

## HOSPITAL PLANT AND BUILDING SERVICES II

**UNIT CODE:** 0914451 23A

**TVET CDACC UNIT CODE:** ENG/CU/MDE/CR/05/5/MA

**UNIT DURATION:** 80 Hours

### **Relationship to Occupational Standards**

This unit addresses the Unit of Competency: Perform Hospital Plant and Building Services Maintenance II.

### **Unit Description**

This unit specifies the competencies required to Perform Hospital hygiene and sanitation systems maintenance. It involves maintaining laundry equipment and maintaining medical gases and vacuum systems equipment.

### **Summary of Learning Outcomes**

S/No	Learning Outcome	Duration in hours.
1.	To maintain laundry equipment	40
2.	To maintain medical gases	20
3.	To maintain vacuum systems equipment	20
	<b>TOTAL</b>	<b>80</b>

### **Learning Outcomes, Content and Suggested Assessment Methods**

Learning Outcome	Content	Suggested Assessment Methods

1. Perform laundry equipment Maintenance	1.1.Importance of laundry in hospital 1.2.Laundry equipment parts and working principle 1.2.1      Washing machine 1.2.2      Driers 1.2.3      Pressing boxes 1.2.4      Hydro-extractors 1.3.Maintenance procedures 1.4.Energy and other supplies 1.4.1      Electricity 1.4.2      Gas 1.4.3      Water 1.4.4      Steam	<ul style="list-style-type: none"> <li>• Practical Assessment</li> <li>• Project</li> <li>• Third Party Report</li> <li>• Portfolio of Evidence</li> <li>• Written Assessment</li> <li>• Oral Questioning</li> </ul>
2. Perform Medical Gases Equipment Maintenance	2.1 Basics of Oxygen Production 2.1.1      Pressure Swing Adsorption (PSA) 2.1.2      Cryogenic Air Separation 2.1.3      Vacuum Swing Adsorption (VSA) 2.1.4      Electrolysis of Water 2.1.5      Chemical Methods 2.2 Types of oxygen plants 2.2.1      Components/parts of an Oxygen Plant 2.2.2      Distribution System 2.2.3      Oxygen Plant Maintenance 2.3 Working Mechanism of Oxygen Concentrators 2.3.1      Components/parts of an	<ul style="list-style-type: none"> <li>• Practical Assessment</li> <li>• Project</li> <li>• Third Party Report</li> <li>• Portfolio of Evidence</li> <li>• Written Assessment</li> <li>• Oral Questioning</li> </ul>

	<p>Oxygen Concentrator</p> <p>2.3.2 Types of Oxygen Concentrators</p> <p>2.3.3 Oxygen Concentrator Maintenance</p> <p>2.4 Piping system components/parts</p> <p>2.4.1 Pipe work processes</p> <p>2.4.2 Choice of correct pipe.</p> <p>2.5 Medical air applications in hospitals and healthcare facilities</p> <p>2.5.1 Air Generation and its controlling mechanism</p> <p>2.5.2 Components of Medical Air Systems</p> <p>2.6 Uses and types of Gas Manifolds</p> <p>2.6.1 Gas Properties</p> <p>2.6.2 Manifold Components and Functionality</p> <p>2.6.3 Design Considerations</p> <p>2.6.4 Installation Procedures</p> <p>2.6.5 Maintenance procedures</p> <p>2.6.6 Safety procedures</p>	
3. Perform vacuum systems Equipment Maintenance	<p>3.1.Applications of vacuum in medical field</p> <p>3.1.1 Components of a Vacuum Plant</p> <p>3.1.2 Operation of Vacuum Plants</p> <p>3.1.3 Maintenance procedures</p>	<ul style="list-style-type: none"> <li>• Practical Assessment</li> <li>• Project</li> <li>• Third Party Report</li> <li>• Portfolio of Evidence</li> <li>• Written Assessment</li> <li>• Oral Questioning</li> </ul>

	<p>3.2.Parts of Suction Machine.</p> <p>3.2.1 Operation and Fault diagnosis</p> <p>3.2.2 Maintenance proceduresS</p>	
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### Suggested Methods of Instruction

- Practical
- Projects
- Demonstrations
- Group discussions
- Role playing
- Interactive lectures
- Individual assignments
- Industrial attachment
- Viewing of related videos

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### Recommended Resources for 25 Trainees

S No.	Category Item	Description Specifications	Quantity	Recommended Ratio (Item: Trainee)
A	<b>Learning Materials</b>			
1.	Reference books	Safety and Health Management in Engineering – by Paul A. Erickson Building Services Engineering – by David V. Chadderton Guidelines for Design and Construction of Hospitals and	5 pcs for each	1:5

		Outpatient Facilities" – by The Facility Guidelines Institute (FGI)  Modern Refrigeration and Air Conditioning by Althouse, Turnquist, and Bracciano:  Medical Gas and Vacuum Systems Handbook:  NFPA 99: Health Care Facilities Code:		
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 Hospital Plant and Building Services equipment diagrams  Equipment block diagram charts  Assorted Medical Gases and Vacuum equipment diagrams Equipment lock 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>B</b>	<b>Learning Facilities &amp; infrastructure</b>			
6.	Lecture theory room	60m <sup>2</sup>	1	1:25

7.	Workshop	150m <sup>2</sup>	1	1:25
8.	Simulation Lab	100m <sup>2</sup>	1	1:25
<b>C</b>	<b>Consumable materials</b>			
9.	Installation materials	PPR welding machine Fittings PPR elbow ¾ and ½ Fittings PPR union ¾ and ½ Fittings PPR Tee ¾ and ½ Fittings PPR reducer ¾ and ½ Fittings GI elbow ¾ and ½ Fittings GI union ¾ and ½ Fittings GI Tee ¾ and ½ Fittings GI reducer ¾ and ½ Tape measure Thread tape Pipe wrench 10 Litres tank PPR pipe ¾ and ½ PPR pipe cutter 100L tanks Sink assembly GI pipe ¾ and ½ PPR cutter Insulation tape, cables, leak detector Refrigeration thermometer Refrigeration copper tube type L Copper fittings (elbows, tee) Brazing torch with horse pipe Wrench Socket Spanner Set	25 pcs for each	1:1

		Manifold gauge (with horses) Charging valves Flaring tool kit Vacuum pump MAPP gas Copper brazing rod Brazing White flux (500g) Gloves ( heavy duty)		
10.	Maintenance materials	Wipes, spare batteries ,sanitizer, service kits	25 pcs for each	1:1
11.	Assorted electrical components	Contactors, transformer, overload relays, timers	25 pcs for each	1:1
12.	Assorted instrumentation components	Sensors, transducers, actuators	25 for each	1:5
<b>D</b>	<b>Tools and Equipment</b>			
13.	Assorted tools and equipment	Side cutters, Side cutters, Pliers, Screw driver, Multi-meter, Allen keys set	25 pcs for each	1:1
14.	PPEs	Safety boots, overall, masks, gloves, antistatic shoes	25 pcs for each	1:1
15.	Hot air gun		5 pcs	1:5
16.	Water pumps		5 pcs	1:5
17.	Drilling machines		5 pcs	1:5
18.	laundry equipment		2 pcs	1:12
19.	Boiler assembly		2	1:12
20.	Blower		5 pcs	1:5
21.	Drilling machines		5 pcs	1:5

22.	Oxygen Concentrator		3 pcs	1:8
23.	Suction Machine		3 pcs	1:8
24.	gas manifold		5 pcs	1:5