Ethiopian TVET-System

Electro Mechanical Works
NTQF Level –I

Based on March, 2017G.C. Occupational Standard

Module Title: - Using Tools Equipment and Measuring Instruments

TTLM Code: EIS EME1 TTLM 0920V1

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This module includes the following Learning Guides

LG 43: **Plan and prepare tasks and workstation**

LG Code: **EIS EME1 M11 L0 01-LG-43**

LG 44: **Prepare hand tools**

LG Code: **EIS EME1 M11 L0 02-LG-44**

LG 45: **Use hand tools and test equipment**

LG Code: **EIS EME1 M11 L0 03-LG-45**

LG 46: **Maintain hand tools**

LG Code: **EIS EME1 M11 L0 04-LG-46**

Instruction Sheet 1	Learning Guide 43: Plan and Prepare Tasks

This learning guide is developed to provide you the necessary information regarding the following content coverage and topics –

- Identifying tasks work
- Hand tools and test instruments
- Preparing workstation

This guide will also assist you to attain the learning outcome stated in the cover page. Specifically, upon completion of this Learning Guide, you will be able to –

- Identify task to be undertaken.
- Identify and select appropriate hand tools and test instruments according to job requirements
- Ready workstation in accordance with job requirement/specification.

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described in number 3 to 15.
3. Read the information written in the “Information Sheets 1”. Try to understand what are being discussed. Ask you teacher for assistance if you have hard time understanding them.
4. Accomplish the “Self-check 1” in page5 .
5. Ask from your teacher the key to correction (key answers) or you can request your teacher to correct your work. (You are to get the key answer only after you finished answering the Self-check 1).
6. If you earned a satisfactory evaluation proceed to “Information Sheet 2”. However, if your rating is unsatisfactory, see your teacher for further instructions or go back to Learning Activity #1.
7. Submit your accomplished Self-check. This will form part of your training portfolio.
8. Read the information written in the “Information Sheet 2”. Try to understand what are being discussed. Ask you teacher for assistance if you have hard time understanding them.
9. Accomplish the “Self-check 2”
10. Ask from your teacher the key to correction (key answers) or you can request your teacher to correct your work. (You are to get the key answer only after you finished answering the Self-check 2).
11. Read the information written in the “Information Sheets 3 . Try to understand what are being discussed. Ask you teacher for assistance if you have hard time understanding them.
12. Accomplish the “Self-check 3”

Information Sheet-1	Identifying tasks work

1.1 Introduction

What is task ?

Task:- is a piece of work to be done or undertaken.

:-an activity that needs to be accomplished with in defined period of time or by deadline to work towards work related goals .

Task can be broken down into assignments which should also have defined start and ends date or deadline for completion.

Example of tasks in electro-mechanical workers are as follows

- Align, fit, and assembly components parts using hand tools, power tools, fixtures,
- Analyze and record test results.
- Install electrical and electronics parts
- Test performance of electrical mechanical assemblies, using test instrument etc.

What is task identification?

Task identify is the over all extent to which a job is done from the start point A to finish point B .the extent to which the outcome is predicated or visible . Task identify is an important and critical elements of job satisfaction

Self-Check 1	True or false Test

Directions: say true for the right statement or false for the wrong statement

1. Task is a piece of work to be done (3 point)
2. Task identify is the overall extent to which a job is done from the start point A to finish point B .(2 point)

Note: Satisfactory rating – 5 points **Unsatisfactory - below 5 points**

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

1. _____
2. _____

Information Sheet-2	Identifying and selection of Hand tools and test instruments

2.1. **Hand tools**

Hand tools :-refer to the small materials used for working, commonly by using your hand and with the force of your arm, wrist or hand.

: - it is a device for doing a particular job that does not use a motor, but is powered solely by the person using it.

2.1.1. Identification and selection of hand tools

Knowing how to identify hand tools is important to select and use hand tools properly. Because using the wrong tool can result in property damage or other hazards such as bodily injury.

The main objective selecting and identifying hand tools are as follows

- A tool that is applicable to a particular operation, Such as for adjusting, dismantling, assembling, finishing, cutting
- Minimizes time and cost of the operation and
- Satisfies accessibility requirements.

There are many hand tools applicable for similar operation.

- Hand tools like screwdriver, adjustable wrench, pipe wrench, open-ended spanner, combination spanner, Allen spanner, socket wrench are used for assembling and disassembling/dismantling operation
- hand tools like hacksaw, shears , chisels, pipe cutter, dies and taps are used for cutting operation
- hand tools like file and hand reamer used for finishing operation
- hand tools like hammer, mallet,piliar,vice and punch are used for adjusting operation .

2.2. Types of hand tools

2.2.1. Hand tools for Assembling and disassembling

They are used to assemble and dismantle machine parts by loosing and tightening bolts, nuts ,pipes, pipe fittings and others. Such as screwdrivers, open-ended spanner/wrench, ombination spanner,adjustable wrench, , socket wrench, and allen spanner.

A. **Screwdrivers:-** are used to assemble or disassemble machines by means tighten or loosen threaded nuts or bolts

Figure 2.1. different types and size of screwdriver

B. **A wrench or spanner:-** is a tool used to provide a mechanical advantage in applying torque to turn bolts, nuts or other hard-to-turn items. According to their type size and function there are different types of wrench or spanners

Combination wrench :-used for fastening and loosening various bolts according to their size.

Figure 2.2. combination wrench

C. **Double ended wrench** or Open-end wrench, or open-ended spanner: a one-piece wrench with a U shaped opening that grips two opposite faces of the

bolt or nut. This wrench is often double-ended, with a different-sized opening at each end.

figure 2.3. double ended wrench

D. **Box end wrench or Ring spanner:-** is a type of wrench with an enclosed opening that grips the faces of the bolt or nut. It has generally a six-point or twelve-point opening for use with nuts or bolt heads with a hexagonal shape.

Figure 2.4 different type and size of box end wrenches

E. **Adjustable end wrench, or Adjustable spanner: -** an open-ended wrench with adjustable rolling gear (usually smooth) jaws

Figure 2.5. Adjustable wrench

F. Allen spanner:- This wrench has a curved arm with hook on the end. This hook fits into one of the notches of the nut, and the handle is turned to loosen or tighten the nut

G. **Pipe wrench: -**used to tighten and loosen pipe coupling and also grip round edges to enable other turning/loosening/tightening actions

Figure 2.6. different size pipe wrench

2.2.2. Hand tools used for cutting :- Cutting hand tools use to cut sheet metal,pipe, wood or metal example like hacksaws, shears and snipes, pipe cutter, dies and taps.

A. **hacksaw :-** Hacksaws are used to cut metal that is too heavy for snips or bolt cutters. There are two parts to a hacksaw: the frame and the blade.

Figure 2.7. different type of hacksaw

B. **Snips and shears:-** are used for cutting sheet metal and steel of various thickness and shapes. Normally, the heavier or thicker materials are cut by shears.

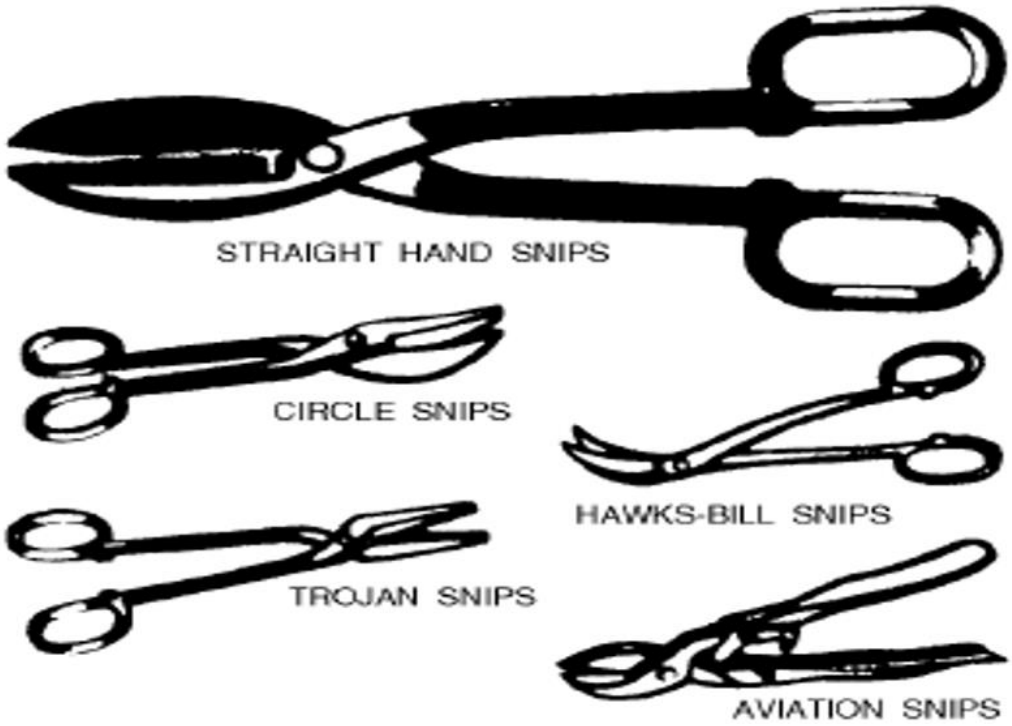


Figure 2.8. different types of snipes

C. **Wire cutters :-**use for cutting wire and stripping outer coating off electrical cables .examples are pliers

- **Pliers: -** Pliers are hand tools, designed primarily for gripping objects by using leverage. Pliers are designed for numerous purposes and require different jaw configurations to grip, turn, pull, or crimp and cut a variety of things

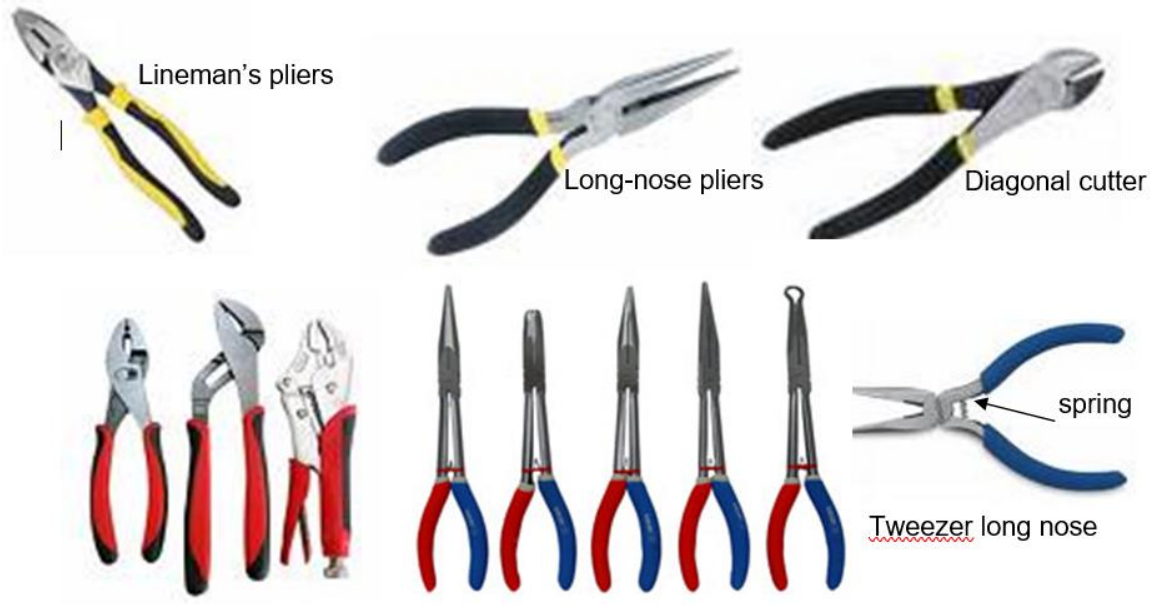


Figure 2.9 different type and function of pliers

2.2.3. Hand tools used for Adjusting: - They are used to adjust materials by striking, punching, holding, gripping and cutting for specified purpose. There are hand tools used to adjust materials by striking, punching, holding, gripping and cutting. Among these, Engineers' Vice , pliers , hammers, mallets and punches.

A. Vice :- is a device used to hold a work piece firmly in position when some work is being performed on it . such as filling , cutting ,gripping, and so forth it is not suitable to hold cylindrical materials like pipe

Figure 2.10 bench vice

B. Hammer: - A hammer is a tool meant to deliver blows to an object. The most common uses are for driving nails, fitting parts, and breaking up objects.

Hammers are often designed for a specific purpose, and vary widely in their shape and structure.

Claw hammer:-used to nail nails or hooks in to wall or wood (small hammer)

Mallet: - used to level tiles, adjusting the rewinding coil of the machine at edge of the slots(typically rubber hammer). Mallet heads are made from a soft material, usually wood or rubber. It is cylindrically shaped with two flat driving faces that are reinforced with iron bands. Never use a mallet to drive nails, screws, or any other object that can damage the face of the mallet

Sledge hammer:- is used to break down down walls and concrete structures

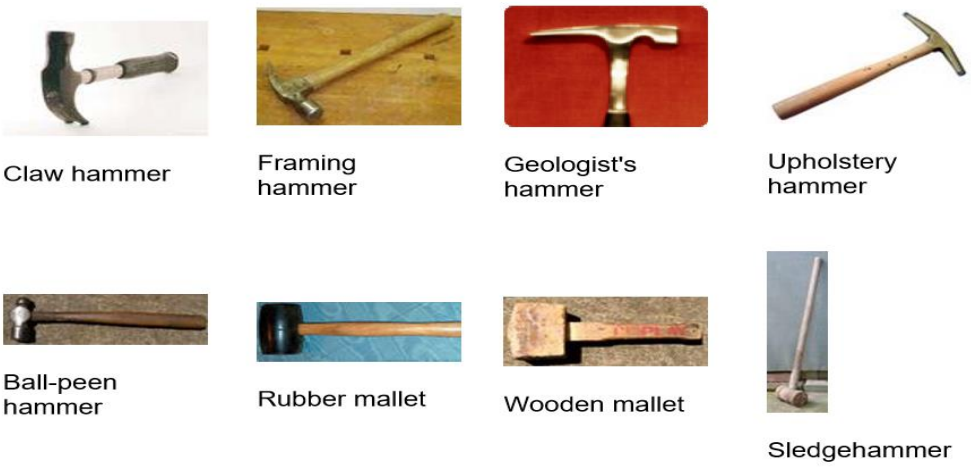


Figure 2.11. different shape and structure of hammer

C. **A punch is a hand or mechanical tool :-**designed to penetrate an object or material, or for stamping a design on a malleable surface that will hold the impression, such as wood, leather, metal or paper.

Figure 2.12 different size punches

D. **Chisel: -** A chisel is a tool with a characteristically shaped cutting edge. (used for carving and/or cutting a hard material such as wood, stone, or metal. The handle and blade of some types of chisel are made of metal or wood with a sharp edge in it. In use, the chisel is forced into the material to cut the material. The driving force may be manually applied using a mallet or hammer

(a)

(b)

(c)

Figure 2.13 (a)- Steel woodworking chisel
(b)-metalworking Bull Point & Cold Chisel
(c) stone bolster chisel

Chisels used in metal work can be divided into two main categories, hot chisels, and cold chisels. A hot chisel is used to cut metal that has been heated in a forge to soften the metal.
Stone chisels are used to carve or cut stone, bricks or concrete slabs. To cut, as opposed to carve, a brick bolster is used

hand tools for finishing : Finishing hand tools are used to finish a hole to an exact dimension with a smooth finish , put the finishing touches on a machined work piece, either to remove burrs or sharp edges or as a final fitting operation .Example for finishing hand tools are files and hand reamers.

A. **Files: -** Files are often used to put the finishing touches on a machined work piece, either to remove burrs or sharp edges or as a final fitting operation. It has Various sizes and types of files are needed for cleaning metal surfaces and shaping metal parts. They are classified according to tooth size, shape, and the numbers of directions the teeth are cut on the file

B. Hand reamer: - A reamer is used to finish a hole to an exact dimension with a smooth finish. Hand reamers are often used to finish a previously drilled hole to an exact dimension and a smooth surface.

Straight flute hand reamer.

Helical flute hand reamer.

Straight flute expansion hand reamer

2.3. Test instruments:-is a device used to generate and measure signals. some useful multimeters (ohmmeters, ammeters, voltmeters), tachometer and oscilloscopes. there are many types of testing instrument, but for this uc, we **discuss about electrical testing device and mechanical testing device**

2.3.1. Electrical testing or measuring instruments are an instruments which measures or test different electrical quantities such as, voltage, current, resistance, power and frequency

Generallay there are two types of electrical test meters:

1. Digital - Meter displays numbers when measuring volts, ohms, amperes, or other electrical measurements.

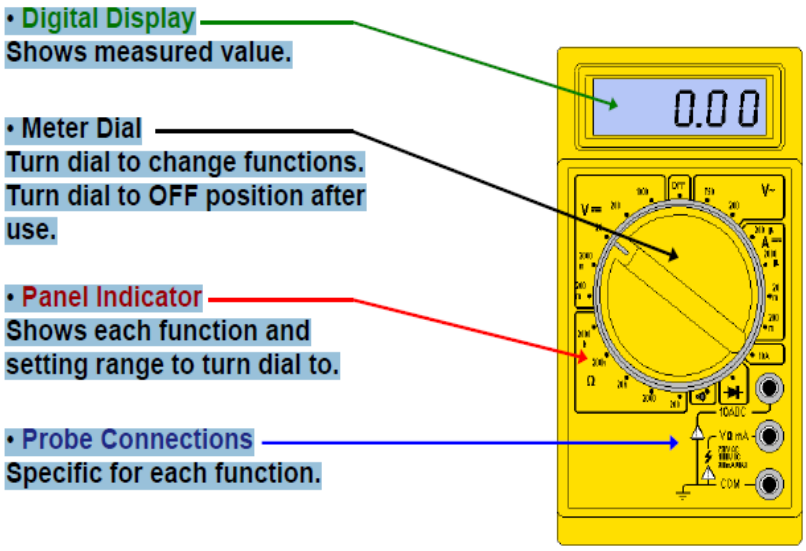
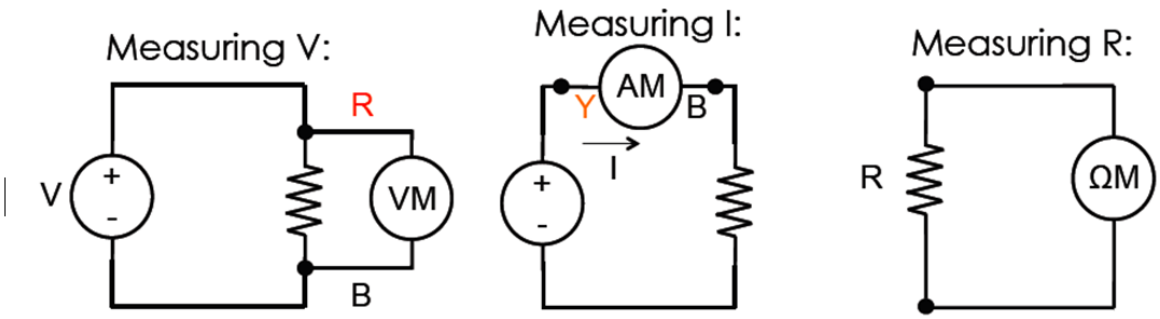


Figure 2.3.1. digital multimeter and its parts

2. Analog – Meter shows a number by using needle deflectors to indicate measurement reading of volts, ohms, amperes, or other electrical measurements proportional to the current path through it .i.e it Uses a moving pointer and a printed scale to indicate values of voltage, current, or resistance(**Volt-Ohm-Milliammeter** (VOM))

Figure 2.3.2. analog multimeter

- **Ammeter:** measures current. Place multimeter leads in series with circuit. Internal impedance is low to avoid changing the behavior of the measured circuit.
- **Voltmeter:** measures voltage. Place multimeter leads in parallel with circuit. Internal impedance is large to avoid changing the behavior of the measured circuit. Digital voltmeters have a fixed impedance, typically ~10MΩ.
- **Ohmmeter:** measures resistance. Place multimeter leads in parallel with resistor. An ohmmeters use an internal battery to supply a voltage and then measure the current through the meter, so disconnect the resistor from any other external power supply(never turn .



Difference between analog and digital multimeter

Analog multimeter	Digital multimeter
Continuous moving indicators forth and back	Discontinuous
Has parallax error	Has no parallax error
Pointer reading	Numerical display(digital reading)
Zero-ohm adjustment changed for each range	No zero ohm adjustments
Ohms ranges up to Rx1000Ω as multiplying factors	Ohm ranges up to 20MΩ each range is the maximum

Tachometer:-is an instrument measuring the rotational speed of a shaft or discas in motor or other machines . The device usually displays the revolution per minute (RPM).

Figure 2.3.3. digital tachometer

Spark plug cleaner and tester:-is an instrument to completely clean and test an old used sparkplug which is used in petrol, gasoline and kerosene engine

Self-Check 2	Written Test and multiple choose

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. List at least four type of hand tools used for Dismantling and assembling? (4point)
2. What are the difference between hand tools and testing instruments

Chose correct answer

(3 point)

3. The instrument that measures the rotational speed of motor is(1 point)

A/analog multimeter B/Digital multimeter C/Tachometer

4. One of the following hand tools are used for finishing works(2 points) .

A/hammer B/ files C/reamer D/B and C

Note: **Satisfactory rating - 5 points** **Unsatisfactory - below 5 points**

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

1. _____
   _____
   _____
   _____
2. _____
   _____
   _____
   _____

3. _____
_

4. _____

Information Sheet-3	Preparing workstation

3.1 Introduction

Work station: - is the place where workers are doing different activist. To do better work we first need better work station

Despite the availability and supply of adjustable workstation furniture and equipment, employees are not aware of how to adjust their work setup for optimum comfort and to minimise the risk of injury. The following checklist is a step-by-step approach designed to be used when employees are located at a new work- station or whenever their tasks are changed.

When setting up the position of this furniture and equipment it is important to try new positions to find the most comfortable arrangement for your- self. Give yourself a chance to get used to any changes, as it may take several hours or even days to determine the best position. Remember it may take several tries to get the best arrangement for yourself, but it is worth the effort - and if a change doesn't work, you can always reset it back to the previous position

Work station for laboratory and office spaces

Locating all offices outside the laboratory environment allows for a safer workspace. Locating the office zone very close to or adjacent to the laboratory for easy access and communication is desirable.

Some laboratories have office spaces within research areas. In this design, it is best to have an obvious separation between the laboratory area and the office area should be separated by partitions ,but preferably using a wall and a door that can be closed.

Doors, Windows, and Walls

Walls should be finished with material that is easy to clean and maintain.

Doors should have view panels to prevent accidents caused by opening the door into a person.

Ways to prepare work station

1. Clean your environments /work areas
2. Preparing/locating walk ways
3. Avoiding unnecessary materials in the work station
4. Locate regular rooms/workshop for the activist to be done
5. Ventilating the room /workshop for good respiration
6. Setting up your work station according to the work activates to be executed.

Self-Check 3	True false Test

Directions: say true for the right statement or false the wrong statement:

1. Work station is the place where workers are doing different activist (3pts)
2. One of the Ways to prepare work station is Clean your environments /work areas (2)

Note: **Satisfactory rating - 3 points** **Unsatisfactory - below 3 points**
You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____
Rating: _____

Name: _____ Date: _____

Short Answer Questions

1. _____
   _____

   _____
   _

2. _____
   _____

   _____
   _

Instruction Sheet 2	Learning Guide 44: Prepare hand tools

This learning guide is developed to provide you the necessary information regarding the following content coverage and topics –

- Checking appropriate hand tools for proper operation and safety
- Identifying faulty tools and repairing tools

This guide will also assist you to attain the learning outcome stated in the cover page. Specifically, upon completion of this Learning Guide, you will be able to –

- Check Appropriate hand tools for proper operation and safety
- Identify Unsafe or faulty tools and marked for repair according to standard company procedure

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described in number 3 to 11.
3. Read the information written in the “Information Sheets 1”. Try to understand what are being discussed. Ask you teacher for assistance if you have hard time understanding them.
4. Accomplish the “Self-check 1” in page 26 .
5. Ask from your teacher the key to correction (key answers) or you can request your teacher to correct your work. (You are to get the key answer only after you finished answering the Self-check 1).
6. If you earned a satisfactory evaluation proceed to “Information Sheet 2”. However, if your rating is unsatisfactory, see your teacher for further instructions or go back to Learning Activity #1.
7. Submit your accomplished Self-check. This will form part of your training portfolio.
8. Read the information written in the “Information Sheet 2”. Try to understand what are being discussed. Ask you teacher for assistance if you have hard time understanding them.
9. Accomplish the “Self-check 2”

10. Ask from your teacher the key to correction (key answers) or you can request your teacher to correct your work. (You are to get the key answer only after you finished answering the Self-check 2).

11. Do the “LAP test” in page _34 (if you are ready). Request your teacher to evaluate your performance and outputs. Your teacher will give you feedback and the evaluation will be either satisfactory or unsatisfactory. If unsatisfactory, your teacher shall advice you on additional work. But if satisfactory you can proceed to Learning Guide .

Information Sheet-1	Checking appropriate hand tools for proper operation and safety

1.1 Introduction

Selecting and checking appropriate hand tools and equipment for work

Proper tools and equipment are essential for the effective operation of any electromechanical works.

The correct tools and equipment plays an essential role in achieving timely and good quality results. For every electromechanical activity there is an optimal combination of tools, equipment and labour. Depending on the nature and content of the works, the technical staff needs to know which tools to use and how to effectively combine them with manual labour.

A major concern when choosing the appropriate type of equipment and tools for electromechanical **works is:**

- ✓ its availability in the region or vicinity(area) to the work site,
- ✓ how to deliver it to the work site,
- ✓ how easy is it to operate and how easily it can be reversed,
- ✓ its cost and reliability, and
- ✓ The availability of spare parts and repair facilities.

There are a large number of tools and devices which are commonly used in fitting work. Generally, the tools may be classified as follows:

- ✓ Measuring instrument.
- ✓ Hand tools

Please Refer LO1

SAFETY

General Safety Aspect

Following safety precautions should be observed while working in a electromechanical work.

i) No electric live part shall be kept exposed. Particular care should be taken not to keep the motor terminals, starter door, panel door etc. in open condition.

ii) Guard for pump – motor coupling and for extended shaft shall be provided.

iii) Top cover of the VHS (vertical hollow shaft) motor shall not be unnecessarily kept in dismantled condition.

iv) Helmet, gumboots, hand gloves, torch and emergency lamp etc. shall be provided to the workers.

v) Shock proof rubber matting shall be kept in front of panel and starters.

vi) Discharging devices shall also be provided to work safely on HT side of transformer.

vii) Firefighting equipment suitable for electrical fire shall be provided. The fire extinguisher shall be thoroughly checked and recharged once in a year.

viii) Damaged wooden flooring, damaged grating etc. shall be repaired on priority.

ix) Safety railing shall be provided above all openings, unwalled edges of flooring and all such places vulnerable for falling or slipping of staff.

x) First aid box shall be kept at visible and accessible place. The first aid box shall be checked once in a month and all used items shall be replenished.

xi) Staff shall be trained in the following aspects to enhance safety awareness and skills to handle safety aspects.

Electrical hazards

While offices are considered lower-risk workplaces in terms of electrical safety, people need to be aware of electrical hazards and the dangers they pose.

Key considerations of electrical hazard

- **Electrical cables** should not be placed on floors where they can create a trip hazard or be damaged by trolleys or chair castors, creating exposure to electrical wires.
- **Personal heaters** which may be used from time to time should not be surrounded by storage materials such as paper, cardboard or other combustible materials and should have no potential for causing a fire.
- **Electrical cables and switches** should be periodically inspected for integrity and replaced or repaired if loose, cracked or damaged. The practice of 'piggy backing' double adaptors should be eliminated as this can create a fire risk from overheating or sparking. If there are insufficient power points, a power board is a safer option or the installation of additional power points by an electrician where possible. Extension cables should be used on power boards which have built-in fuses to minimize the risk of electric shock.

- **Electrical switchboard cupboards** are sometimes found to be used for storage and so they should be part of the workplace inspection process to ensure that there is no combustible material, paper, cloths or flammable liquids stored around them. In fact there should be nothing except the electrical switchboard in the electrical switchboard cabinet.
- Legislation refers to **Residual Current Devices (RCDs)** and these should be used as specified.
- All electrical work should be carried out by a **qualified electrician**. Under WHS laws, **regular inspection** and testing of electrical equipment is required if the equipment is used in an environment in which the normal use of the equipment exposes it to operating conditions that are likely to damage the equipment or reduce its expected life span, including conditions that involve exposure to moisture, heat, vibration, mechanical damage, corrosion and dust. In most offices, these conditions will not apply, so regular inspection, testing and tagging will not be required.
- Any work which cuts into the integrity of a wall or ceiling (nailing, drilling, cutting etc.) should only be done after **identifying all electricity supply** so as to minimize the risk.
- **Water and wet areas in office kitchens** should be well clear of all electricity outlets and cables, and all cables and switches should be inspected periodically for integrity, but only after the power is switched off. If using cleaning chemicals in the office kitchen, avoid spraying power points or switches.
- During **consultation** with people working in the office, electrical safety should be discussed and any concerns which people have about electrical outlets, cables, switches etc. should be investigated.

Self-Check -1	**True or false Test**

Directions: say true for the right statement or false the wrong statement

1. All electrical work should be carried out by a **qualified electrician**. (**3 points**)
2. Proper tools and equipment are essential for the effective operation of any electro -mechanical works. (**2 points**)

Note: **Satisfactory rating –5and above points** **Unsatisfactory - below 5 points**

You can ask your teacher for the copy of the correct answers.

Answer Sheet_3

Score = _____

Rating: _____

Name: _____ Date: _____

Answer sheet for the given question

1. _____

   _____

   _____

2. _____

   _____

Information Sheet-2	Identifying faulty tools and repairing tools

2.1 INTRODUCTION

Any tool has the potential for being dangerous if it is defective or poorly manufactured; this doesn't just apply to power tools like table saws and drills, it can also apply to simple hand-held tools, like hammers, wrenches, or screwdrivers, as well. Depending on their industry, workers may also use very sophisticated, computerized machinery that must not only be manufactured to exacting specifications, but which also has to be well maintained throughout the life cycle of the tool or machine.

When workers use tools in the workplace, it shouldn't be too much to expect that they have been manufactured to be safe when used as instructed and that they will operate as the manufacturer intends. And yet, when it comes to workplace accidents, defective tools and defective machinery are among the leading causes of serious injuries and fatalities nationwide and in Texas.

2.2. The purpose of marking unsafe tools and equipment

It has a vital role to play in reducing the risk associated with some workplace hazards and providing safer and healthier working **conditions**. Insufficient/inadequate maintenance can cause serious (and potentially deadly) accidents or **health** problems

Among some of the most common defects in workplace tools and equipment include

- ✓ damaged or poorly manufactured power cords,
- ✓ safety switches that malfunction(fault) ,
- ✓ electrical power tools without the fluid necessary to run them,
- ✓ missing safety guards,
- ✓ Attachments that do not connect to the tools securely and many more.

Hand tools are non-powered. They include anything from axes to wrenches. The greatest hazards posed by hand tools result from misuse and improper maintenance.

Authorized person

A person authorised by the local manager/supervisor, who is sufficiently competent to make the plant or equipment safe to use, or confirm that the plant or equipment has been made safe to use.

Danger tag

A label/sign that identifies that cleaning, servicing, repairing or alteration is being undertaken on isolated installations, plant or equipment.

Out-of-service tag

A label/sign attached to plant or equipment that indicates the plant or equipment is faulty or unsafe to operate and is currently out of service.

The Head of Division must ensure that staff and workers have access to suitable resources, including access to out-of-service tags, for implementation.

Staff members or students who become aware of plant or equipment which is faulty or unsafe to use must:

- ✓ turn off or de-energize plant or equipment, if safe to do so;
- ✓ make safe the plant or equipment;

Complete an out-of-service tag, ensuring that the tag describes the:

- ✓ plant or equipment that is out of service;
- ✓ reason the plant or equipment is out of service;
- ✓ if applicable, conditions under which the plant or equipment can be used safely;
- ✓ name of the person completing the tag; and
- ✓ date;

• **place the completed out-of-service tag on the plant or equipment at:**

- ✓ the point of isolation from the energy source; or
- ✓ the main control panel; or
- ✓ a prominent position;

notify the manager/supervisor responsible for the plant or equipment; and

make arrangements (directly or through the manager/supervisor) for the plant or equipment to be repaired or removed from the work area.

Unless authorized, no person may use plant or equipment that has been tagged with an out-of-service tag or remove the tag.

Some examples of misuse include the following:

- ✓ Using a screwdriver as a chisel may cause the tip of the crew driver to break and fly, hitting the user or other employees;
- ✓ Using a tool with a wooden handle (e.g., hammer) if the handle is loose, splintered, or cracked, the head of the tool may fly off and strike the user or another worker;
- ✓ Using a wrench if its jaws are sprung, because it might slip; and

- ✓ Using impact tools (e.g., chisels, wedges) if they have mushroomed heads, the heads might shatter on impact, sending sharp fragments flying.
- ✓ Hand tool precautions including the following:
- ✓ Employers shall caution employees that saw blades, knives or other tools be directed away from aisle areas and other employees working in close proximity. Knives and scissors shall be sharp. Dull tools can be more hazardous than sharp ones;
- ✓ Floors shall be kept as clean and dry as possible to prevent accidental slips with or around dangerous hand tools; and
- ✓ Around flammable substances, sparks produced by iron and steel hand tools can be a dangerous ignition source. Where this hazard exists, spark-resistant tools made from brass, plastic, aluminum or wood shall be used.

When and how should you inspect powered hand tools?

- ✓ Inspect tools for any damage prior to each use.
- ✓ Check the handle and body casing of the tool for cracks or other damage.
- ✓ If the tool has auxiliary or double handles, check to see that they installed securely.
- ✓ Inspect cords for defects: check the power cord for cracking, fraying, and other signs of wear or faults in the cord insulation.
- ✓ Check for damaged switches and ones with faulty trigger locks.
- ✓ Inspect the plug for cracks and for missing, loose or faulty prongs.

What should you do if you find a tool defective?

- ✓ If a tool is defective, remove it from service, and tag it clearly "Out of service for repair".
- ✓ Replace damaged equipment immediately - do not use defective tools "temporarily".
- ✓ Have tools repaired by a qualified person - do not attempt field repairs.

2.3 Unsafe Acts and Unsafe Conditions of tools and equipment

Unsafe acts

- ✓ Operating equipment without qualification or authorization
- ✓ Lack of/or improper use of PPE

- ✓ Operation equipment at unsafe speeds
- ✓ Failure to warn
- ✓ Bypass or removal of safety devices
- ✓ Using defective equipment

Unsafe Conditions

- ✓ Defective tools, equipment or supplies
- ✓ Inadequate supports or guards
- ✓ Congestion in the workplace
- ✓ Inadequate warning systems
- ✓ Fire and explosion hazards
- ✓ Poor shop or laboratory keeping
- ✓ Hazardous atmospheric conditions

Misuse of Tools

Any use of a tool can cause a mishap ranging from cutting your finger to causing a permanent and life-changing injury. If the tool is misused, the amount of financial damages you can collect may be reduced. Misuse can take various forms including, but not limited to

People expect the equipment they use to perform according to its purpose. When it malfunctions, injuries or death can occur. For example, scaffolding or platforms can collapse, ladder rungs break and levers get stuck on machines. The Occupational Health and Safety Administration (OSHA) has identified what it refers as the fatal four, which are the four main causes of death to workers on construction sites, all of which can be attributable to malfunctioning equipment:

Self-Check -2	Multiple chose Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. Which one is Unsafe Conditions ?(3)
   a. Fire and explosion hazards c. a and b
   b. Inadequate warning systems d. all
2. What should you do if you find a tool defective?(3)
   a. remove it from service c. tag it clearly
   b. Replace damaged equipment immediately d. all
3. When and how should you inspect powered hand tools? (4)
   a. Inspect tools for any damage prior to each use.
   b. Check the handle and body casing of the tool for cracks or other damage.
   c. Check for damaged switches and ones with faulty trigger locks.
   d. All are answer

Answer Sheet_3

Score = _____
Rating: _____

Name: _____ Date: _____

Answer sheet for the given question

1_____
2_____
3_____

Operation Sheet- 1	Procedure of Selecting hand tools

Steps to Selecting hand tools

Step1. Identifying types work

Step2.selecting tools and equipment

Step3.identify hand or power tools

Step4, Identifying the workability of tools

Step5. Identifying tools are easily movable

Step6.Use properly hand tools

Operation Sheet- 2	Techniques of Identifying hand tool defects

Techniques of Identifying hand tool defects

Step 1. Select appropriate tools

Step 2. Observe defect tools and equipment

Step 3. Identify the problem

Step 4. Based on the problem identify the solution type

Step 5.apply suitable maintenance of defective tools

Step 6. Check properly maintained the tools

Step 7. Check the workability of tools after maintenance

LAP Test	Practical Demonstration

Name: _____ Date: _____

Time started: _____ Time finished: _____

Instructions: Given necessary templates, tools and materials you are required to perform the following tasks within 2- hour.

Task 1.Observe and record defect Hand tools and instrument and identify all defects

Task 2. Prepare hand tool selection format and select suitable tools and equipment for wire splice

Instruction Sheet 3	Learning Guide 45: Use hand tools and test equipment

This learning guide is developed to provide you the necessary information regarding the following content coverage and topics –

- Observing All safety procedures in using tools
- Personal protective equipment (PPE)
- Selecting Measuring tools in line with job requirement
- checking and adjusting of Measuring/testing devices
- Reporting Malfunctions, unplanned or unusual events to supervisor

This guide will also assist you to attain the learning outcome stated in the cover page. Specifically, upon completion of this Learning Guide, you will be able to –

- Use hand tools according to task undertaken
- observe at all times all safety procedures and appropriate Personal Protective Equipment (PPE) when task is undertaken
- select Measuring tools in line with job requirements
- check and adjust Measuring/testing devices in accordance with work requirements
- report Malfunctions, unplanned or unusual events to the supervisor

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described in number 3 to 15.
3. Read the information written in the “Information Sheets 1”. Try to understand what are being discussed. Ask you teacher for assistance if you have hard time understanding them.
4. Accomplish the “Self-check 1” in page 41.
5. Ask from your teacher the key to correction (key answers) or you can request your teacher to correct your work. (You are to get the key answer only after you finished answering the Self-check 1).
6. If you earned a satisfactory evaluation proceed to “Information Sheet 2”. However, if your rating is unsatisfactory, see your teacher for further instructions or go back to Learning Activity #1.
7. Submit your accomplished Self-check. This will form part of your training portfolio.
8. Read the information written in the “Information Sheet 2”. Try to understand what are being discussed. Ask you teacher for assistance if you have hard time understanding them.
9. Accomplish the “Self-check 2”

10. Ask from your teacher the key to correction (key answers) or you can request your teacher to correct your work. (You are to get the key answer only after you finished answering the Self-check 2).
11. Read the information written in the “Information Sheets 3 . Try to understand what are being discussed. Ask you teacher for assistance if you have hard time understanding them.
12. Accomplish the “Self-check 3”
13. Read the information written in the “Information Sheets 4”. Try to understand what are being discussed. Ask you teacher for assistance if you have hard time understanding them.
14. Accomplish the “Self-check 4”
15. Read the information written in the “Information Sheets 5”. Try to understand what are being discussed. Ask you teacher for assistance if you have hard time understanding them.
16. Accomplish the “Self-check 4”
17. Do the “LAP test” in page _63 (if you are ready). Request your teacher to evaluate your performance and outputs. Your teacher will give you feedback and the evaluation will be either satisfactory or unsatisfactory. If unsatisfactory, your teacher shall advice you on additional work. But if satisfactory you can proceed to Learning Guide #.

Information Sheet-1	Observing All safety procedures in using tools

Introduction

While doing our daily activities observing safety is very important for us and hand tools Safety is protecting ourselves and tools from causing hazards. Tools are designed to make a job easier and enable you to work more efficiently. If they are not properly used and cared for, their advantages are lost to you. Regardless of the type of work to be done, you must have, choose, and use the correct tools in order to do your work quickly, accurately, and safely. Without the proper tools and the knowledge of how to use them, you waste time, reduce your efficiency, and may even injure yourself.

Safety procedures are documented procedures for performing task by using tools. The purpose of safe work procedure is to reduce the risk to health and safety in the work place and reduces likelihood of an injury by ensuring that the workers know how to work safely when carrying out the task involved in their job .safe work procedures are called safe work method statements (SWMS)

There are different workplace safety procedures and instructions

Handling hand tools: -these involves procedures on how to handle hand tools in work place where different hand tools are used

Handling workplace: - this implies that keeping the work area clean and neat.

Lifting and moving objects: -are procedure that pertains to how objects/tools are to be lifted and moved safely without strain to the person /worker.

Handling chemicals: these are involves procedure how to handle chemicals like gases, liquids solids, dusts in different working areas.

Electrical materials /equipment: these are safety procedure s that pertains to the installations, repair and maintenance of electrical equipment.

The following steps should be followed to ensure sound safe work

1. Observe the task/activities: it is important to observe the task/activities being performed the preferred way to ensure safest method.
2. Record the sequence of basic job steps: write down the steps that make up the task /activities

3. Record potential hazards of each steps : Next to each step identify what may have potential ta cause injury or disease
4. Identify ways of eliminating and controlling hazards: list the measure that needs to put in to place
5. Test the procedure: observe staff/ student following the safety work procedure
6. Monitor and review: make sure the activity is supervised to ensure the follow the steps.

Self-Check 1	Written Test and multiple choose

Directions: Answer all the questions listed below. Illustrations may be necessary to aid some explanations/answers.

1. What is safety? (5 pts)

say true for the right statement or false the wrong statement

2. Tools are designed to make a job easier and enable you to work more efficiently. (2pts)
3. Without the proper tools and the knowledge of how to use them, you waste time, reduce your efficiency, and may even injure yourself.(2)
4. The purpose of safe work procedure is to reduce the risk to health and safety in the work place.(2)

Note: Satisfactory rating - 10 points **Unsatisfactory - below 10 points**

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

1. _____
   _____
   _
2. _____
3. _____
4. _____

Information Sheet-2	Personal Protective Equipment(PPE)

Introduction

Personal protective equipment (PPE): Equipment used to prevent hazards and the spread of infectious diseases. Examples include disposable gloves, face shields, protective garments, mouth-to-mouth respiration.

The use of personal protective equipment (PPE) to reduce injuries is in the work place . It includes all clothing and accessories designed to create a barrier against workplace hazards. It should be considered a means of minimizing the hazards after engineering controls, administrative controls, and safe work practices have been implemented.

Personal protective equipment can be categorized by the area of the body protected, by the types of hazard, and by the type of garment or accessory. A single item, for example boots, may provide multiple forms of protection: a steel toe cap and steel insoles for protection of the feet from crushing or puncture injuries, impervious rubber and lining for protection from water and chemicals, high reflectivity and heat resistance for protection from radiant heat, and high electrical resistivity for protection from electric shock. The protective attributes of each piece of equipment must be compared with the hazards expected to be found in the workplace.

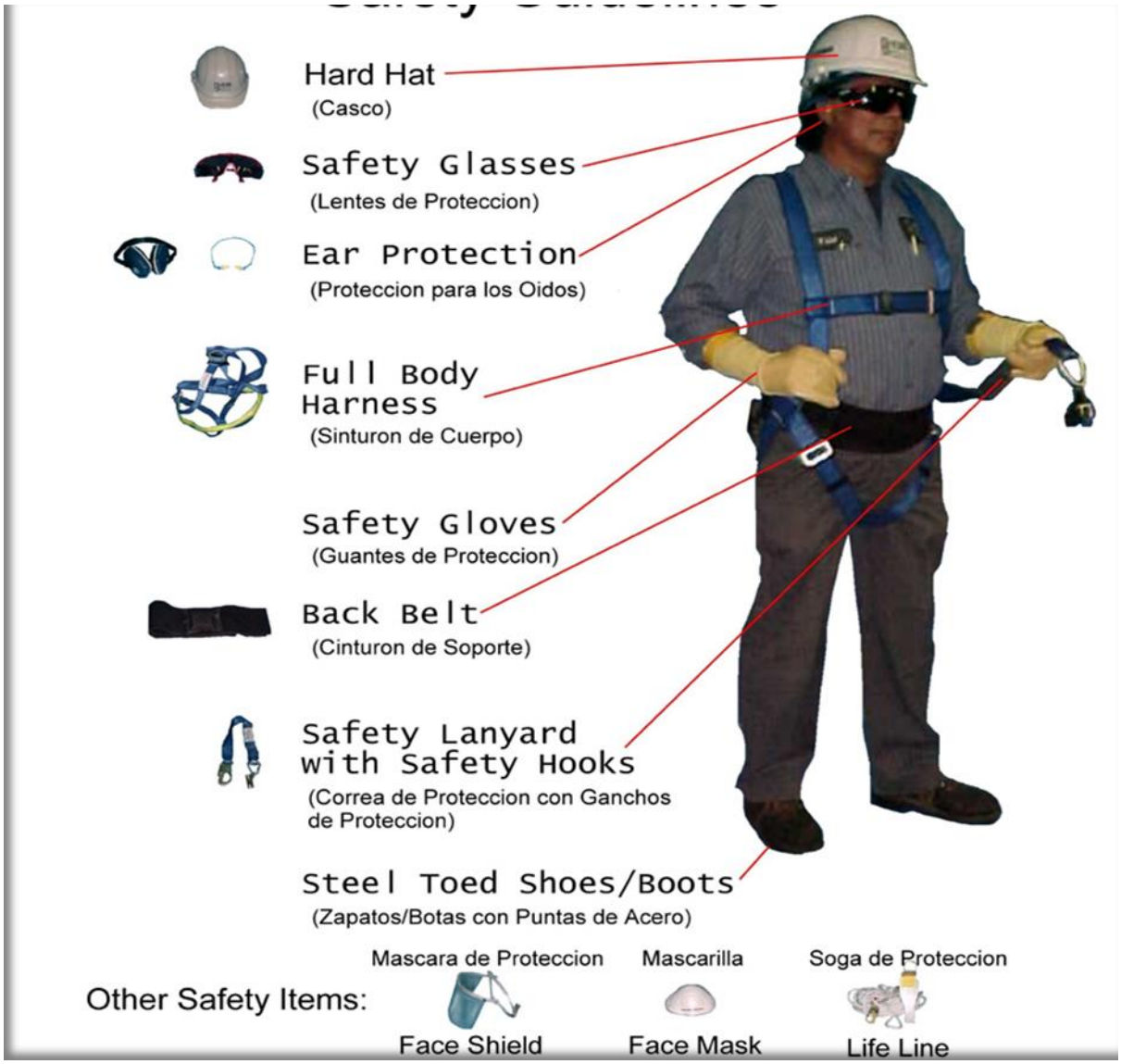


Figure 2.1 different types PPE

2.1. Head and eye protection

When working on site, or in a heavy engineering erection shop involving the use of overhead cranes, all persons should wear a safety helmet. Even small objects such as nuts and bolts can cause serious head injuries when dropped from a height. Safety helmets (hard hats) are made from high impact resistant plastics or from fiber-glass reinforced polyester mouldings. Figure 2.2(a) shows such a helmet. Such helmets can be colour-coded for personnel identification and are light and comfortable to wear. Despite their lightweight construction, they have a high resistance to impact and penetration. To eliminate the possibility of electric shock,

safety helmets have no metal parts. The harness inside a safety helmet should be adjusted so as to provide ventilation and a fixed safety clearance between the outer shell of the helmet and the wearer's skull. This clearance must be maintained at 32 millimeters. The entire harness is removable for regular cleaning and sterilizing. It is fully adjustable for size, fi t and angle to suit the individual wearer's head. Whilst it is possible to walk about on an artificial leg, nobody has ever seen out of a glass eye. Therefore, eye protection is possibly the most important precaution you can take in a workshop. Where eye safety is concerned, prevention is better than cure.

Figure 2.2 Head protection: (a) a typical fiber-glass safety helmet (b) plastic face safety visor for complete protection against chemical and salt-bath splashes; (c) transparent plastic goggles suitable for machining operations

2.2. Hand protection

The edges of thin sheet metal can be razor sharp and can cause deep and serious cuts. Gloves and ' palms ' of a variety of styles and types of materials are available to protect your hands whatever the nature of the work. In general terms, plastic gloves are

impervious to liquids and should be worn when handling oils, greases and chemicals. However, they are unsuitable and even dangerous for handling hot materials. Leather gloves should be used when handling sharp, rough and hot materials. NEVER handle hot metal with plastic gloves. These could melt onto and into your flesh causing serious burns that would be difficult to treat.

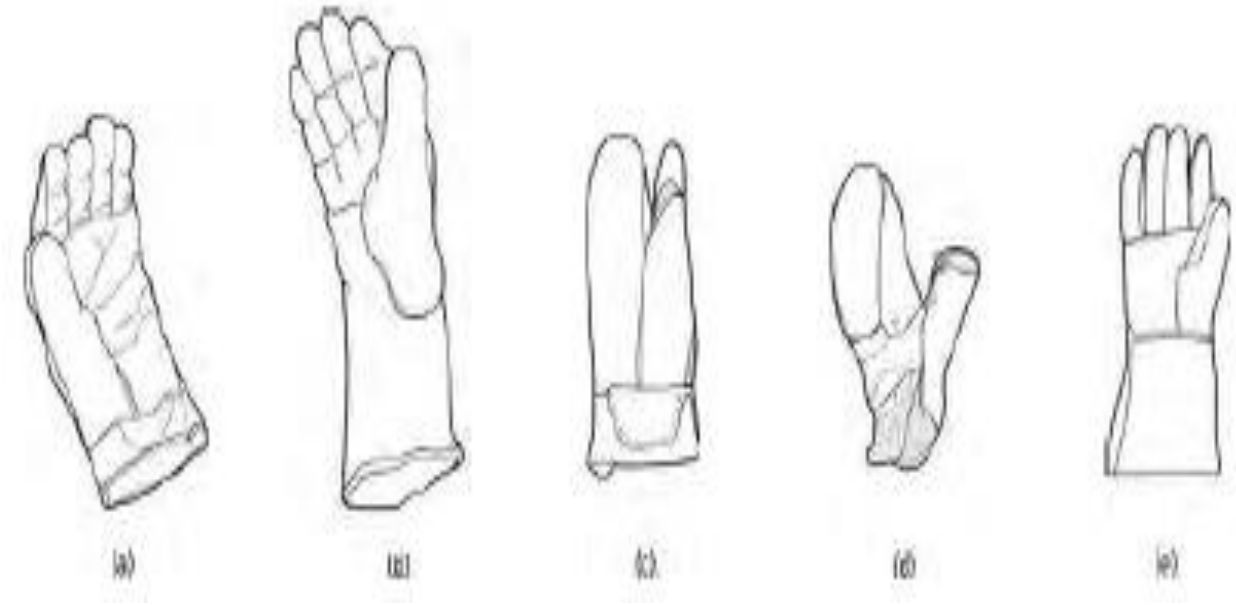


Figure 2.3. Gloves suitable for industrial purposes: (a) leather glove with reinforced palm – ideal for handling sheet steel and sections; (b) gauntlet – available in rubber, neoprene or PVC for handling chemical, corrosive or oily materials; (c) heat resistant leather glove – can be used for handling objects heated up to 300°C; (d) chrome leather hand pad or 'palm' – very useful for handling sheet steel, sheet glass, etc.; (e) industrial gauntlets – usually made of leather because of its heat resistance:

2.3. Foot protection

The injuries that you can suffer when wearing lightweight, casual shoes in a workshop environment are shown in figure 2.4. This figure also shows some examples of safety footwear. Such safety footwear is available in a variety of styles and prices. It looks as smart as normal footwear and is equally as comfortable.

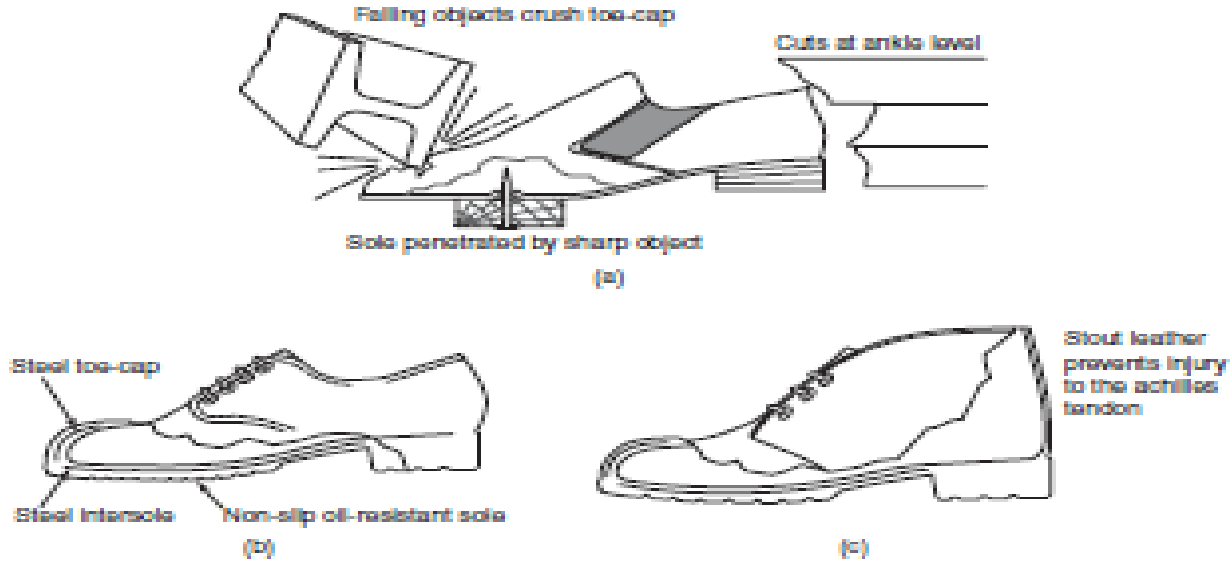


Figure 2.4 Safety foot ware: (a) lightweight shoes offer no protection: (b) industrial safety shoes; (c) industrial safety boot

Self-Check 2	multiple choose and true or false Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

Name: _____ Date: _____

Directions: Answer all the questions listed below.

1. Which one is Personal protective equipment? (2 point)

a. Foot protection C. Head protection

b. Hand protection d. all

2. When to gloves should be used? (2 point)

a. when handling sharp, c. a and b

b. Handling hot materials d. all

say true for the right statement or false the wrong statement

3. Personal protective equipment (PPE) Equipment used to prevent hazards and the spread of infectious diseases. (3)

4. NEVER handle hot metal with plastic gloves.(3)

Note: Satisfactory rating - 10 points Unsatisfactory - below 10 points

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

1. _____
2. _____
3. _____
4. _____

Information Sheet-3	Selecting Measuring tools in line with job requirement

Introduction

Measurement is how we determine the exact capacity of something that is in solid, liquid or gas form.

Measuring tools are: a device for measuring physical quantities.

When using any measuring tools ensure that measurement is:

- accurate
- precise
- viewed exactly off the scale of the measuring instrument

There are different types of measuring tools in different working areas such as rules, measuring tapes, caliper, micrometer etc.

a. a/Ruler: - is measuring tool used for measuring shorter straight line (linear lines). We can measure millimeters and centimeters with a ruler. (A ruler is not suitable to measure long lengths and round shapes.)

If you need to measure using a ruler, you will place the 0cm measurement at the start of the line and read the measurement at the end of the line on the comparative point on the ruler.

Figure 3.1. Ruler length of line=13cm or 130mm

Take care when reading measurements:

- Ensure that you have placed the 0mm exactly on the pre-determined point.
- Ensure that you have a square view of the measurement.

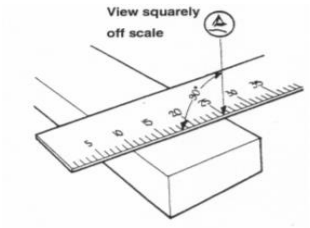


Figure 3.2. Measuring exactly with rules

b/ TAPE RULE Or FLEXIBLE RULE: - It is made of steel and is used for linear measurements where standard rules are not long enough. It can be easily carried in a pocket. Measuring tapes are usually gradated in millimeters, centimeters and meters Tape rule extend to an overall length of 3 to 5meters.

b. **Varner caliper:** is used to make semi- accurate measurements for inside, outside and depth dimensions. Standard Varner calipers are available in sizes 150mm to 250mm. Custom- made Varner calipers can be made to specifications if required. Graduations, (that determine the accuracy of the instrument) are usually 0,02mm or 0,05mm on the Varner scale.)

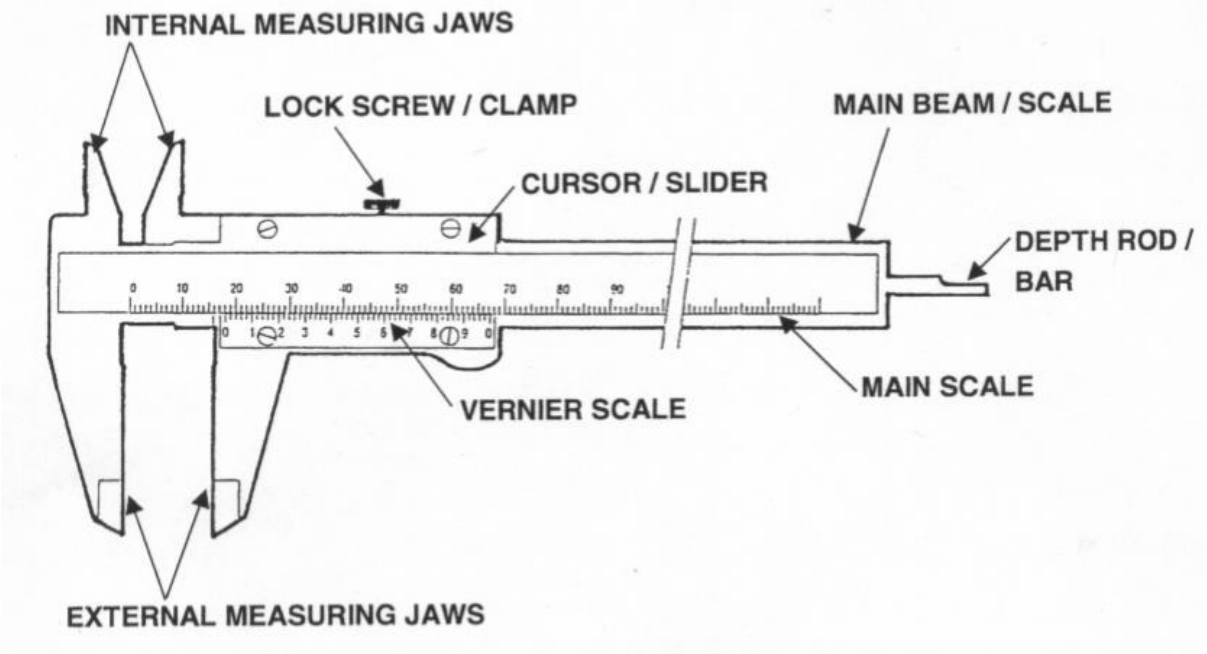


Figure 3.3. Varner caliper and its parts

c. Micrometer (device)

A micrometer is a widely used device in mechanical engineering for precisely measuring thickness of blocks, outer and inner diameters of shafts and depths of slots. Appearing frequently in metrology, the study of measurement, micrometers

have several advantages over other types of measuring instruments like the Varner caliper.

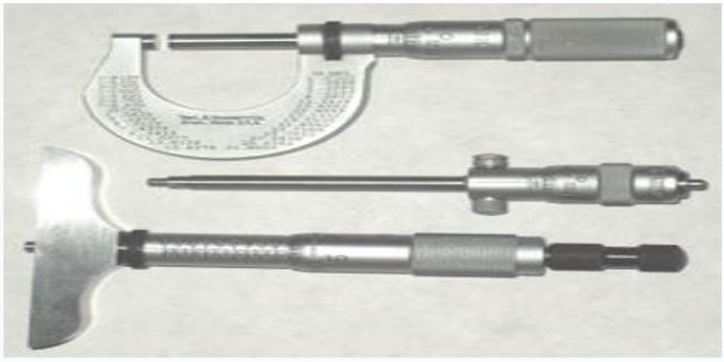


Figure 3.4. Outside, inside, and depth micrometers

An outside micrometer is typically used to measure wires, spheres, shafts and blocks.

An inside micrometer is commonly used to measure the diameter of holes, and a **Depth micrometer** typically measures depths of slots and steps.

The bore Micrometer is typically a three-anvil head on a micrometer base used to accurately measure inside diameters.

Reading micrometer

Figure 3.5. Micrometer thimble reading 5.78mm

The spindle of an ordinary metric micrometer has 2 threads per millimeter, and thus one complete revolution moves the spindle through a distance of 0.5 millimeter. The longitudinal line on the frame is graduated with 1-millimeter divisions and 0.5-millimeter subdivisions. The thimble has 50 graduations, each being 0.01 millimeter (one-hundredth of a millimeter). To read a metric micrometer, note the number of millimeter divisions visible on the scale of the sleeve, and add the total to the particular division on the thimble which coincides with the axial line on the sleeve.

Suppose that the thimble was screwed out so that graduation 5, and one additional 0.5 subdivision were visible (as shown in the fig3.5), and that graduation 28 on the

thimble coincided with the axial line on the sleeve. The reading then would be 5.00 +0.5 +0.28 = 5.78 mm

d. Electric meters: are instruments used to measure electrical values. The two most common meters are the ammeter (which measures ampere) and the voltmeter (which measures volts).

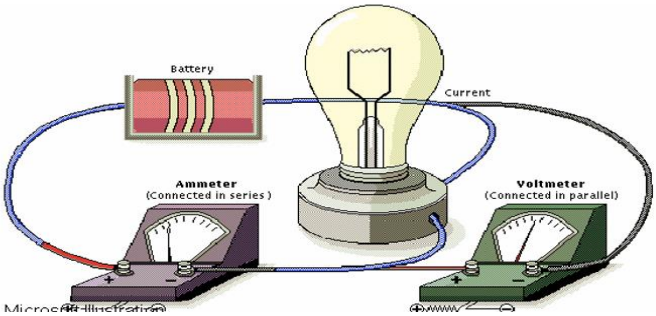


Figure 3.6. Electric meter measures and currents

Self-Check 3	Written Test and multiple choose test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. What is the function of measuring tool? (3pts)
2. Way we measure when we do an activity (2)
3. One of the following tools measures the length of an object(2pts)

   A/ ruler B/ tap meter C /micrometer D/ A and B
4. The device used to measure the values of electric current and electric voltage is (2pts)

   A/ electric meter B/ micrometer C/ vainer caliper D/ none

Note: **Satisfactory rating - 9 points** **Unsatisfactory - below 9 points**

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

3. _____
   _____

   _____
   _____
4. _____
   _____

   _____
   _____
5. _____
6. _____

Information Sheet-4	Checking and adjusting of Measuring/testing devices

Introduction

The purpose of checking is to identify whether the device is properly operated or not adjusted and maintained safely – with any deterioration detected and remedied before it results in a health and safety risk. Checking/ inspection is necessary for any equipment where significant risks to health and safety may arise from incorrect installation, reinstallation, deterioration or any other circumstances.

Testing device/equipment should be checked for damage to insulated leads and probes and needs to be confirmed as working before use. Testing device should be tested regularly to ensure safe working condition.

Adjusting of measuring /testing device may be required for the following reasons

- A new instrument
- After an instrument has been required or modified.
- When specified time period has elapsed.
- When specific usage (operating hours) has elapsed.
- Before and/or after a critical measurement
- After an event for example after an instrument has been exposed to shock, vibration or physical damage.

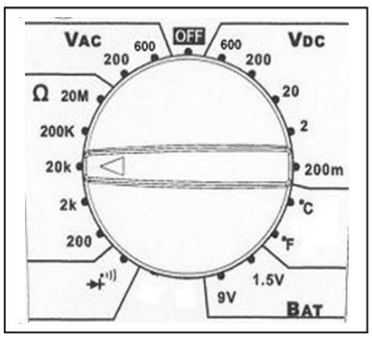
Example of measuring /testing device are multimeter, Varner caliper micrometer etc.

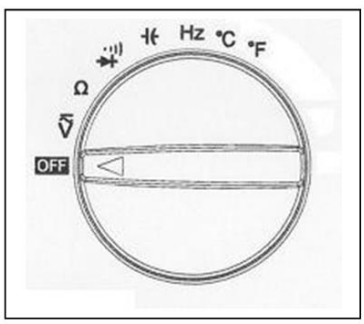
a. Adjusting multimeter function:

The dial of the DMM allows you to choose the function you're interested in measuring. Whether you intend to measure one of the three elements of Ohm's Law (current,voltage and resistance) or a more advanced function like frequency or capacitance, you must first set the dial to the appropriate function.

b. Adjusting multimeter range

The dial also plays another essential role in measuring electricity – to- determining the range of measurement. The range you select on the dial determines the placement of the decimal point as it appears on the digital display (LCD). In turn, the position of the decimal point determines how refined, or precise, your reading is. This is called resolution.





(a) (b)

Figure 4.1. (a)manual ranging meter (b) auto ranging meter

N.B on manual ranging meter the function and the range must be selected whereas on auto ranging meter will automatically choose the range .

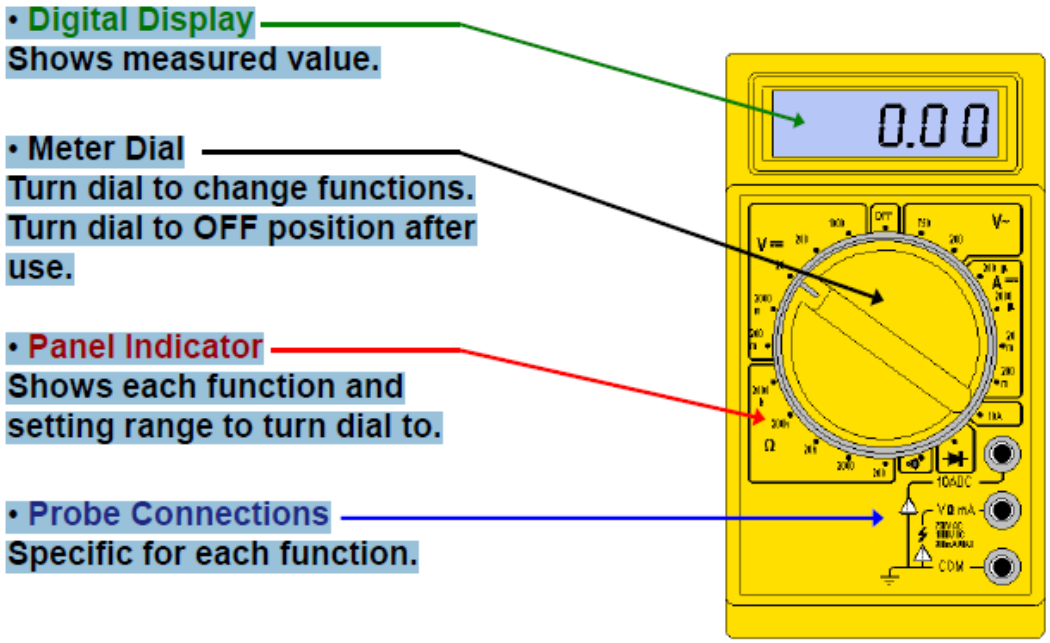


Figure 4.2 checking and adjusting parts of digital multimeter

Symbols	Measurement Functions	Descriptions
V~	AC Voltage	Measures amount of AC Electrical Pressure
V⎓	DC Voltage	Measures amount of DC Electrical Pressure
mV	Milli Volts	.00V or 1/1000V
A	Amperes	Measures amount of electron flow
mA	Milli Amperes	.001 or 1/1000A
Ω	Ohms	Measurement of resistance to the flow of electron
	Diode	Device used to control direction of electron flow
	Audible Continuity	Audible indication of continuity for low resistance
	Capacitance	Device used to store electrical potential

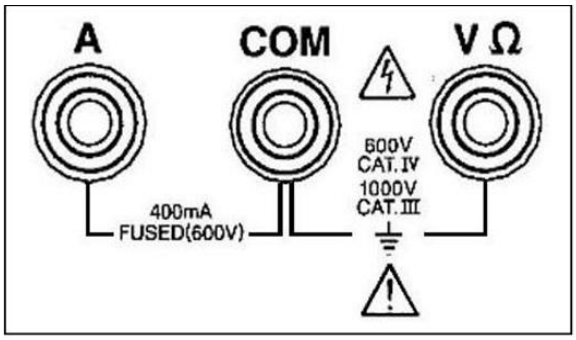
c. Auto vs. Manual Ranging

Manual ranging multimeters force us to think about the measurement before we select the range of the meter. As an example, if I want to measure 120V AC on a manual ranging meter I would turn the Dial or switch to the VAC section and select the 200V Range. This gives you ample measurement range and the maximum resolution for the measurement. If the voltage is unknown, start with the maximum or highest range and step down to achieve the maximum resolution on the display. Note that OL or overload means that you need to select a higher range and this should not damage the meter.

Auto ranging multimeters, only the measurement function needs to be selected. The multimeters circuitry will “automatically” select the best range for the measurement. There are two things to remember about an auto ranging meter. One thing is that the timing for the meter to achieve and settle on a range can take a few seconds. The other is the symbols and numerical expression used on the display. If a user fails to pay close attention to what the display is telling them, an error can occur with the interpretation of the displayed value. As an example, 240mV could be interpreted as 240V if the user doesn’t pay close attention to the little “m” in the “mV” icon on the display.

d. Checking and adjusting the port panel

The port panel is where you plug in your test leads. The diagram below explains where the test leads go for specific tests.



Use care when connecting leads to your instrument. Pay close attention and be sure to connect the leads into the correct port that is marked for the measurement selected on the dial.

DC Voltage Measurements: To measure DC voltage, we place the Red lead into the

V Ω COM port. Turn the dial or switch to V_{DC} or ⎓

If it is a manual ranging meter set it for the proper range. As in the example below, we want to measure a 9V battery so the best range would be the 20 V range. If you have an auto-ranging meter you only need to set the function on the dial to VDC or V ⎓

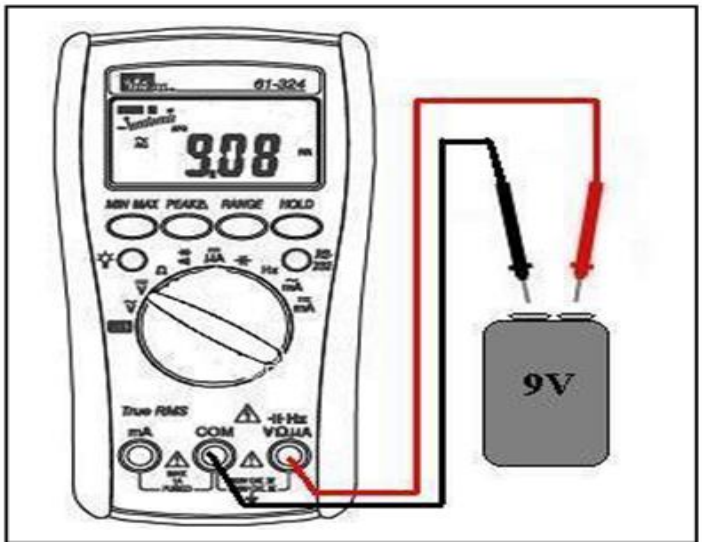


Figure 4.3. Adjusting how to measure DC voltage

AC Voltage Measurement: To measure AC voltage, we place the Red lead into the

V Ω port and black lead into the **COM** port. Turn the dial or switch to V~

If it is a manual ranging meter set it for the proper range. As an example the meter would be set to the 200 V range to measure a 120V outlet. . If you have an auto-ranging meter you only need to set function to V_{AC} or V.

Remember that it is always a good practice to connect the black lead first then the red.

Self-Check 4	Multiple chose Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page .

1. To measure DC voltage where to turn the dial or switch? (2pts)

   a. V_{AC} b. V_{DC} c. a and b d. all

2. Digital display function is (2pts)

   a. Show measured value c. turn dial to change function

   b. Show each function d. all

3. Adjusting of measuring /testing device may be required for the following reasons(2)

   a. A new instrument c. Before and/or after a critical measurement

   b. After an instrument has been required or modified. D. all

6

Note: **Satisfactory rating - 6 points** **Unsatisfactory - below 3 points**

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

1. _____
2. _____
3. _____

Operation Sheet 1.	Adjusting multimeter to measure AC voltage

procedure for adjusting multimeter to measure Ac voltage.

material requires

Ac or dc power supply

Digital or analog meter

Test light

procedure

1. Check the device functionality by Turing" ON" its power
2. Insert the red probe to VΩ and black probe to common
3. Check the continuity of jack (the probe).
4. Select the function switch to AC function
5. Select the range you want to measure the values
6. Turn on the source power and read the values with corresponding to the pointer deflection on the scale calibration

Information Sheet-5	Reporting Malfunctions, unplanned or unusual events to supervisor

Introduction

Reporting: is the document containing information about malfunction, unplanned or unusual events to organization or supervisors.

Report may refer to specific periods, events occurrences or subject and may be communicated or presented in oral or written form.

Reporting to supervisor: is the process of providing information to supervisor to enable in judging the effectiveness of their responsibility center and become base for taking corrective measure or action to events/unplanned condition.

When reports are reported to supervisor?

- When tools and testing devices are properly not working
- When events are occurred like hazards, unsafe condition
- When unusual events are happened

The importances of reporting report to supervisor are:

- To plane and implemented unplanned activities.
- To plan and resolve the malfunction tools and measuring device
- To provide appropriate solution to unusual events
- To provide appropriate solution for the duties performed

The role of supervisor

- Plan and control unusual events
- Identify and perform malfunction of measuring device and tools.
- Create and facilitates good condition for unusual event condition.
- Take immediate action when necessary to correct any reported hazards. •
- Identify and monitor trainees confined space entry training program needs.

Self-Check 5	Multiple chose Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page .

1. When reports are reported to supervisor? (2)
   a. When tools and testing devices are properly not working
   b. To provide appropriate solution to unusual events
   c. To provide appropriate solution for the duties performed
   d. all
2. The importance of reporting report to supervisor are(2)
   a. To plane and implemented unplanned activities.
   b. To plan and resolve the malfunction tools and measuring device
   c. To provide appropriate solution to unusual events
   d. all
3. The role of supervisor is(2)
   a. Plan and control unusual events
   b. Identify and perform malfunction of measuring device and tools.
   c. Create and facilitates good condition for unusual event condition
   d. all
4. What is the role of supervisor (3pts)(2)
   a. Plan and control unusual events
   b. Identify and perform malfunction of measuring device and tools.
   c. Create and facilitates good condition for unusual event condition.
   d. all

Note: **Satisfactory rating - 8 points** **Unsatisfactory - below 8 points**

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

1. _____
2. _____
3. _____
4. _____

LAP Test	Practical Demonstration

Name: _____ Date: _____

Time started: _____ Time finished: _____

Instructions: Given necessary templates, tools and materials you are required to perform the following tasks within 1 hours.

1. Measure Ac voltage of 220v and Dc voltage from the power source of AC and Dc respectively.

Instruction Sheet 4	Learning Guide 46: Maintain hand tools

This learning guide is developed to provide you the necessary information regarding the following content coverage and topics –

- Handling tools
- Routine maintenance of tools
- storing tools in appropriate location

This guide will also assist you to attain the learning outcome stated in the cover page. Specifically, upon completion of this Learning Guide, you will be able to –

- Handle tools without damage according to procedures
- Routine ***maintenance*** of tools is undertaken according to standard operational procedures, principles and techniques
- Store tools safely in appropriate locations in accordance with manufacturer's specifications or standard operating procedures

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described in number 3 to 11.
3. Read the information written in the "Information Sheets 1". Try to understand what are being discussed. Ask you teacher for assistance if you have hard time understanding them.
4. Accomplish the "Self-check 1" in page 70.
5. Ask from your teacher the key to correction (key answers) or you can request your teacher to correct your work. (You are to get the key answer only after you finished answering the Self-check 1).
6. If you earned a satisfactory evaluation proceed to "Information Sheet 2". However, if your rating is unsatisfactory, see your teacher for further instructions or go back to Learning Activity #1.
7. Submit your accomplished Self-check. This will form part of your training portfolio.
8. Read the information written in the "Information Sheet 2". Try to understand what are being discussed. Ask you teacher for assistance if you have hard time understanding them.
9. Accomplish the "Self-check 2"
10. Ask from your teacher the key to correction (key answers) or you can request your teacher to correct your work. (You are to get the key answer only after you finished answering the Self-check 2).

11. Read the information written in the “Information Sheets 3 . Try to understand what are being discussed. Ask you teacher for assistance if you have hard time understanding them.
12. Accomplish the “Self-check 3”
13. Do the “LAP test” in page __ (if you are ready). Request your teacher to evaluate your performance and outputs. Your teacher will give you feedback and the evaluation will be either satisfactory or unsatisfactory. If unsatisfactory, your teacher shall advice you on additional work. But if satisfactory you can proceed to Learning Guide #.

Information Sheet-1	Handling tools

Introduction

Materials required in construction operations shall be stored, and handled in a manner to prevent deterioration and damage to the materials, ensure safety of workmen in handling operations and non-interference with public life including safety of public, prevention of damage to public property and natural environment. Materials shall be stored and placed so as not to endanger the public, the workers or the adjoining property. Materials shall be stacked on well -drained, flat and unyielding surface. Material stacks shall not impose any undue stresses on walls or other structures. Materials shall be separated according to kind, size and length and placed in neat, orderly piles. While planning the layout, the requirements of various materials, components and equipment's at different stages of construction shall be considered. Stairways, passageway.

1. tools and equipment handling

Good tools can be quite an investment, but if you take good care of them, they'll return the favor. Keeping your tools properly stored, cleaned, and maintained will save you time and money and make your DIY endeavors that much more rewarding.

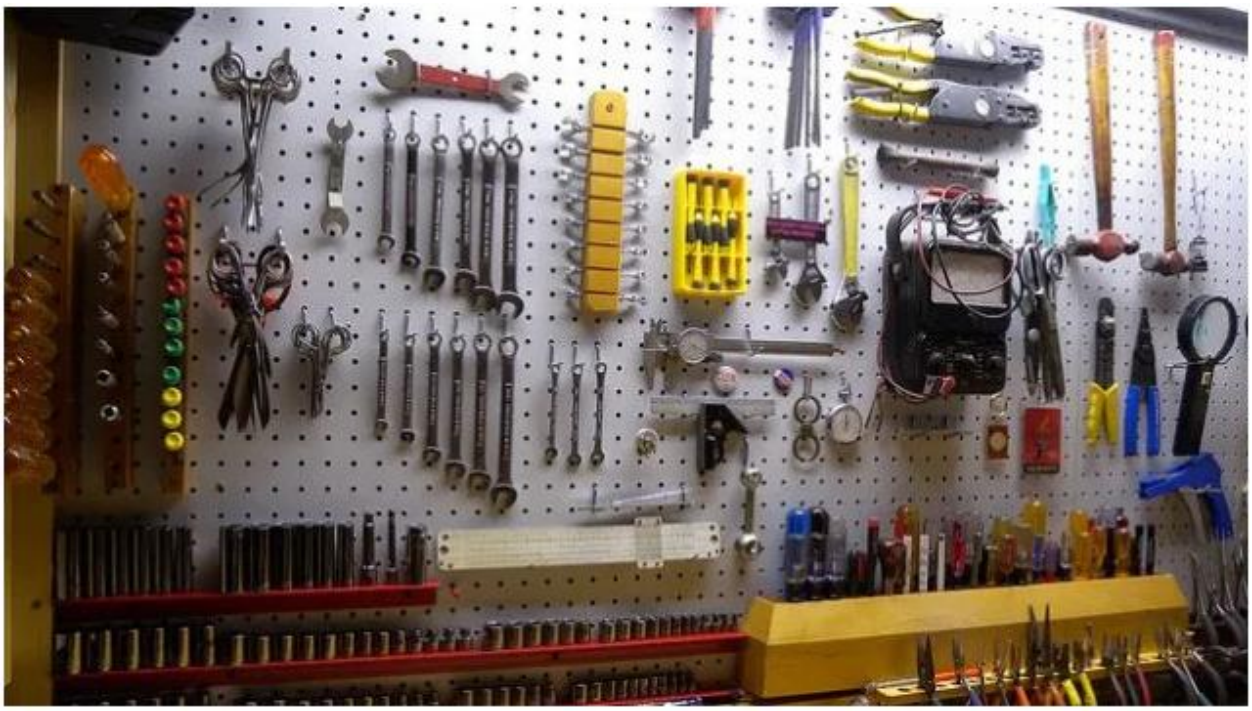


Figure 1.1.Electromechanical tools and equipments arrangement

We're mostly talking about hand tools, power tools, and garden tools in this article, but much of the same advice applies whether your tools of choice are kitchen knives, crafting tools, or whatever else. Store them well, keep them Cleaning, and you won't be sorry.

Four basic safety rules can help prevent hazards associated with the use of hand and power tools:

- ✓ Keep all tools in good condition with regular maintenance.
- ✓ Use the right tool for the job.
- ✓ Examine each tool for damage before use and do not use damaged tools.
- ✓ Operate tools according to the manufacturers' instructions

Self-Check -1	True or false Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. To prevent hazards associated with the use of hand and power tools Use the right tool for the job. (2pts)
2. Material stacks shall not impose any undue stresses on walls or other structures.(**2pts**)
3. Keeping your tools properly stored, cleaned, and maintained will save your time and money (2pts)

Note: **Satisfactory rating –6 and above points** **Unsatisfactory - below 6 points**
You can ask you teacher for the copy of the correct answers.

Answer Sheet_3

Score = _____
Rating: _____

Name: _____ Date: _____

Answer sheet for the given question

1_____
2_____
3_____

1. Introduction

All tools, equipment and vehicles must be properly maintained so that workers are not endangered. Construction regulations require inspections of vehicles, tools, machines and equipment before use.

Preventive maintenance is the systematic care and protection of tools, equipment, machines and vehicles in order to keep them in a safe, usable condition limit downtime and extend productivity. We must always be aware that maintenance tasks themselves are potentially hazardous and can result in injury. The successful maintenance program is:

- ✓ well organized and scheduled,
- ✓ controls hazards,
- ✓ defines operational procedures, and
- ✓ Trains key personnel.

The degree of detail to include in your company's program regarding equipment maintenance will depend on the kinds of tools/equipment used. Power Tools should be maintained in good working order. This may be limited to ensuring that blades/bits are replaced when needed and that guards or other safety devices are operable and any damaged electrical cords/plugs are repaired or replaced. Damaged or defective equipment/tools should be tagged and removed from service.

General requirements for equipment maintenance include:

- ✓ Obtaining a copy of the maintenance schedule recommended by the manufacturer.
- ✓ Ensuring that maintenance is performed as required.

Ensuring that the person(s) performing the maintenance are competent (e.g. licensed mechanic).

- ✓ Retaining records of maintenance/service conducted.
- ✓ Specifying who is responsible for overseeing equipment maintenance and where the records are kept.
- ✓ Set up a system for removal and tagging of damaged or defective tools and equipment.

1.1. Preventive Maintenance

- ✓ routine cleaning
- ✓ adjustment,
- ✓ replacement of equipment parts

1.1.1. Equipment Management Benefits

Performance high level

Lowers repair costs

Lengthens lifespan

All Hand Tools

- ✓ Ensure you are properly trained to safely use the tool.
- ✓ Ensure you have the correct PPE for the task, some tools require different PPE to others.
- ✓ If the tool has guarding or other safety devices they shall be fitted as per the manufacturers
- ✓ Inspect the tool for damage and or wear before use.
- ✓ Specially designed tools may be needed in hazardous environments. (Always use non-sparking
- ✓ Tools in the presence of flammable vapors or dusts. Insulated tools with appropriate ratings
- ✓ Must be used for electrical work).
- ✓ Never modify or alter a tool from its original manufacturers design.
- ✓ Never use homemade tools unless authorized to do so (check the prohibited items register).
- ✓ Never use a tool that is prohibited from site (check the prohibited items register).
- ✓ If in doubt stop the task and seek further advice before recommencing.

1.2. Techniques and principles of maintenance

Routine maintenance refers to a simple, small-scale activities associated with and general upkeep of a building, equipment, machine, plant, or system against normal wear and tear. It requires only minimal skills or training, but it is done within a specific period of time e.g. daily weekly monthly etc.

Basic Principles of Routine Maintenance

The basic principles of routine maintenance are as follows: to perform the maintenance must be performed routinely, prepare and carry out the maintenance plan, and record the maintenance items effectively. Detailed maintenance plan and items must be prepared, carried out and recorded effectively during the routine maintenance.

General hand tools maintenance include the following

a. Painting
b. Cleaning
c. Sharpening
d. Lubricating
e. Repairing
f. Tightening
g. Testing

Cleaning hand Tools

Cleaning your tools regularly extends their life and allows you the opportunity to ensure they remain free from rust if they have metal parts and apply lubricant.

Cleaning the tools regularly is essential to their proper functioning. After a day of work, your tools will be covered with some amount of dirt. It's important to clean them after you're finished using them. When cleaning your tools, don't use chemicals that are extremely harsh. Follow the manufacturer's guidelines for proper cleaning and maintenance**.**

The Cleaning Process:

1. Make sure you wear heavy duty gloves when handling hand tools, especially hand ools with sharp cutting edges.
2. ALWAYS check the manufacturer's directions and recommendations for proper cleaning and maintenance of your tool(s), and follow any such instructions carefully.
3. DISCONNECT all power cords from the tool being cleaned.
4. Wet a cleaning rag with the cleaning solution and wring out thoroughly so that it is just damp, not wet or dripping. Wipe down the surface of the tool. Avoid getting water in or around the power cables or motor casings.

5. Check any exposed metal parts of the tool for rust. If there is any rust, remove it by rubbing briskly with the steel wool.

Lubricate tools.

Whether you work with pneumatic or regular tools, it is important to lubricate them regularly. Lubricating tools helps them to perform better and reduces wear and tear of components.

Lubrication is even more important when working with air or pneumatic tools. Pneumatic tools need to be lubricated once a day before use. When moisture or condensation enters the interiors of pneumatic tools, it can cause corrosion. Corrosion can decrease the life of an instrument. Corroded parts are difficult to repair and replace. Hence, the internal components of pneumatic tools should be coated with special air-tool oil. This oil prevents corrosion by displacing any moisture that enters the interior of the equipment.

Inspect tools regularly.

Regularly inspect your tools for signs of damage and faulty functioning. Inspections should take place at the end of each construction job. Ensure that you repair them immediately if there is any damage

Self-Check -2	Multiple chose Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. The successful maintenance program is (**3 points**)
   a. Well organized and scheduled.
   b. Controls hazards.
   c. defines operational procedures
   d. all
2. hand tools maintenance include (3 points)
   a. Painting b. Cleaning c. Sharpening d. all

3. Equipment Management Benefits(3)
   a. Performance high level
   b. Lowers repair costs
   c. Lengthens lifespan
   d. all

Note: **Satisfactory rating –9 points** **Unsatisfactory - below 9 points**
You can ask you teacher for the copy of the correct answers.

Answer Sheet_1

Score = _____
Rating: _____

Name: _____ Date: _____

Short Answer Questions

1._____
2._____
3. _____

3.**Introduction to Store tools with care.**

Storing tools properly is of prime importance. Although tools are designed for rough use, it is important to store them properly. Cover up your tools to keep dirt and rain away from the machine. If the tools aren't used for a long time, inspect them regularly for signs of damage, wear and tear, corrosion, etc.

3.1 Storing equipment and tools

Safe storage of materials and equipment is essential for many businesses, such as construction job sites, laboratories, and other locations that handle chemicals, flammable gases and other hazardous materials. Storage methods and procedures are regulated for many such items; when in doubt it is always best to be cautious to prevent accidents. Locking storage cabinets and restricting access to storage areas will prevent unauthorized handling of stored items and minimize the possibility of theft.

3.1.1 Requirements for Storing Materials Indoors

Storing materials indoors requires attention to access, fire prevention and protection, floor loading, and overhead hazards. Buildings under construction require special precautions. Access. Place or store materials so they do not interfere with access ways, doorways, electrical panels, fire extinguishers, or hoist ways. Do not obstruct access ways or exits with accumulations of scrap or materials. Aisles must be wide enough to accommodate forklifts or firefighting equipment.

Fire Prevention: When storing, handling, and piling materials, consider the fire characteristics. Store non compatible materials that may create a fire hazard at least 25 feet apart or separate them with a barrier having at least a 1-hour fire rating. Pile material to minimize internal fire spread and to provide convenient access for firefighting.

Fire Doors: Maintain a 24-inch clearance around the travel path of fire doors.

Sprinklers: Maintain at least an 18-inch clearance between stored materials and sprinkler heads.

Heating Appliances: Maintain at least a 3-foot clearance between stored materials and unit heaters, radiant space heaters, duct furnaces, and flues or the clearances shown on the approval agency label.

Fire Protection: Emergency fire equipment must be readily accessible and in good working order.

Floor Loading: Conspicuously post load limits in all storage areas, except for floors or slabs on grade.

Buildings Under Construction: Store materials inside buildings under construction at least 6 feet away from any hoist way or inside floor openings, and 10 feet away from an exterior wall that does not extend above the top of the material stored.

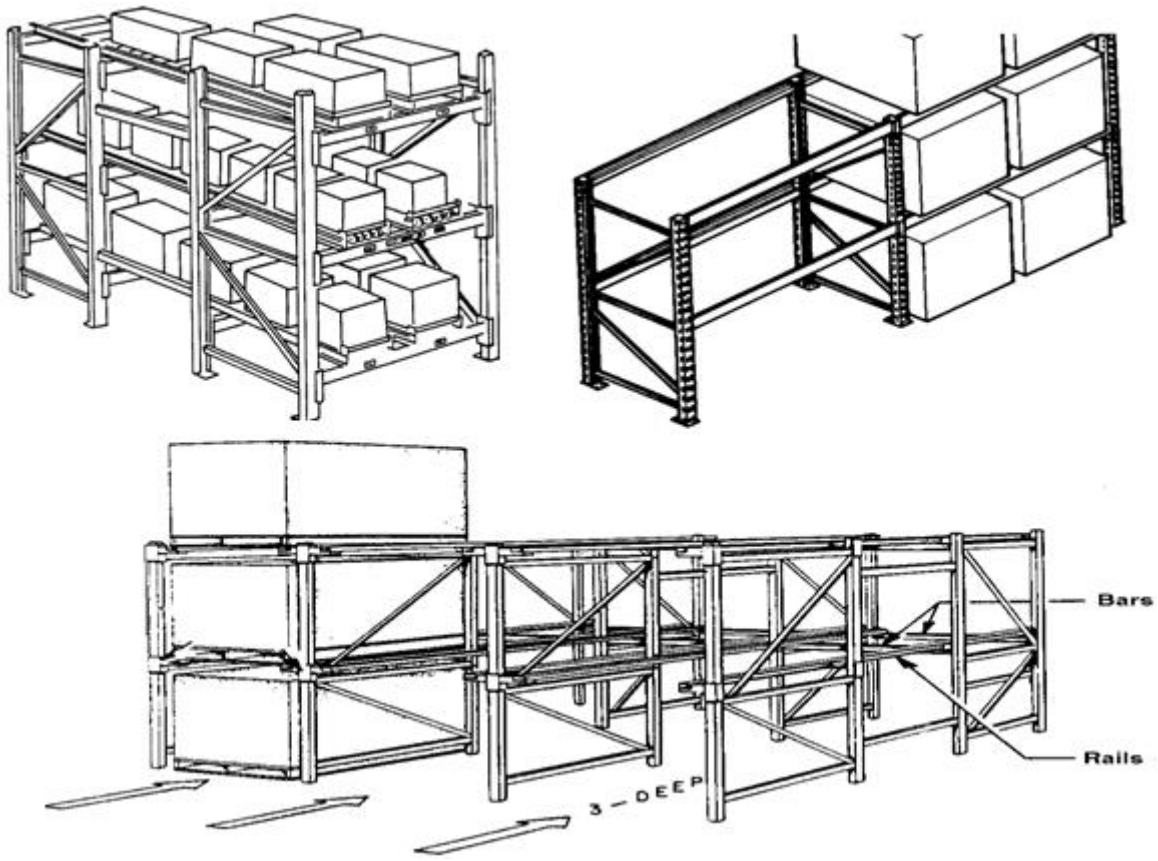


Figure 3.1.Storage racks for hand tools

Self-Check -3	True or false Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. Storing tools properly is of prime importance.(2point)
2. When storing, handling, and piling materials, consider the fire characteristics.(2point)
3. If the tools aren't used for a long time, inspect them regularly for signs of corrosion.(2point)

Note: **Satisfactory rating –6 points** **Unsatisfactory - below 6points**
You can ask you teacher for the copy of the correct answers.

Answer Sheet_1

Score = _____
Rating: _____

Name: _____ Date: _____

Short Answer Questions

1. _____
2. _____
3. _____

List of Reference Materials

1. Community Needs Assessment. Available on: https://www.cdc.gov/globalhealth/healthprotection/fetp/training_modules/15/community-needs_pw_final_9252013.pdf
2. Gathering information: Available on: https://dps.mn.gov/divisions/ojp/forms-documents/Documents/Wilder_Program_Evaluation_8.pdf
3. Information Gathering. Available on: http://www.teamreporterapp.com/information-gathering/
4. Medical Advice Disclaimer (2005-2019). The Importance of Using Community Resources in Treatment. Available on: https://www.eatingdisorderhope.com/recovery/self-help-tools-skills-tips/the-importance-of-using-community-resources-in-treatment

1. **WAC 296-24 General safety and health standards**
2. **WAC 296-62 General occupational health standards**
3. **WAC 296-800-160 Personal protective equipment (PPE)**
4. **WAC 296-155 Part C Personal protective and lifesaving equipment**
5. **WAC 296-45 Electrical workers.**
6. **https://www.scribd.com**
7. **https://www.pearsonhighered.com**
8. **https://www.uvu.edu.com**
9. **https://www.uni-ide.de.com**