OPERATION THEATRE EQUIPMENT

UNIT CODE: 0914451 18A

TVET CDACC UNIT CODE: ENG/CU/MDE/CR/07/5/MA

UNIT DURATION: 120 Hours

Relationship to Occupational Standards

This unit addresses the Unit of Competency: Perform Operation Theatre Equipment Maintenance.

Unit Description

This unit specifies the competencies required to perform operation theatre equipment maintenance. It involves performing surgical diathermy equipment, anaesthesia equipment, operating theatre table, operating theatre light, patient monitor, CSSD equipment, c-arm equipment, cath lab machine and heart lung machine maintenance.

Summary of Learning Outcomes

S/No.	Learning Outcome	Duration in hours.
1.	To perform surgical diathermy equipment maintenance	10
2.	To perform anaesthesia equipment maintenance	20
3.	To perform operating theatre table maintenance	10
4.	To perform operating theatre light maintenance	10
5.	To perform patient monitor maintenance	15
6.	To perform CSSD equipment maintenance	15
7.	To perform c-arm equipment maintenance	15
8.	To perform cath lab machine maintenance	15
9.	To perform heart lung machine maintenance	10
	TOTAL	**120**

Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods
1. Perform Surgical Diathermy Equipment Maintenance	1.1 Operation theatre layout 1.2 Methods and electrosurgery equipment. 1.2.1 High frequency thermal effect 1.2.2 Monopolar coagulation 1.2.3 Bipolar coagulation 1.2.4 Fulguration 1.2.5 Cutting (Blended cut) 1.3 Components of a typical electrosurgical Unit (ESU) 1.3.1 High frequency oscillators 1.3.2 Output power intensity control 1.3.3 Patient plate monitor 1.3.4 Modulating and output stage circuits 1.3.5 Neutral and active electrodes 1.4 Effects of current on biological tissue 1.4.1 Thermal effect 1.4.2 Faradic effect 1.4.3 Electrolytic effect 1.5 Maintenance procedure	• Practical Assessment • Project • Third Party Report • Portfolio of Evidence • Written Assessment • Oral Questioning

	1.5.1 User maintenance 1.5.2 Electrode care 1.5.3 Patient plate monitor positioning and care 1.5.4 Output power intensity adjustment 1.5.5 Technician maintenance 1.5.6 Electrode cleaning 1.5.7 Patient plate monitor alarm 1.5.8 Control circuitry 1.6 Safety precautions of electro-surgery	
2. Perform Anaesthesia Equipment Maintenance	2.1 Principle of anaesthesia 2.1.1 Patient situation during operation 2.1.2 Anaesthesia effect during operation 2.1.3 Risks of anaesthesia 2.2 Main parts of anaesthetic machine 2.2.1 Anaesthesia gases 2.2.2 Vaporizers 2.2.3 BOYLES anaesthetic unit 2.2.4 Vaporizer 2.2.5 Ventilator 2.2.6 Scavenging System 2.2.7 Patient Monitor 2.2.8 Bellows 2.2.9 Flowmeter	• Practical Assessment • Project • Third Party Report • Portfolio of Evidence • Written Assessment • Oral Questioning

	2.2.10 Flowmeter tubes 2.2.11 Pressure regulator 2.2.12 Check valves 2.2.13 O-rings 2.2.14 Oxygen Sensor 2.2.15 Regulators 2.2.16 Breathing attachments 2.3 Operational principles of anaesthetic machine 2.4 Fault diagnosis 2.5 Maintenance of anaesthetic machine 2.6 Safety 2.6.1 Pin index 2.6.2 Connector system 2.7 Colour coding	
3. Perform Operating Theatre Table Maintenance	3.1 Uses of operation theatre table 3.2 Types of operation theatre tables 3.2.1 Mechanical system 3.2.2 Hydraulic system 3.2.3 Electrical system 3.3 Main parts of operation theatre table 3.3.1 Arm rest 3.3.2 Head rest 3.3.3 Clamps 3.3.4 Base 3.3.5 Column 3.4 Requirements of operation theatre table 3.5 Fault diagnosis of theatre table	• Practical Assessment • Project • Third Party Report • Portfolio of Evidence • Written Assessment • Oral Questioning

	3.6 Maintenance procedures of typical faults. 3.7 Safety test	
4. Perform Operating Theatre Light Maintenance	4.1 Requirements of operation theatre lamp 4.2 Main parts of theatre lamp 4.2.1 Arm rest 4.2.2 Head rest 4.2.3 Clamps 4.2.4 Base 4.2.5 Column 4.3 Features of theatre lamp 4.3.1 Focusing 4.3.2 Positioning 4.3.3 Dimmers 4.3.4 Filters 4.4 Mounting facilities 4.5 Electrical system 4.5.1 Switches 4.5.2 Relays 4.5.3 Change over systems 4.6 Fault diagnosis 4.7 Maintenance procedures of typical faults	• Practical Assessment • Project • Third Party Report • Portfolio of Evidence • Written Assessment • Oral Questioning
5. Perform Patient Monitor Maintenance	5.1 Functions of patient monitors 5.2 Parts of patient monitoring system 5.2.1 ECG leads 5.2.2 Probes 5.2.3 NIBP Cuff 5.2.4 Display 5.3 Types of patient monitors	• Practical Assessment • Project • Third Party Report • Portfolio of Evidence • Written Assessment • Oral Questioning

	5.3.1 Electro-cardiogram (ECG) 5.3.2 Vital signs monitor 5.3.3 Pulmonary analyzer 5.4 Principle of operations of patient monitors 5.5 Fault diagnosis 5.6 Maintenance procedures 5.7 Safety procedures	
6. Perform CSSD Equipment Maintenance	6.1 CSSD equipment 6.1.1 Autoclave 6.1.2 Oven 6.1.3 Ultrasonic washer 6.1.4 UV steriliser 6.2 Autoclave general operation and working principle 6.2.1. Types of autoclaves 6.2.1.1. Vertical 6.2.1.2. Horizontal 6.3 Oven general operation and working principle 6.4 Ultrasonic washer general operation and working principle 6.5 UV sterilizer general operation and working principle. 6.6 (CSSD) Equipment Fault diagnosis 6.7 (CSSD) Equipment Maintenance procedures 6.8 (CSSD) Equipment Safety procedures	• Practical Assessment • Project • Third Party Report • Portfolio of Evidence • Written Assessment • Oral Questioning

7. Perform C-ARM Equipment Maintenance	7.1 Principle of C-arm Machine 7.1.1 Physical properties 7.1.2 Electrical electronic properties 7.2 Application of fluoroscopy 7.2.1 Diagnosis 7.2.2 Therapeutic 7.3 Parts of the C-arm machine 7.4 Maintenance procedures 7.5 Safety procedures	• Practical Assessment • Project • Third Party Report • Portfolio of Evidence • Written Assessment • Oral Questioning
8. Perform Cath Lab machine Maintenance	8.1 Principle of Cath Lab Machine 8.2 Application of Cath Lab machine 8.2.1 Catheterization 8.2.2 Angioplasty 8.3 Parts of the Cath Lab machine 8.4 Maintenance procedures 8.5 Safety procedures	• Practical Assessment • Project • Third Party Report • Portfolio of Evidence • Written Assessment • Oral Questioning
9. Perform Heart lung machine Maintenance	9.1 Functions of Heart lung machine 9.2 Parts of Heart lung machine 9.3 Principle of operations of Heart lung machine 9.4 Fault diagnosis 9.5 Maintenance procedures 9.6 Safety procedures	• Practical Assessment • Project • Third Party Report • Portfolio of Evidence • Written Assessment • Oral Questioning

Suggested Methods of Instruction

- Practical
- Projects
- Demonstrations
- Group discussions
- Direct instructions

- Role playing
- Interactive lectures
- Individual assignments
- 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	Sound Design for the Theatre by David Grenfell: 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 Theatre equipment diagrams Equipment block diagram charts	1 pcs for each	1:25
4.	Software	Assorted installation software	25 for	1:1

		for the equipment	each	
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.	Simulation Lab	100m^2	1	1:25
9.	Clinical Rotations	Operating theatre room	1	1:25
C	**Consumable materials**			
10.	Installation materials	Insulation tape, cables,	25 pcs for each	1:1
11.	Maintenance materials	Wipes, spare batteries ,sanitizer, service kits	25 pcs for each	1:1
12.	Assorted electrical components	Contactors, transformer, overload relays, timers	25 pcs for each	1:1
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.	Surgical Diathermy		2 pcs	1:12
20.	Anaesthesia machine		2 pcs	1:12
21.	Operating Theatre		3 pcs	1:8
22.	Operating Theatre Light		2 pcs	1:12
23.	Patient Monitor		5 pcs	1:5
24.	CSSD Equipment	Assorted	2 pcs for each	1:12
25.	C-ARM Equipment		1 pcs	1:25
26.	Heart lung machine		1pcs	1:25