textbook of clinical chemistry and molecular diagnostics	Carl A. Burtis, Edward R. Ashwood and David Bruns. Fourth edition; 2006	5	1:5
3.	Reference Books			
3.1	Clinical Chemistry Principles, Techniques, and Correlations	Michael L. Bishop, Edward P. Fody and Larry E. Schoeff. Eight edition; 2017	5	1:5
3.2	ENZYMES: Biochemistry, Biotechnology and Clinical Chemistry	Trevor Palmer and Philip Bonner. Second Edition; 2007		
3.4	District Laboratory practice in tropical countries Part II	Monica cheesbrough 2nd *ed* 2005		
4.	Journals/Publication/Magazines	• Clinical chemistry published articles	25	1:1
B.	**Learning Facilities & Infrastructure**			
1.	Lecture Room	5*5m	1	1:25
2	Laboratory room	5*10 m	1	1:25
3.	Library	Standard (colleges library)	1	

C.	**Consumable Materials**			
1.	Paper	Standard	5rim	1:5
2.	Pen	Standard		
3	Pencil and rubber	Standard		
4	Graph paper	Standard		
5	Bucher paper	Standard	10	1:3
6	Marker	Standard	12 per pack	
7	Printer ink	Standard	4	
8	White board marker	Standard	15	
9	Plaster	Standard	1 roll	
10	Gloves	Standard	1 pak	
11	Test tubes (Plain)	Standard	25 pc	
12	Request paper	Standard	Standard	
13	Pasteur pipette	Standard	25	1:1
14	Cuvettes/ Reaction tubes	Standard	5	1:5
15	Clinical chemistry Reagents	Standard	1 pak each	
16	Quality controls	Standard	1 pak	
17	Standard/Calibrators	Standard	1 pak	
D.	**Tools and Equipment**			
1.	Computer	Lap top	1	1:25
2.	LCD projector	Standard	1	1:25
3.	Printer	Standard	1	1:25
4	Photocopy machine	Standard	1	1:25
5	Scanner	Standard	1	1:25
6	Back up	Standard	1	1:25
7	White board	110X80mm	1	1:25
8	Spectrophotometer	Standard	1	1:25
9	Semi-automated analyzer	Standard	1	1:25
10	Centrifuge	Standard	2	1:15
11	Water bath	Standard	1	1:25
12	Incubator	Standard	1	1:25
13	Micropipettes	Standard	10	1:3
14	Glass and plastic wares	Standard	25	1:1
15	Water distiller/Deionizer	Standard	1	1:25
16	Refrigerators	Standard	1	1:25

LEARNING MODULE 06
TVET-PROGRAMME TITLE: Medical Laboratory Techniques Level IV
MODULE TITLE: Performing Immuno-Haematological Tests
MODULE CODE: HLT MLT4 M 06 0222
NOMINAL DURATION: 180 Hours
MODULE DESCRIPTION: This unit module covers the knowledge, skills and attitude required to identify concepts of immunohematology, immunology, perform blood typing, cross matching routine and anti-immunoglobulin test and procedures that are part of the requirement of pre- and post-blood transfusion practice.
LEARNING OUTCOMES At the end of the module the learner will be able to: **LO1.** Identify concept of Immunohematology **LO2.** Process samples and associated request forms **LO3.** Perform tests **LO4.** Maintain a safe environment **LO5.** Maintain laboratory records
MODULE CONTENTS: **LO1. Identify concept of Immunohematology** 1.1. Identifying concept of Immunohematology 1.2. Classifying blood typing 1.3. Identifying types of blood cross matching 1.4. Identifying blood components and products 1.5. Identifying methodology of blood typing and cross matching 1.6. Identifying microscope set up and use **LO2. Process samples and associated request forms** 2.1. Checking and matching samples and request forms 2.2. Returning samples and request forms that do not comply with requirements 2.3. Sorting specimens according to tests requested, urgent status and volume 2.4. Logging acceptable samples 2.5. Processing samples 2.6. Storing sample components

LO3. Perform tests

3.1. Selecting authorized tests

3.2. Performing ABO grouping/typing

3.3. Performing RH typing

3.4. Performing compatibility test/Cross matching

3.5. Performing anti-immunoglobulin test

3.6. Interpreting and reporting test results

3.7. Recording test results

3.8. Discussing test result with colleague when there is panic result

3.9. Verifying results

3.10. Communicating test results

3.11. Storing tested sample or sample components

3.12. Performing documentation on log book/laboratory information system

LO4. Maintain a safe environment

4.1. Using established OHS work practices and PPE

4.2. Cleaning spills using appropriate techniques

4.3. Minimizing generation of wastes

4.4. Ensuring safe disposal of bio-hazardous materials and other laboratory wastes

LO5. Maintain laboratory records

5.1. Entering approved data into laboratory information system

5.2. Maintaining instrument logs as required by accreditation checklists

5.3. Maintaining records of blood and blood products received, used and returned to supplier

5.4. Maintaining security and confidentiality of all clinical information, laboratory data and records

Learning Methods:

- Interactive lecture
- Group discussion
- Demonstration
- Group assignment
- Individual assignment

Assessment Methods:

- Continuous assessments (quiz, assignment, tests etc.).
- Oral questioning (Interview)
- Practical exam
- Final written exam

Assessment Criteria

LO1. Identify concept of Immunohematology

- Concept of Immunohematology is identified
- Blood typing is classified
- Type of blood cross matching is identified
- Blood components and products are identified
- Methodology of blood typing and cross matching are identified
- Microscope set up and use are identified

LO2. Process samples and associated request forms

- Samples and request forms are checked and matched before they are accepted
- Samples and request forms that do not comply with requirements to their source are returned with reasons for non-acceptance
- Specimens are sorted according to tests requested, urgent status and volume
- Acceptable samples are logged by applying required document tracking mechanisms
- Samples are processed as required by requested tests
- Sample components are stored appropriately until required for testing

LO3. Perform tests

- Authorized tests that are indicated for the requested investigations are selected
- ABO grouping/typing is performed according to documented methodologies, applying required quality control procedures
- RH typing is performed
- Compatibility test/Cross matching is performed
- Anti-immunoglobulin test is performed
- Test results are interpreted and reported according to standard operating procedures
- All results, noting any phenomena that may be relevant to the interpretation of results are

recorded

- When result interpretation is outside parameters of authorized approval is discussed with colleague
- Results are verified before releasing for clinician/client
- Communication of results is performed
- Tested sample or sample components are stored according to organizational sample retention policy for retesting when requested
- Complete documentation on laboratory log book/laboratory information system application soft ware's are performed to permit the before issuing of blood or blood components that have been cleared for use by clinical staff

LO4. Maintain a safe environment

- Established OHS work practices and PPE are used to ensure personal safety and that of other laboratory personnel
- Spills are cleaned up using appropriate techniques to protect personnel, work area and environment from contamination
- The generation of wastes is minimized
- The safe disposal of bio-hazardous materials and other laboratory wastes are ensured in accordance with enterprise procedures

LO5. Maintain laboratory records

- Entries are made on report forms or into computer systems, accurately recording or transcribing required data as required
- Instrument logs are maintained as required by accreditation checklists
- Records of blood and blood products received, used and returned to supplier are maintained
- Security and confidentiality of all clinical information, laboratory data and records are maintained

Annex: Resource Requirements

HLT MLT4 M06 0221 Performing **Immuno-Haematological Tests**				
Item No.	**Category/Item**	**Description/ Specifications**	**Quantity**	**Recommended Ratio (Item: Learner)**
A.	**Learning Materials**			
1.	TTLM	• Prepared by the trainer	25	1:1
2.	Textbooks	-	5	1:5
2.1	Immunohematology: Principles and Practice	Eva D. Quinley , 3rd edition: 2011		
3.	Reference Books			
3.1.	Immunohematology for Medical Laboratory Technicians	Sheryl A. Whitlock; 2010	5	1:5
3.2.	Immunohematology and Transfusion Medicine: A Case Study Approach	Mark T. Friedman, Kamille A. West Peyman Bizargity, Kyle Annen Jeffrey S. Jhang. Second Edition; 2015		
3.4.	Rossi's Principles of Transfusion Medicine	Wiley Blackwell .5th edition; 2016		
4.	**Learning Facilities & Infrastructure**	• Health Indicators/latest • EDHS,2016 • Fact sheets • Standard formats	10	1:3
B.	**Learning Facilities & Infrastructure**			
1.	Lecture Room	5*5m	1	1:25
2.	Library	Standard	1	

3.	Demonstration room	5*10m	1	1:25
C.	**Consumable Materials**			
1.	Paper	A4	5rim	1:5
2.	Pen	Standard		
3	Pencil and rubber	Standard		
4	Graph paper	Standard		
5	Bucher paper	Standard	10	1:3
6	Marker	Standard	12 per pack	
7	Printer ink	Standard	4	
8	White board marker	Standard	15	
9	Plaster	Standard	1 roll	
10	Gloves	Standard	1 pack	
11	70% alcohol	Standard	1 bottle	
12	Disinfectant solution	Standard	1 bottle	
13	Anti-sera A, B and D	Standard	1 vial each	
14	Anti-human globulin	Standard	1 vial	
15	Cotton	Standard	1 roll	
16	Gauze	Standard	1 roll	
17	Physiological saline	Standard	1 bottle	
18	Sealing clay	Standard	1 pc	
19	Capillary tubes	Standard	1 pak	
20	Blood lancet	Standard	1 pak	
21	Microscopic slides	Standard	1pak of 50	2:1
22	Test tubes	Standard	25	1:1
23	Anticoagulants	Standard	1 bottle	
24	Needle with syringes	Standard	1 pak	
D.	**Tools and Equipment**			
1.	Computer	Lap top	1	1:25
2.	LCD projector	LCD Projector	1	1:25
3.	Printer	Laser Jet	1	1:25
4	Photocopy machine	Standard	1	1:25
5	Scanner	Standard	1	1:25
6	Back up	Standard	1	1:25

7	White board	110X80mm	1	1:25
8	Microscope	Standard	10	1:3
9	Macro centrifuge	Standard	2	1:25
10	Macro centrifuge	Standard	1	1:25
11	Water bath	Standard	1	1:25
12	ELISA machine	Standard	1	1:25
13	Incubator	Standard	1	1:25
14	Shaker	Standard	1	1:25
15	Refrigerator	Standard	1	1:25
16	Plates (ELISA)	Standard	1	1:25
17	Glass wares	Standard	1	1:25
18	Auto clave	Standard	1	1:25
19	Weighing Scale	Standard	1	1:25
20	Thermometer	Standard	1	1:25
21	Test tubes	Standard	1	1:25
22	Tourniquet	Standard	1	1:25
23	Container for sharp instruments	Standard	1	1:25

LEARNING MODULE 07
TVET-PROGRAMME TITLE: Medical Laboratory Techniques level IV
MODULE TITLE: Preparing Histopathological Samples for Examination
MODULE CODE: HLT MLT4 M07 0222
NOMINAL DURATION: 140 Hours
MODULE DESCRIPTION: This module covers the knowledge, skills and attitude required to prepare histological and pathological samples for examination involving processing and sectioning of human tissues.
LEARNING OUTCOMES At the end of the module the learner will be able to: **LO1.** Assemble equipment and materials **LO2**. Process tissue **LO3**. Stain sections **LO4.** Maintain a safe work environment
MODULE CONTENTS: **LO1. Assemble equipment and materials** 1.1. Confirming number and type of required sections 1.2. Collecting and arranging workspace equipment 1.3. Performing pre-use and safety checks 1.4. Reporting faulty or unsafe equipment 1.5. Inspecting processor reagents and reporting any items requiring replacement 1.6. Assembling specified processing equipments, safety materials and containers **LO2. Process tissue** 2.1. Preparing fine/ultra structure of tissue 2.2. Selecting reagents for tissue processing 2.3. Performing fixation ,dehydration , clearing and impregnation of tissue 2.4. Performing infiltration and embedding tissue in correct orientation 2.5. Performing tissue sectioning 2.6. Performing mounting of sections on microscopic slide 2.7. Monitoring procedure of tissue processing 2.8. Checking quality of embedded tissue

LO3. Stain sections

3.1. Selecting reagents

3.2. Staining sections

3.3. Examining sections microscopically

3.4. Preparing mounted section permanently

3.5. Photographing and presenting Section

3.6. Attaching permanent labels

3.7. Performing trouble shooting

3.8. Ensuring security and traceability of all information

LO4. Maintain a safe work environment

4.1. Ensuring personal safety and minimizing cross-contamination

4.2. Handling specimens and equipments safely.

4.3. Cleaning up Spills

4.4. Minimizing waste generation and their environmental impacts

4.5. Collecting and disposing wastes safely

4.6. Reporting hazards and incidents

Learning Methods:

- Interactive lecture
- Group discussion
- Demonstration
- Simulation
- Group assignment
- Individual assignment

Assessment Methods: Formative

- Continuous assessments (quiz, assignment, tests etc.).
- Oral questioning
- Skill check out
- Final written exam

Assessment Criteria

LO1. Assemble equipment and materials

- The number and type of sections required are confirmed.
- Equipment are collected and the workspace arranged
- Pre-use and safety checks are performed to ensure equipment is fit for purpose.
- Faulty or unsafe equipment are reported to appropriate personnel
- Processor reagents are inspected for deterioration and adequate volume and any items requiring replacement reported
- All specified processing equipment, safety equipment, materials and containers are assembled.

LO2. Process tissue

- Fine/Ultra Structure of tissue is prepared
- Reagents are selected for tissue processing
- Fixation ,dehydration , clearing and impregnation of tissue are performed
- Infiltration and embedding tissue in correct orientation are performed
- Sectioning of tissue is performed
- Mounting of sections on microscopic slide is performed.
- The procedure of tissue processing is monitored
- The quality of embedded tissue is checked

LO3. Stain sections

- Reagents specified in the method are selected
- Sections are stained according to the method
- Sections are examined microscopically
- Mounted section is prepared permanently
- Section is photographed and presented if required
- Permanent labels giving specimen details are attached according to enterprise traceability requirements
- Trouble shooting is performed
- Security and traceability of all information are ensured

LO4. Maintain a safe work environment

- Personal safety is ensured and cross-contamination minimized through the use of PPE.
- All specimens and equipment are handled in accordance with enterprise safety protocols/procedures.
- Spills are cleaned up using appropriate techniques to protect personnel, work area and environment.
- Generation of waste and environmental impacts is minimized
- All wastes are collected and disposed of safely
- Hazards and incidents are reported to designated personnel using enterprise procedures.

Annex: Resource Requirements

HLT MLT 4 M07 0222 **Preparing Histopathological Samples for Examination**				
Item No.	Category/Item	Description/ Specifications	Quantity	Recommended Ratio (Item: Learner)
A.	**Learning Materials**			
1.	TTLM	• Flip chart • Posters • Job aids	25	1:1
2.	Textbooks	• Training modules • Text books	25	1:1
2.1	Bancroft's Theory and Practice of Histological Techniques	S. Kim Suvarna , Christopher Layton and John D. Bancroft. Eight edition; 2013		
3	Reference Books	•		
3.1	Histopathology Specimens: Clinical, Pathological and Laboratory Aspects	Derek C. Allen R. Iain Cameron Third Edition; 2017		
3.2	Basic and Advanced Laboratory Techniques in Histopathology and Cytology	Pranab Dey; 2018		
3.3	Histopathology for Medical Laboratory Technology students Lecture note Series	Seyoum B, Yimam J ;2007		
3.4	Journals/Publication/Magazines	• Fact sheets • Standard formats	10	1:3
B.	**Learning Facilities & Infrastructure**			

1.	Lecture Room	5*5m	1	1:25
2.	Library	Standard	1	
3.	Demonstration room	Standard	1	
C.	**Consumable Materials**			
1.	Paper and Check list	standard	5 rim	1:5
2.	Pen	Standard	As required	
3	Tissue labeling material	Standard		
3	Pencil and rubber	Standard		
4	Graph paper	Standard		
5	Bucher paper	Standard	10	1:3
6	Art line marker	Standard	12 / pack	
7	Printer ink	Standard	4	
8	White board marker	Standard	15	
9	Plaster	Standard	1 roll	1:25
11	Fixative	Standard	1 bottle	1:25
12	Paraffin wax	Standard	1 bottle	1:25
13	Different conc. Of alcohol	Standard	1 bottle	1:25
14	Hematoxyline	Standard	1 bottle	1:25
15	Decalcifying agent	Standard	1 bottle	1:25
16	Eosin	Standard	1 bottle	1:25
17	Distilled water	Standard	1 bottle	1:25
18	Gloves	Standard	1 pak	1:25
19	Masks	Standard	1 pak	1:25
20	Syringe with needle	Standard	1 pak	1:25
D.	**Tools and Equipments**			
1.	Computer	Lap top	1	1:25
2.	LCD projector	Standard	1	1:25
3.	Printer	Standard	1	1:25
4	Photocopy machine	Standard	1	1:25
5	Scanner	Standard	1	1:25
6	Back up	Standard	1	1:25
7	White board	Standard	1	1:25
8	Audio-Visual materials	Standard	1 pc	1:25
9	Coplin (staining) jar	Standard	1 pc	1:25
10	Histo pathological slide films	Standard	1 bottle	1:25
11	Deep freezer	Standard	1	1:25
12	Microscope	Standard	12	1:2
13	Microtome	Standard	1	1:25
14	Water bath	Standard	1	1:25
15	Autoclave	Standard	1	1:25
16	Goggle	Standard	25pc	1:1
17	Gowns	Standard	25pc	1:1
18	Tissue cassette	Standard	25 pc	1:1

LEARNING MODULE 8
TVET-PROGRAMME TITLE: Medical Laboratory Techniques Level IV
MODULE TITLE: Implementing Laboratory Quality Assurance
MODULE CODE: HLT MLT4 M08 0222
NOMINAL DURATION: 90 Hours
MODULE DESCRIPTION: This module covers the knowledge, skills and attitude required to implement quality assurance for pre-analytical, analytical and post-analytical activities of the laboratory.
LEARNING OUTCOMES At the end of the module the learner will be able to: **LO1.** Identify the Concept quality assurance **LO2.** Prepare document and record **LO3**.Implement quality Pre-analytic process **LO4.** Implement quality analytic process **LO5.** Implement quality post- analytic process **LO6.** Conduct Process improvement activities
MODULE CONTENTS: **LO1. Identify the Concept quality assurance** 1.1. Identifying concepts of quality assurance 1.2. Identifying differences of quality assurance and quality control 1.3. Benefit of quality assurance program 1.4. Identifying quality elements in all quality cycle 1.5. Identifying laboratory path of work flow **LO2. Prepare document and record** 2.1. Identifying document and record systems 2.2. Preparing SOP and guidelines are 2.3. Identifying and achieving Records 2.4. Accomplishing quality manual **LO3. Implement quality Pre-analytic process** 3.1 Identifying patient and laboratory requests

3.2 labeling specimen and requests

3.3 Collecting the specimen

3.4 Identifying and maintaining chain of custody

3.5 Receiving, storing and transporting specimen

LO4. Implement quality analytic process

4.1. Identifying internal quality controls and calibrated materials

4.2. Differentiating error, accuracy and precision

4.3. Defining qualitative and quantitative quality controls

4.4. Identifying qualitative quality control methods

4.5. Performing Internal quality control

4.6. Calculating and interpreting quality control data

4.7. Identifying external quality control methods

4.8. defining biological reference range and critical values

LO5 Implement quality post- analytic process

5.1 Interpreting test result

5.2 Identifying reporting system

5.3 Releasing of test result

5.4 Maintaining client's information and confidentiality

LO6 Conduct Process improvement activities

6.1 Identifying laboratory related occurrences

6.2 Assessing root cause of the occurrence

6.3 Taking corrective and prevented actions

6.4 Identifying continual improvement methods

LEARNING METHODS:

- Lecture
- Demonstration
- Group discussion
- Exercise
- Individual assignment

ASSESSMENT CRITERIA:

LO.1 Identify the Concept quality assurance

- Concepts of quality assurance is identified
- Differences of quality assurance and quality control are identified
- Benefit of quality assurance program is understood
- Identify quality elements in pre-analytical, analytical and post analytical laboratory process.
- Laboratory path of work flow is identified

LO.2 Prepare document and record

- Document and record systems are identified.
- SOP and guidelines are prepared
- Records are identified, achieved and indexed according to document policy of the organization
- Accomplish all laboratory activities according to quality manual

LO3 Implement quality Pre-analytic process

- Patient and laboratory requests are properly identified.
- Specimen and requests are properly labeled according to the laboratory procedures
- Collect the right specimen at the right time with proper collection materials according to the laboratory procedures
- Chain of custody are identified and maintained
- Proper specimen are received, stored and transported according to quality policy manuals.

LO4 Implement quality analytic process

- Internal quality controls and calibrated materials are identified
- Error, accuracy and precision are differentiated
- Qualitative and quantitative quality controls are defined
- Qualitative quality control methods are identified for respective tests.
- Internal quality control is performed
- Quality control data are calculated and interpreted
- External quality control methods are identified

- Biological reference range and critical values are defined

LO5. Implement quality post- analytic process

- Client test result are interpreted according to the laboratory procedures
- Proper reporting system is identified according to the laboratory procedures
- Releasing of test result is kept according to the laboratory procedures
- Clients information and confidentiality are maintained according to the laboratory information management policy

LO6. Conduct Process improvement activities

- Laboratory related occurrences are identified
- Root cause of the occurrence are assessed
- Corrective and prevented actions are taken using different tools.
- Continual improvement methods are identified

Annex: Resource Requirements

HLT MLT4 M08 0222 Implementing Laboratory Quality Assurance				
Item No.	Category/Item	Description/ Specifications	Quantity	Recommended Ratio (Item: Learner)
A.	**Learning Materials**			
1.	TTLM	Prepared by trainer	25	1:1
2.	Textbooks			
3.	Reference Books			
3.1	District laboratory practice in tropical countries Part I, II,	Monica Cheesbrough. Second edition; 2006	5	1:5
3.2	Quality Assurance and Quality Control in the Analytical Chemical Laboratory: A Practical Approach	Piort Konieczka, Jacek Namiesnik; 2002		
3.2	Statistical Methods for Quality Assurance	Stephen B. Vardeman J. Marcus Jobe. Second Edition; 2016		
3.3	Fundamentals of Quality Control and Improvement	Amitava Mitra. Fourth edition; 2016		
3.4	ISO15189 quality standard	ENAO, 2012.		
4.	Journals/Publication/Magazines			
B.	**Learning Facilities & Infrastructure**			
1.	Lecture Room	5*5m	1	1:25
2.	Library	1		
3.	Laboratory	1		
C.	**Consumable Materials**			

1.	paper	Standard	5rim	1:5
2.	pencil	Standard	5	1:5
3.	pen	Standard	5	1:5
4.	Sheets and Loges	Standard		
D.	**Tools and Equipments**			
1.	Computer	Standard	1	
2.	Printer	Standard	1	
3	Sample documents	Standard		
4	Chalk board	Standard		
6	White board	Standard		
7	Flip chart	Standard		
8	Written materials	Standard		
9	LCD projector	Standard		
10	SOP		5	1:5

LEARNING MODULE 9
TVET-PROGRAMME TITLE: Medical Laboratory Techniques level-IV
MODULE TITLE : Managing Community Health Service
MODULE CODE : HLT HES4 M09 0222
NOMINAL DURATION: 72 Hours
MODULE DESCRIPTION: This modules covers the knowledge, skills and attitude required to manage health service of the area to improve quality of service.

LEARNING OUTCOMES

At the end of the module the learner will be able to:

LO1. Follow organizational guidelines, understand health policy and service delivery system

LO2. Plan, manage, monitor and evaluate health system

LO3. Lead and build individual's and team's capacity

MODULE CONTENTS:

LO1. Follow organizational guidelines, understand health policy and service delivery system

1.1 . Recognizing the policy and organization of the health care system
1.2 Discussing primary healthcare in Ethiopia
1.3 Identifying elements of primary health care
1.4 Describing health service extension program
1.5 Tracking workplace instructions and policies
1.6 Enduring organizational programs and procedures
1.7 Using organizational resources for the purpose intended.
1.8 Identifying equity issues in population health
1.9 Describing basic principles of leadership

LO2. Plan, manage, monitor and evaluate health system

2.1. Demanding management skills to bring efficient health care system
2.2. Planning Health programs
2.3. Managing Resources
2.4. Developing individual and team capacity
2.5. Resolving issues promptly and effectively
2.6. Developing health service monitoring and evaluation mechanism

LO3. Lead and build individual's and team's capacity

3.1. Identifying Self- improvement areas

3.2. Identifying goals and objectives of learning and development program to match the specific requirements of competence standards

3.3. Identifying and implementing, learning and development needs in line with organizational requirements

3.4. Providing coaching/ mentoring to facilitate individual and team achievement of competencies

3.5. Developing joint action plans by team and individuals.

3.6. Allocating duties and responsibilities based on competencies

3.7. Collaborative efforts are made to attain organizational goals

3.8. Developing feedback mechanism to bring about improvement

LEARNING METHODS:

- Lecture
- Demonstration
- Group discussion
- Exercise
- Individual assignment

ASSESSMENT METHODS:

- Interview
- Written test
- Demonstration/Observation

ASSESSMENT CRITERIA:

LO.1 Follow organizational guidelines, understand health policy and service delivery system

- The policy and organization of the health care system of Ethiopia is comprehended
- Primary healthcare in Ethiopia is understood
- Elements of primary health care are identified
- Health service extension program is understood
- Workplace instructions and policies are followed.
- Organizational programs and procedures are supported within the job role.
- Organizational resources are used for the purpose intended
- equity issues in population health are identified

- basic principles of leadership are described

LO2. Plan, manage, monitor and evaluate health system

- Management skills required to bring about efficient health care system are dealt with
- Health programs are planned
- Resources for health care are managed
- Individual and team capacity is developed
- Issues raised through participation and consultation are resolved promptly and effectively
- Health service monitoring and evaluation mechanisms are developed

LO3. Lead and build individual's and team's capacity

- Self- improvement areas are identified based on individual's self- performance evaluation.
- Learning and development needs are systematically identified and implemented in line with organizational requirements
- Learning and development program goals and objectives are identified to match the specific knowledge and skills requirements of competence standards
- Workplace learning opportunities and coaching/ mentoring are provided to facilitate individual and team achievement of competencies
- Joint action plans are developed by team and individuals.
- Duties and responsibilities are allocated based on the skills, knowledge and aptitude required to properly undertake the assigned task as well as considering individual's preference,
- Collaborative efforts are made to attain organizational goals
- Feedback from individuals or teams is used to identify challenges, develop interventional strategies, and implement them to bring about improvement.

Annex: Resource Requirements

HLT HES4 M09 0222 Managing Community Health Service				
Item No.	Category/Item	Description/ Specifications	Quantity	Recommended Ratio (Item: Learner)
A.	**Learning Materials**			
1.	TTLM		30	1:1
2.	Textbooks		30	1:1
3.	Reference Books	National health policy guidelines SBCC modules	10	1:3
4.	Journals/Publication/Magazines	Health Indicators/latest EDHS,2016 Fact sheets Standard formats	10	1:3
B.	**Learning Facilities & Infrastructure**			
1.	Lecture Room	5*5m	1	1:25
2.	Library	Standard (colleges library)	1	
C.	**Consumable Materials**			
1.	Paper	A4	5rim	1:5
2.	Pen	Standard	As required	
3	Pencil and rubber	Standard		
4	Graph paper	Standard		
5	Bucher paper	Standard	10	1:3
6	Marker	Standard	12 per pack	
7	Printer ink	Standard	4	
8	White board marker	6 per pack	15	
9	Plaster	Rol3		
D.	**Tools and**			

	Equipment's			
1.	Computer	Lap top	1	1:30
2.	LCD projector	LCD Projector	1	1:30
3.	Printer		1	1:30
4	Photocopy machine		1	1:30
5	Scanner	Smart	1	1:30
6	Back up	Smart	1	1:30
7	White board	110X80mm	1	1:30

LEARNING MODULE 10
TVET-PROGRAMME TITLE: Medical Laboratory Techniques Level IV
MODULE TITLE: Preventing and Eliminating MUDA
MODULE CODE: HLT MLT4 M10 0222
NOMINAL DURATION: 56 Hours
MODULE DESCRIPTION: This module covers the knowledge, skills and attitude required by a worker to prevent and eliminate MUDA/wastes in his/her workplace by applying scientific problem-solving techniques and tools to enhance quality, productivity and other kaizen elements on continual basis. It covers responsibility for the day-to-day operation of the work and ensures Kaizen Elements are continuously improved and institutionalized.
LEARNING OUTCOMES At the end of the module the learner will be able to: **LO1.** Prepare for work **LO2**.Identify MUDA and problem **LO3.** Analyze causes of a problem **LO4.** Eliminate MUDA and Assess effectiveness of the solution **LO5.** Prevent occurrence of wastes and sustain operation
MODULE CONTENTS: **LO1. Prepare for work** 1.1. Using work instructions to determine job requirements 1.2. Reading and interpreting job specifications following working manual 1.3. Observing OHS requirements throughout the work 1.4. Selecting appropriate material is selected for work 1.5. Identifying and checking safety equipment and tools **LO2**. **Identify MUDA and problem** 2.1. Preparing and implementing plan of MUDA and problem identification 2.2. Causes and effects of MUDA 2.3. Listing all possible problems using statistical tools and techniques 2.4. Identifying all possible problems related to kaizen elements 2.5. Tools and techniques situation of the work place

2.6. .Identifying and measuring wastes/MUDA

2.7. Reporting identified and measured wastes to relevant personnel

LO3. Analyze causes of a problem.

3.1 Listing all possible causes of a problem

3.2 Analyzing cause relationships using 4M1E

3.3 . Causes of the problems

3.4 .Root cause which is most directly related to the problem

3.5 Listing all possible ways using creative idea generation

3.6 Testing and evaluating the suggested solutions for potential complications

3.7 Summaries of the action plan to implement the suggested solution.

LO4. Eliminate MUDA and Assess effectiveness of the solution

4.1. Implementing Plan of MUDA elimination by medium KPT members.

4.2. Attitude and ten basic principles to eliminate waste/MUDA

4.3. Tools and techniques to eliminate MUDA

4.4. Reducing and eliminating wastes/MUDA

4.5. Identifying tangible and intangible results

4.6. Comparing tangible results with targets using various types of diagrams

4.7. Reporting improvements gained by elimination of waste/MUDA to relevant bodies

LO5. Prevent occurrence of wastes and sustain operation.

5.1 Plan of MUDA prevention

5.2 Standards required for machines, operations, defining normal and abnormal conditions, clerical procedures and procurement

5.3 Preventing wastes/MUDA by using visual and auditory control methods

5.4 Creating waste-free workplace using 5W and 1Hsheet

5.5 Completion of required operation with standard procedures and practices

5.6 Facilitating the updating of standard procedures and practices

5.7 Ensuring and training the capability of the work team on the new Standard

5.8 Operating Procedures (SOPs).

LEARNING METHODS:

- Lecture

- Demonstration
- Group discussion
- Exercise
- Individual assignment

ASSESSMENT METHODS:

- Practical assessment
- Written exam/test
- Questioning or interview

ASSESSMENT CRITERIA:

LO1. Prepare for work

- Work instructions are used to determine job requirements, including method, material and equipment.
- Job specifications are read and interpreted following working manual.
- OHS requirements, including dust and fume collection, breathing apparatus and eye and ear personal protection needs are observed throughout the work.
- Appropriate material is selected for work.
- Safety equipment and tools are identified and checked for safe and effective operation.

LO2.Identify MUDA and problem

- Plan of MUDA and problem identification is prepared and implemented.
- Causes and effects of MUDA are discussed.
- All possible problems related to the process /Kaizen elements are listed using statistical tools and techniques.
- All possible problems related to kaizen elements are identified
- are used to draw and analyze current and listed on Visual Management Board/Kaizen Board.
- Tools and techniques situation of the work place
- Wastes/MUDA are identified and measured based on relevant procedures
- Identified and measured wastes are reported to relevant personnel

LO3. Analyze causes of a problem

- All possible causes of a problem are listed.
- Cause relationships are analyzed using 4M1E.

- Causes of the problems are identified
- The root cause which is most directly related to the problem is selected
- All possible ways are listed using creative idea generation to eliminate the most critical root cause.
- The suggested solutions are carefully tested and evaluated for potential complications.
- Detailed summaries of the action plan are prepared to implement the suggested solution.

LO4. Eliminate MUDA and Assess effectiveness of the solution

- Plan of MUDA elimination is prepared and implemented by medium KPT members.
- Necessary attitude and the ten basic principles for improvement are adopted to eliminate waste/MUDA.
- Tools and techniques are used to eliminate wastes/MUDA based on the procedures and OHS.
- Wastes/MUDA are reduced and eliminated in accordance with OHS and organizational requirements.
- Tangible and intangible results are identified.
- Tangible results are compared with targets using various types of diagrams.
- Improvements gained by elimination of waste/MUDA are reported to relevant bodies

LO5. Prevent occurrence of wastes and sustain operation

- Plan of MUDA prevention is prepared and implemented
- Standards required for machines, operations, defining normal and abnormal conditions, clerical procedures and procurement are discussed and prepared
- Occurrences of wastes/MUDA are prevented by using visual and auditory control methods
- Waste-free workplace is created using 5W and 1Hsheet
- The completion of required operation is done in accordance with standard procedures and practices
- The updating of standard procedures and practices is facilitated
- The capability of the work team that aligns with the requirements of the procedure is ensured and trained on the new Standard Operating Procedures (SOPs)

Annex: Resource Requirements

HLT MLT4 M10 0222 Preventing and Eliminating MUDA				
Item No.	**Category/Item**	**Description/ Specifications**	**Quantity**	**Recommended Ratio (Item: Learner)**
A.	**Learning Materials**			
1.	TTLM		25	1:1
2.	Textbooks	• Training modules • Text books	25	1:1
3.	Reference Books	• National health policy • Guidelines • HES Training modules	25	1:1
3.1		•	6	1:5
4.	Journals/Publication/Magazines	• Health Indicators/latest • EDHS,2016 • Fact sheets • Standard formats	10	1:3
B.	**Learning Facilities & Infrastructure**			
1.	Lecture Room	5*5m	1	1:25
2.	Library	Standard (colleges library)	1	
3.	Demonstration room		1	1:6
C.	**Consumable Materials**			
1.	Paper	A4	5rim	1:5
2.	Pen		As required	
3	Pencil and rubber			

4	Graph paper			
5	Bucher paper		10	1:3
6	Marker		12 per pack	
7	Printer ink		4	
8	White board marker	6 per pack	15	
9	Plaster	Rol3		
10	Medical supplies		As required	
D.	**Tools and Equipment**			
1.	Computer	Lap top	1	1:25
2.	LCD projector	LCD Projector	1	1:25
3.	Printer		1	1:25
4	Photocopy machine		1	1:25
5	Scanner	Smart	1	1:25
6	Back up	Smart	1	1:25
7	White board	110X80mm	1	1:25
8	Medical equipment		As required	

Acknowledgement

The Ministry of Health and Ministry Labor and Skill wishes to extend thanks and appreciation to the many representatives of industry, academic and government agencies who donated their time and expertise to the development of this Model Curriculum for the TVET Program IV.

The trainers who developed the curriculum

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