DIAGNOSTIC AND LABORATORY EQUIPMENT I

UNIT CODE: 0914451 17A

TVET CDACC UNIT CODE: ENG/CU/MDE/CR/06/5/MA

UNIT DURATION: 80 Hours

Relationship to Occupational Standards

This unit addresses the Unit of Competency: Perform diagnostic and laboratory Equipment Maintenance I.

Unit Description

This unit specifies the competencies required to perform diagnostic and laboratory equipment maintenance. It involves performing vital-signs monitors, microscope and centrifuge maintenance.

Summary of Learning Outcomes

S/No.	Learning Outcome	Duration in hours.
1.	To perform vital-signs monitors maintenance	40
2.	To perform microscope maintenance	20
3.	To perform centrifuge maintenance	20
	TOTAL	**80**

Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods
1. Perform vital-signs monitors maintenance	1.1 Meaning and function of a Blood Pressure Machine (BP)	• Practical Assessment • Project

	1.1.1 Methods of blood pressure measurements 1.1.2 Types and parts of blood pressure machines 1.1.3 Blood pressure monitors 1.2.3.1 Stethoscope 1.2.3.2 Pulse sensors 1.2.3.3 Respiratory sensors 1.1.4 Common faults and maintenance of blood pressure machines and pressure monitors 1.2 Electromagnetic Blood Flowmeters 1.3 Blood Flow estimation by Radiographic method 1.4 Pulse Oximetery working and maintenance 1.5 Meaning and function of a Capnograph 1.5.1 Types of Capnograph machine 1.5.2 Parts of a Capnograph machine 1.5.3 Methods of Capnograph measurements 1.5.4 Common faults in Capnograph 1.5.5 Maintenance	• Third Party Report • Portfolio of Evidence • Written Assessment • Oral Questioning

	procedures 1.6 Blood gas analyzer working principle 1.6.1 Parts of a blood gas analyzer 1.6.2 Control devices of a blood gas analyzer 1.6.3 Maintenance procedures 1.7 Principles of EEG 1.7.1 Basic components of EEG 1.7.2 Maintenance procedures 1.7.3 Safety procedures 1.7.4 Calibration 1.8 Principles of ECG 1.8.1 Basic components of ECG 1.8.2 Maintenance procedures 1.8.3 Safety procedures 1.8.4 Calibration 1.9 Principles of glucometer 1.9.1 Basic components of glucometer 1.9.2 Maintenance procedures 1.9.3 Safety procedures 1.9.4 Calibration 1.10 Components of diagnostic set	

	1.11 Principles of bilirubinometer 1.10.1 Basic components of bilirubinometer 1.10.2 Maintenance procedures 1.10.3 Safety procedures 1.10.4 Calibration	
2. Perform Microscope maintenance	2.1 Principles of microscopy 2.2 Function of a microscope 2.3 Parts of a microscope 2.3.1. Base 2.3.2. Stage 2.3.3. Lenses 2.3.4. Adjustment knobs 2.4 Types of a microscope 2.4.1 Light microscope 2.4.2 Fluorescent microscope 2.4.3 Electron microscope 2.5 Operation principles of microscopes 2.6 Optical system of a microscope 2.7 Common faults 2.8 Maintenance procedures	• Practical Assessment • Project • Third Party Report • Portfolio of Evidence • Written Assessment • Oral Questioning
3. Perform Centrifuge Maintenance	3.1 Principles of centrifuge 3.2 Function of a centrifuge 3.3 Parts of a centrifuge 3.4 Types of a centrifuge 3.4.1 Manual centrifuge 3.4.2 Electrical centrifuge 3.4.3 Table top/bench top	• Practical Assessment • Project • Third Party Report • Portfolio of Evidence • Written Assessment • Oral Questioning

	3.4.4 Haematocrit 3.4.5 Ultracentrifuge 3.4.6 Refrigerated centrifuge 3.5 Operation principles of a centrifuge 3.6 Control devices of a centrifuge 3.7 Maintenance procedures 3.8 Safety procedures.	

Suggested Methods of Instruction

- Practical
- Projects
- Demonstrations
- Group discussions
- Interactive lectures
- Industrial attachment
- Viewing of related videos

Recommended Resources for 25 Trainees

S No.	Category Item	Description Specifications	Quantity	Recommended Ratio (Item: Trainee)
A	**Learning Materials**			
1.	Reference books	Principles of Instrumental Analysis by Douglas A. Skoog, F. James Holler, and Stanley R. Crouch Electrical Measurements and Instrumentation 2nd edition	5 pcs for each	1:5

2.	Maintenance manuals	Assorted Systems component Maintenance reports, manufacture's manuals and data sheets Instrumentation Handbooks	5 pcs for each	1:5
3.	Charts	Assorted diagnostic and lab equipment diagrams Equipment block diagram charts	1 pcs for each	1:25
4.	Software	Assorted installation software for the equipment	25 for each	1:1
5.	Audio visual presentations	Projector	1	1:25
B	**Learning Facilities & infrastructure**			
6.	Lecture theory room	$60m^2$	1	1:25
7.	Workshop	$150m^2$	1	1:25
8.	Computer laboratory	$100m^2$	1	1:25
9.	Clinical rotations	OPD, Diagnostic and Laboratory department	1	1
C	**Consumable materials**			
10.	Installation materials	Insulation tape, cables, assorted electronic components	25 pcs for each	1:1
11.	Maintenance materials	Wipes, , spare batteries ,sanitizer, service kits	25 pcs for each	1:1
12.	Assorted electrical	Contactors, transformer, overload relays, timers,	25 pcs for each	1:1

	components	resistors, ics capacitors, diodes, breadboards		
13.	Assorted instrumentation components	Sensors, transducers, actuators , cuvettes	25 for each	1:5
D	**Tools and Equipment**			
14.	Assorted tools and equipment	Side cutters, Side cutters, Pliers, Screw driver, Crimping tools, Multi-meter, Oscilloscope, Solder guns, Allen keys set	25 pcs for each	1:1
15.	PPEs	Safety boots, overall, masks, gloves, antistatic shoes	25 pcs for each	1:1
16.	Hot air gun		5 pcs	1:5
17.	Blower		5 pcs	1:5
18.	Drilling machines		5 pcs	1:5
19.	Patient monitor		5 pcs	1:5
20.	Endoscopy Equipment		2 pcs	1:12
21.	ECG, EEG machine		1 pcs	1:25
22.	Capnograph		2 pcs	1:12
23.	Diagnostic Set		12 pcs	1:2
24.	Blood Pressure Machines		12 pcs	1:2
25.	Pulse Oximeter		12 pcs	1:2
26.	Electrocardiogram		2 pcs	1:12
27.	Glucometer		12 pcs	1:2
28.	Bilirubinometer		12 pcs	1:2
29.	Microscope		5 pcs	1:5

30.	Centrifuge		5 pcs	1:5
31.	Bacteriological Incubator		3 pcs	1:8
32.	Hematology Analyzer		3 pcs	1:8
33.	Biochemistry Analyzer		3 pcs	1:8
34.	Electrolyte Analyzer		3 pcs	1:8
35.	Biosafety Cabinet		2 pcs	1:12
36.	photometer		3 pcs	1:8