

# WORKSHOP TECHNOLOGY I (MECHANICAL)

## Introduction

This module unit involves the study of safety regulations, hand tools and equipment, machine tools, diesel and petrol engines and water pumps. It is designed to equip the trainee with: knowledge, skills and attitudes that enable him/her to perform basic workshop tasks.

## General Objectives

By the end of the module unit, the trainee should be able to:

- understand safety regulations in the workshop
- identify tools to be used in a conventional workshop
- understand the operations of petrol and diesel engines as well as pumps
- understand fundamentals of electrical installation
- understand fundamentals of building trades

## Module Unit Summary and Time Allocation – (66 Hours)

Code	Sub Module Unit	Content	Time Hours		
			Theory	Pract	Total
10.1.01	Safety Regulations	<ul style="list-style-type: none"> <li>• Health and Safety</li> <li>• Dealing with Fatal</li> <li>• Accidents</li> <li>• Fires</li> </ul>	4	6	10
10.1.02	Hand Tools	<ul style="list-style-type: none"> <li>• Classification</li> <li>• List</li> <li>• Fires</li> </ul>	12	6	18
10.1.03	Machine Tools	<ul style="list-style-type: none"> <li>• Description of Machine Tools</li> <li>• Classification</li> <li>• Safety</li> </ul>	6	6	12
10.1.04	Diesel and Petrol Engines	<ul style="list-style-type: none"> <li>• Diesel and Petrol Engines</li> <li>• Fuel Systems</li> <li>• Engine Construction</li> </ul>	4	6	10
10.1.05	Water Pumps	<ul style="list-style-type: none"> <li>• Types</li> <li>• Working</li> </ul>	10	6	16

		Principles • Maintenance	36	30
Total				

			<i>Content</i>
10.1.01	<b>SAFETY REGULATIONS</b>	10.1.01T1	Health and Safety Act
	<i>Theory</i>		<ul style="list-style-type: none"> <li>- obligation of employees</li> <li>- obligation of the employer</li> <li>- Factories Act</li> <li>- Personal hygiene</li> <li>- clothing</li> <li>- personal cleanliness</li> </ul>
10.1.01T0	<i>Specific Objectives</i> By the end of the sub module unit, the trainee should be able to:	10.1.01T2	Personal hygiene
	a) state the responsibility of employee under the Health And Safety Act	10.1.01T3	Dealing with fatal accidents
	b) state the need of personal hygiene		<ul style="list-style-type: none"> <li>- first aid kit</li> <li>- first aid procedures</li> <li>- electrical shock</li> <li>- burns</li> <li>- chemical burns</li> <li>- fractures/strains</li> <li>- provision of ambulance</li> <li>- accident reporting</li> </ul>
	c) explain first aid procedures in the event of accident in workshop		
	d) classify fire extinguishers	10.1.01T4	Fires extinguishers
10.1.01C	<i>Competence</i> The trainee should have the ability to:		<ul style="list-style-type: none"> <li>- classification</li> <li>- extinguisher</li> </ul>
	i) identify safety hazards and avoid them		
	ii) behave responsibility as obligated by law		
	iii) minimize, control or avoid contact with environmental pollutants	10.1.01P0	<b>Practice</b> <i>Specific Objectives</i> By the end of the sub-module unit, the trainee should be able to:
	iv) classify fire extinguishers		a) identify safety hazards in workshop environment

- b) identify the dangers associated with polluted environment
- c) demonstrate the use of firefighting equipment

10.1.02C

**Competence**

The trainee should have the ability to:

- i) Use hand tools to perform simple tasks in mechanical engineering workshop
- ii) Use hand tools to perform simple tasks in mechanical engineering workshop

*Content*

- 10.1.01P1 Safety hazards in the workshop
  - workshop tidiness
  - safety clothing
  - machine guards
  - fumes

- 10.1.01P2 Dangers of polluted environment
  - fumes
  - liquids
  - gases
  - explosives
  - noise
  - dust

- 10.1.01P3 Fire fighting equipment
  - heat extinguishers
  - carbon dioxide (CO<sub>2</sub>)
  - foam
  - hallogen

*Content*

- 10.1.02T1 Classification of hand tools
- 10.1.02T2 List of hand tools
- 10.1.02T3 Care and maintenance of cutting tools
  - sharpening
  - oiling
  - lubricating
  - repairs of hands
  - reconditioning
  - storage

**Practice**

10.1.02 **HAND TOOLS**

**Theory**

- 10.1.02T0 *Specific Objectives*  
By the end of the sub-module unit, the trainee should be able to:
  - a) classify hand tools
  - b) list down hand tools
  - c) care and maintenance of hand tools

- 10.1.02P0 *Specific Objectives*  
By the end of the sub-module unit, the trainee should be able to:
  - a) identify hand tools
  - b) select hand tools
  - c) make appropriate use of measuring equipment
  - d) use hand tools appropriately

	e) perform simple tasks using hand tools		iii) obtain flat surfaces using the shaping machine
	f) care and maintain cutting tools		
	<i>Content</i>		<i>Content</i>
10.1.02P1	identify hand tools	10.1.03T1	Description of machine tools
10.1.02P2	select hand tools	10.1.03T2	Machine tools -lathe machine -milling machine
10.1.02P3	make appropriate use of measuring equipment		
10.1.02P4	using hand tools appropriately		<b>Practice</b>
10.1.02P4	perform simple tasks using hand tools	10.1.03P0	<i>Specific Objectives</i> By the end of the sub-module unit, the trainee should be able to:
10.1.02P5	perform tasks using hand tools		a) identify machine tools
10.1.02P6	care and maintaining of tools		b) perform simple tasks on the lathe
10.1.03	<b>MACHINE TOOLS</b>		c) produce flat surfaces on the shaping machine
	<b>Theory</b>		d) observe related safety rules of the machine tools
10.1.03T0	<i>Specific Objectives</i> By the end of the sub-module unit, the trainee should be able to:		
	a) describe machine tools		
	b) classify machine tools		
10.1.03C	<i>Competence</i> The trainee should have the ability to:	10.1.03P1	<i>Content</i> Identification of machine tools in mechanical engineering workshop
	i) turn, drill, face and bore on the lathe machine	10.1.03P2	Lathe machine tasks - turning - facing - drilling - boring
	ii) cut plane surfaces on the milling machine	10.1.03P3	Shaping machine - holding work on chuck - reciprocating head/cutter

10.1.03P4 safety on use of machine tools

## 10.1.04 DIESEL AND PETROL ENGINES

### Theory

10.1.04T0 *Specific Objectives*  
By the end of the sub-module unit, the trainee should be able to:

- a) describe simple petrol and diesel engines
- b) describe the fuel systems
- c) differentiate between diesel and petrol engines

10.1.04C *Competence*  
The trainee should have the ability to service two and four stroke diesel/petrol engines

### Content

10.1.04T1 Simple petrol and diesel engine

- construction
- operation
  - o two stroke
  - o four stroke
  - o adjustment
  - o magnet ignition

10.1.04T2 Fuel systems

- petrol
- diesel
- oil filters
- fuel pumps
- maintenance
- injector pumps

10.1.04T3 Engine construction

- carburetors
- sketches to illustrate
- component parts
- body and component materials

- diesel and petrol engines
- body construction
- carburetor operation
- fuel pump operation
- injection pump operation
- ignition operation and adjustment

### Practice

10.1.04P0 *Specific Objectives*  
By the end of the sub-module unit, the trainee should be able to:

- a) sketch a cross section of two stroke engine
- b) sketch a cross section of four stroke engine
- c) service engines
- d) service a two stroke engine
- e) service a four stroke engine

### Content

10.1.04P1 Sketching a cross section of two stroke diesel/petrol engine

- 10.1.04P2 Sketching a cross section of four stroke engine
- 10.1.04P3 servicing engines
- 10.1.04P4 Service a two stroke diesel/petrol engine
- 10.1.04P5 Service a four stroke diesel/petrol engine

## 10.1.05 WATER PUMPS

### Theory

- 10.1.05T0 *Specific Objectives*  
By the end of the sub-module unit, the trainee should be able to:
- describe types of water pumps
  - explain the working principles of water pumps

- 10.1.05C *Competence*  
The trainee should have the ability to:
- operate service and maintain water pumps
  - identify types of water pumps

### Content

- 10.1.05T1 Types of water pumps
- 10.1.05T2 Working principles of water pumps

### Practice

- 10.1.05P0 *Specific Objectives*  
By the end of the sub-module unit, the trainee should be able to:
- describe types of water pumps
  - maintain and service water pumps
  - select suitable pump for specific use
  - identify pump controls
  - service water pumps

### Content

- 10.1.05P1 Types of water pumps
- 10.1.05P2 Maintain water pumps
- 10.1.05P3 Pump selection
- 10.1.05P4 Pump controls
- 10.1.05P5 Servicing water pumps

### Suggested Teaching/Learning Methods

- Lectures
- Demonstrations
- Practicals
- Field visits
- Discussion

### Suggested Teaching/Learning Resources

- Textbooks
- Charts
- Pump manuals

*Suggested Assessment  
Methods*

- Practical tests
- Project work
- Written tests
- Assignments

**Tools and Equipment**

- Cutting tools
- Measuring tools

- Fastening tools
- Forming tools
- Lath machine
- Milling machine
- Shaping machine
- Simple diesel engines
- Simple petrol engines
- Water pumps