TVET CERTIFICATE III in COMPUTER SYSTEM TECHNOLOGY

PERIPHERALS INSTALLATION AND CONFIGURATION

COMPI301

Install and configure PC Peripherals

Competence

REQF Level: 3

Credits: 3

Learning hours:

30H

Sector: ICT

Sub-sector: COMPUTER SYSTEM TECHNOLOGY

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Purpose statement

This core module describes the skills, knowledge and attitude required to install and configure PC Peripherals. The learner will be able to select and arrange different materials, equipment and tools used when doing PC Peripheries installation and configuration.

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Learning Unit 1 – Prepare tools, Materials and equipment

LO 1.1 – Identification of tools, Materials and equipment

- Content/Topic 1 Identification of Hand and safety tools and equipment

Personal safety equipment

A personal safety is a general recognition and avoidance of possible harmful situations or persons in your surroundings. Safety Measures Personal safety is your top priority when working with computer components.

- ✓ **ESD Tools**

Electrostatic discharge (ESD) is the sudden flow of electricity between two electrically charged objects caused by contact, an electrical short, or dielectric breakdown. A build-up of static electricity can be caused by tribo-charging or by electrostatic induction. The ESD occurs when differently-charged objects are brought close together or when the dielectric between them breaks down, often creating a visible spark. There are two ESD tools: the antistatic wrist strap and the antistatic mat.

1. **The antistatic wrist strap:** protects computer equipment when grounded to a computer chassis.
2. **The antistatic mat:** protects computer equipment by preventing static electricity from accumulating on the hardware or on the technician.

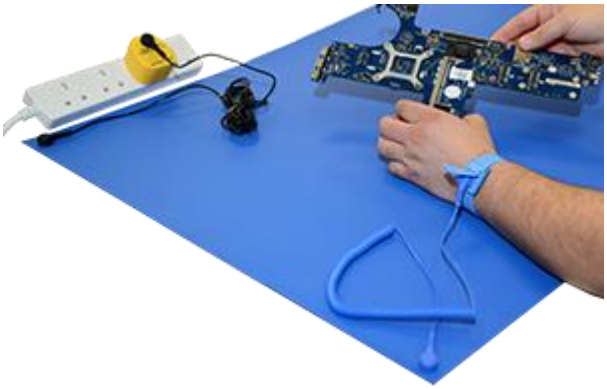

Figure 1: Antistatic mat and Antistatic wrist strap

- ✓ **Hand tools**

Most tools used in the computer assembly process are small hand tools. They are available individually or as part of a computer repair toolkit. Toolkits range widely in size, quality, and price. Some common hand tools and their uses are:

- **Flat-head screwdriver:** Used to tighten or loosen slotted screws.
- **Phillips-head screwdriver:** Used to tighten or loosen cross-headed screws.
- **Torx screwdriver:** Used to tighten or loosen screws that have a star-like depression on the top, a feature that is mainly found on laptops.

- **Hex driver:** Used to tighten or loosen nuts in the same way that a screwdriver tightens or loosens screws (sometimes called a nut driver).
- **Needle-nose pliers:** Used to hold small parts.
- **Wire cutters:** Used to strip and cut wires.
- **Tweezers:** Used to manipulate small parts.
- **Part retriever:** Used to retrieve parts from locations that are too small for your hand to fit.
- **Flashlight:** Used to light up areas that you cannot see well.
- **Wire stripper:** A wire stripper is used to remove the insulation from wire so that it can be twisted to other wires or crimped to connectors to make a cable.
- **Crimper:** Used to attach connectors to wires.
- **Punch-down tool:** Used to terminate wire into termination blocks. Some cable connectors must be connected to cables using a punch down tool.
- **Cable ties:** Used to bundle cables neatly inside and outside of a computer.
- **Parts organizer:** Used to hold screws, jumpers, fasteners, and other small parts and prevents them from getting mixed together.

Figure 2: shows some common tools used in computer repair

- ✓ **Screwdrivers**: A screwdriver is a tool, manual or powered, used for screwing and unscrewing screws. A typical simple screwdriver has a handle and a shaft, ending in a tip the user puts into the screw head before turning the handle.

- ✓ **Needle-Nose pliers:** Needle-nose pliers provide cutting and holding functionalities to the user. They are useful especially in hardware and electronics repair; because of their pointed needle-like tip, they come in handy if a nut or an element has become stuck in an otherwise unreachable cranny of the motherboard.

- Content/Topic 2 Identification of cleaning and Diagnostic tools

- ✓ **Cleaning Tools**

Having the appropriate cleaning tools is essential when maintaining and repairing computers. Using the appropriate cleaning tools helps ensure that computer components are not damaged during cleaning. Cleaning tools include the following:

- ➢ **Soft cloth:** Used to clean different computer components without scratching or leaving debris.
- ➢ **Compressed air:** Used to blow away dust and debris from different computer parts without touching the components.
- ➢ **Isopropyl Alcohol (99%):** Isopropyl alcohol is probably one of the most important cleaners to use with a computer. It's a high-quality rubbing alcohol that you can find in most drug stores. It does an excellent job of cleaning off thermal compounds without leaving a residue that could impact future compounds.

- ✓ **Diagnostic Tools**

Diagnostic tools are used to test and diagnose equipment. Diagnostic tools include the following:

- ➢ A **digital multimeter**, as shown in Figure bellow, is a device that can take many types of measurements. It tests the integrity of circuits and the quality of electricity in computer components. A digital multimeter displays the information on an LCD or LED.

Figure 3: Multimeter

- **A loopback adapter**, also called a loopback plug, tests the basic functionality of computer ports. The adapter is specific to the port that you want to test.
- **The toner probe,** as shown in Figure bellow, is a two-part tool. The toner part is connected to a cable at one end using specific adapters, such as an RJ-45, coaxial, or metal clips. The toner generates a tone that travels the length of the cable. The probe part traces the cable. When the probe is in near proximity to the cable to which the toner is attached, the tone can be heard through a speaker in the probe.

Figure 4: Toner Probe

Although an external hard drive enclosure is not a diagnostic tool, it is often used when diagnosing and repairing computers. The customer hard drive is placed into the external enclosure for inspection,

diagnosis, and repair using a known-working computer. Backups can also be recorded to a drive in an external enclosure

LO 1.2 – Testing tools, materials and equipment

- Content/Topic 1 Testing hand, safety and diagnostic tools

✓ **Testing Personal safety equipment**

Personal protective equipment, commonly referred to as "PPE", is equipment worn to minimize exposure to hazards that cause serious workplace injuries and illnesses. These injuries and illnesses may result from contact with chemical, radiological, physical, electrical, mechanical, or other workplace hazards.

PPE should be visually inspected once every 6 months, and fully tested for compliance every 12 months by a competent specialist. A personal protective equipment (PPE) test ensures different types of PPE equipment are safe and secure and can protect the wearer as intended. PPE includes clothing and other articles intended to protect the wearer from injury or other health-related risks.

✓ **Testing ESD Tools**

Electrostatic Discharge test meters (ESD testers) are used to measure the level of electrostatic discharge on a person, surface, or piece of equipment. Other ESD devices with integrated circuits will be needed to prevent damage that might be caused by sparks from excess ESD.

ESD test meters measure electrostatic discharge by monitoring the surface resistance level to determine whether it is within an acceptable range for safety. It can vary quite widely in their specific function, depending on what they are measuring.

✓ **Testing antistatic wrist strap**

One way to assure that the wrist strap system is working correctly is to use an ESD Test Station. The ESD Test Station assesses the resistance of the wrist strap system (including the operator) and provides a pass/fail indication. Some more advanced test stations will also provide the actual resistance measurement and can even log test data on a computer. But the frequency of testing differs from company to company. Some require testing just once at the beginning of the shift. Other companies may require re-testing several times a day.

The best test of the wrist strap system is while it is worn. This includes all three components: the wristband, the ground cord (including resistor), and the interface with the wearer's skin. "Because wrist straps have a finite life, it is important to develop a test frequency that will guarantee integrity of the system. Typical test programs recommend that wrist straps that are used daily should be tested daily.

✓ **Testing antistatic mat**

An antistatic mat uses a conductive plastic material to safely drain static electric charges away from a work surface. The electrical resistance of a mat's surface generally falls in a range of 1 megohm, or million ohms, to 10 gigohms, or billion ohms. A typical multimeter you might buy at an electronics shop can't measure resistances this high, but specialty equipment outlets sell meters capable of testing antistatic mats. Over time, accumulated dirt will interfere with the mat's electrical resistance. Periodic testing with the right meter will tell you when to clean or replace the mat.

Steps of testing an antistatic mat:

- **Step 1:** Lay the mat on a clean, flat, no conducting surface.
- **Step 2:** Turn the ESD test meter on. Connect one of its probes to the mat's metal grounding rivet or clip.
- **Step 3:** Connect the other probe to the furthest point on the mat's top surface.
- **Step 4:** Read the meter's display. Some meters have a resistance gauge, and some have "good," "high" and "low" resistance lights. A mat in good condition will read between 1 megohm and 10 gigohms, or it should light its "good" light.
- **Step 5:** Disconnect the probes.
- **Step 6:** Touch the metal contact of one probe to a point on the mat's edge, and touch the other probe to the edge directly across from the first probe.
- **Step 7:** Move the probes to several points around the mat's edge, always keeping the full width of the mat between them. The meter should have fairly consistent resistance readings, or light its "good" light. If it doesn't, clean the mat with a mild cleaning agent and retest it.

✓ **Testing Screwdrivers**

A screwdriver is a tool, manual or powered, used for screwing and unscrewing screws. A typical simple screwdriver has a handle and a shaft, ending in a tip the user puts into the screw head before turning the handle. The following are quality control elements to pay attention before use a screwdriver:

- Handles are tight in the shank, clean, not worn or cracked and do not show signs that the screwdrivers were used as a chisel or as a punch.
- If they are electrically insulated, insulation has not been compromised, exposing the underlying metal shank.
- The shanks are straight and do not show signs the screwdrivers were used as a pry bar or submitted to extra turning power.
- The tips of the blades in slotted screwdrivers show a straight edge.
- The tips of Phillips screwdrivers have the star configuration well defined.

✓ **Testing Needle-Nose pliers**

Needle-nose pliers provide cutting and holding functionalities to the user. The following are quality control elements to pay attention before use a Needle-Nose pliers:

- Pivot points and/or joints are firm.
- If a plier is electrically insulated, check that the insulation has not been compromised, exposing the underlying conductive material.
- Pliers are not being abused. e.g.: hammering the jaws to cut a wire or bolt.

✓ **Testing diagnostic tools**

Multimeter

A multimeter is a tool that is used to take measurements of electrical circuits. No matter what type of multimeter you own, you can probably test resistance and voltage with it. When your multimeter seems like it is not working correctly, there are a number of things you can do to test it. If a multimeter fails any of these tests it is probably defective and will need to be replaced.

- Set your multimeter to the lowest setting for resistance (the word "ohms" or “Ω" symbol can also denote resistance). Touch the red probe to the black probe. Check the display to make sure that it reads "0," as there should not be any resistance between the two probes.
  Find a resistor of known value. Purchase one from a store that sells electronics components if you don't have one handy. Set the multimeter to the correct factor of 10; set the multimeter to the 100Ω mark to test a resistor known to be a 500Ω resistor, for instance. Place one probe at each end of the resistor. Check the display to make sure it shows a value very close to the resistor value. Perform this check with more than one resistor if the multimeter does not measure the first resistor correctly.

- Purchase a new 9V battery. Turn the dial on your multimeter to set it to measure voltage rather than resistance. Place the red probe against the positive terminal of the battery. Touch the black probe to the negative terminal. Ensure that the multimeter provides a reading of 9V or very close to it.

LO 1.3 – Proper arrangement of the workplace

- Content/Topic 1 Arrangement of Hand and safety tools and equipment

✓ **Personal safety equipment**

All PPE clothing and equipment should be of safe design and construction, and should be maintained in a clean and reliable fashion. Employers should take the fit and comfort of PPE into consideration when selecting appropriate items for their workplace. PPE that fits well and is comfortable to wear will encourage employee use of PPE. Most protective devices are available in multiple sizes and care should be taken to select the proper size for each employee. If several different types of PPE are worn together, make sure they are compatible. If PPE does not fit properly, it can make the difference between being safely covered or dangerously exposed. It may not provide the level of protection desired and may discourage employee use.

Employers are required to train their employees who must use PPE in order to know at least the following:

- When PPE is necessary.
- What PPE is necessary?
- How to properly put on, take off, adjust and wear the PPE.
- The limitations of the PPE.
- Proper care, maintenance, useful life and disposal of PPE.

Safe working conditions help prevent injury to people and damage to computer equipment. A safe workspace is clean, organized, and properly lighted. Everyone must understand and follow safety procedures. Follow the basic safety guidelines to prevent cuts, burns, electrical shock, and damage to eyesight. As a best practice, make sure that a fire extinguisher and first-aid kit are available in case of fire or injury.

This is a partial list of basic safety precautions to use when working on a computer:

- Remove your watch and jewelry and secure loose clothing.
- Turn off the power and unplug equipment before performing service.
- Cover sharp edges inside the computer case with tape.
- Never open a power supply or a CRT monitors.
- Do not touch areas in printers that are hot or that use high voltage.
- Know where the fire extinguisher is located and how to use it.
- Keep food and drinks out of your workspace.
- Keep your workspace clean and free of clutter.
- Bend your knees when lifting heavy objects to avoid injuring your back.

- ✓ **ESD Tools**

ESD is based on the fact that people and things are made of electrons. When these electrons are scraped off us by contact with another object a destructive transfer of electrons (electrostatic discharge) potentially can take place.

To prevent ESD we want to be aware of our surroundings. Walking across insulators like carpets and wood can cause static to cling to our skin and clothes. If we are working on a circuit board this static can then erupt off our clothes and skin onto the chips in a circuit board. When this happens, the high voltage in the ESD can puncture the semiconductors' isolation reducing input resistance from 10's of Megohms to 100k – if not causing a short.

This is why wear anti-static strips connected to ground should always. The wrist strap does two things: it provides a conductive path to ground for electrons that are static on our skins and clothes, and since it is worn on one hand (instead of two) that path is "dedicated" making it easy for electricity on the surface to find it.

At least 3000 volts of static electricity must build up before a person can feel ESD. For example, static electricity can build up on you as you walk across a carpeted floor. When you touch another person, you both receive a shock. If the discharge causes pain or makes a noise, the charge was probably above 10,000 volts. By comparison, less than 30 volts of static electricity can damage a computer component. ESD can cause permanent damage to electrical components.

Follow these recommendations to help prevent ESD damage:

- Keep all components in antistatic bags until you are ready to install them.
- Use grounded mats on workbenches.
- Use grounded floor mats in work areas.
- Use antistatic wrist straps when working on computers.

- ✓ **Antistatic wrist strap**

A wrist strap ground grounds the wrist strap separate from anything else. If you feel you need to separate your work surface from the wearer of the wrist strap this a good choice. On the other hand, a common point ground can be used to ground both an anti-static mat and wrist strap together.

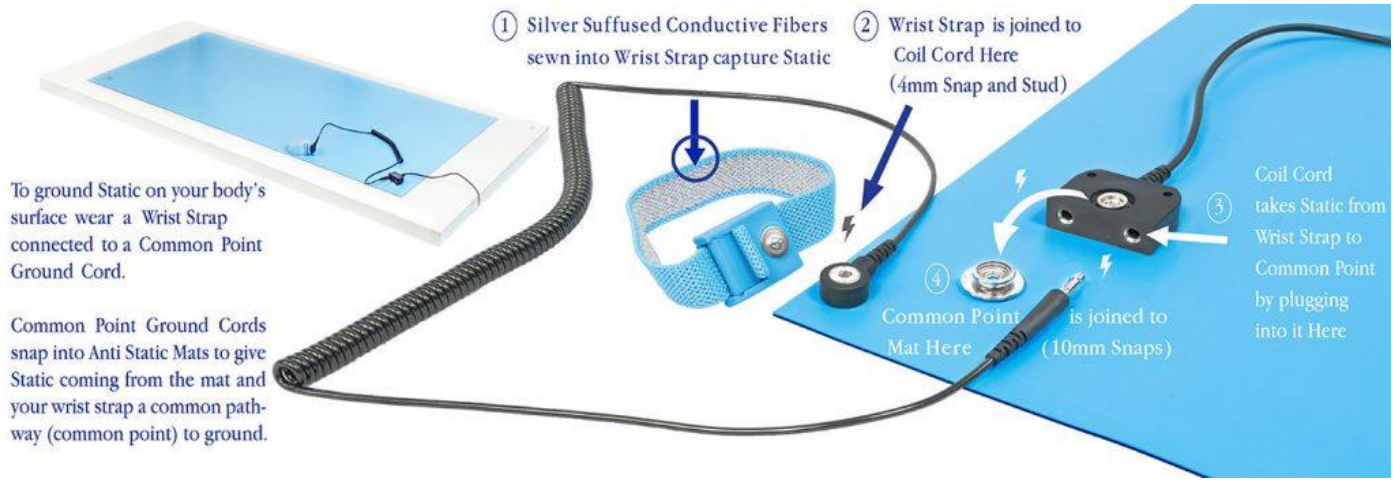

Figure5: The arrangement of an antistatic wrist strap

- ✓ **Antistatic mat**

When working on anything electronic you want to make sure you take precautions against static electricity and ESD (electrostatic discharge) from damaging your work. This is accomplished by electrically bonding yourself to ground.

Anti-Static or ESD mats are used to electrically bond (ground) objects laid on top of them or people standing on top of them. Mats can be either static dissipative or conductive.

While the top side is static dissipative, the **bottom side** can be conductive. In fact, since most electronics manufacturers use metal shelving and grounded floors they prefer that the bottom side is conductive so that there is no electrical barrier between the grounded (metal) shelving and the mat being used as shelf liner. If the matting is being used as shelf liner laying on top of a wood shelf without connection to an electrical ground it would be considered **isolated- (a potential source of ESD).**

Whether you are using a metal table or wood table underneath the anti-static mat you will want to give static electricity a dedicated path from the mat into an electrical ground when you are using it as a work surface. This is accomplished by connecting a grounding cable to the mat via using metal snaps.

- ✓ **Needle nose pliers**

The first step to organizing tools is to do a thorough inventory. Once you have a general idea of the tools on hand, sort them into like categories. Group all of the power tools, the small hand tools, and so on. Next, create zones and use cabinetry to keep the like items together.

- Content/Topic 2 Arrangement of Cleaning and Diagnostic tools

Cleaning tools

Keeping computers clean inside and out is a vital part of a maintenance program. Dirt can cause problems with the physical operation of fans, buttons, and other mechanical components. On electrical components, an excessive build-up of dust acts like an insulator and traps the heat. This insulation impairs the ability of heat sinks and cooling fans to keep components cool, causing chips and circuits to overheat and fail.

As a PC technician, you'll find yourself collecting different cleaning solutions and cleaning pads to clean a variety of devices and components, including the mouse and keyboard CRT and LCD monitors.

Most of these cleaning solutions contain flammable and poisonous materials. Take care when using them so that they don't get on your skin or in your eyes. To find out what to do if you are accidentally exposed to a dangerous solution, look on the instructions printed on the can or check out the material safety data sheet. **Material Safety Data Sheet (MSDS)** explains how to properly handle substances such as chemical solvents. An MSDS includes information such as physical data, toxicity, health effects, first aid, storage, shipping, disposal, and spill procedures. It comes packaged with the chemical, you can order one from the manufacturer, or you can find one on the Internet.

Having the appropriate cleaning tools is essential when maintaining and repairing computers. Using the appropriate cleaning tools helps ensure that computer components are not damaged during cleaning.

Cleaning tools include but not limited to the following:

- ✓ **Soft cloth:** Used to clean different computer components without scratching or leaving debris
- ✓ **Compressed air:** Used to blow away dust and debris from different computer parts without touching the components
- ✓ **Cable ties:** Used to bundle cable s neatly inside and outside of a computer
- ✓ **Parts organizer:** Used to hold screws, jumpers, fasteners, and other small parts and prevents them from getting mixed together

Diagnostic tools

Diagnostic tools are used to test and diagnose equipment. Diagnostic tools include the following:

- ✓ **Digitalmultimeter**, as shown in Figure bellow, is a device that can take many types of measurements. It tests the integrity of circuits and the quality of electricity in computer components. A digital multimeter displays the information on an LCD or LED.

Learning Unit 2 – Deploy PC Peripherals

LO 2.1 – Identification and Specification of PC Peripherals

- Content/Topic 1 Description of PC peripherals and External cables

✓ **PC Peripherals**

Peripherals are a generic name for any device external to a computer, but still normally associated with its extended functionality. The purpose of peripherals is to extend and enhance what a computer is capable of doing without modifying the core components of the system. A **printer** is a good example of a peripheral. It is connected to a computer, extends its functionality, but is not actually part of the core machine.

Do not confuse computer peripherals with computer accessories. An accessory can be any device associated with a computer, such as a printer or a **mouse pad**. A printer is a peripheral, but a mouse pad is definitely not one. A mouse pad does not extend the functionality of a computer; it only enhances the user experience.

Peripherals are often sold apart from computers and are normally not essential to its functionality. You might think the display and a few vital input devices such as the mouse and keyboard would be necessary, but certain computers such as servers or embedded systems do not require mice, keyboards, or even displays to be functional.

Peripherals are meant to be easily interchangeable, although you may need to install new drivers to get all the functionality you expect out of a new peripheral device. The technology which allows peripherals to work automatically when they are plugged in is called **plug and play**. A plug and play device is meant to function properly without configuration as soon as it is connected. This isn't always the case however. For this reason, some people sarcastically refer to the technology as 'plug and pray'.

Description of External cables

✓ **VGA cable**

A video graphics array (VGA) cable is a type of computer cable that carries visual display data from the CPU to the monitor. A complete VGA cable consists of a cable and a connector at each end, and the connectors are typically blue.

Figure6: VGA Cable

A VGA cable is used primarily to link a computer to a display device. One end of the VGA cable is attached to the port in the graphics card on the computer motherboard, and the other to the port in the display device. When the computer is running, the video card transmits video display signals via the VGA cable, which are then displayed on the display device. VGA cables are available in different types, where shorter cables with coaxial cable and insulation provide better video/display quality.

- ✓ **DVI Cable**

Digital Visual Interface, DVI is a video display interface. It was developed to be an industry standard for transmitting digital video content to display devices at resolutions as high as 2560 x 1600. Common devices that utilize the DVI connection are computer monitors and projectors. DVI can even be used with some TVs, although HDMI is more common as only some DVI cables can transmit audio signals. The DVI connector (shown below) may have one of three names depending on the signals it supports: DVI-A (for analog only), DVI-D (for digital only), or DVI-I (for both digital and analog).

Figure7: A DVI Cable

- ✓ **Power cable**

Power cable, mains cable or flex, a power cord is the primary cable that provides power to the computer, printer, monitor, and components within a computer. The figure bellow is an example of the power cord that is commonly used with computers, monitors, printers, and other peripherals.

Figure8: An example of power cable

- ✓ **HDMI cable**

HDMI stands for High Definition Multimedia Interface and is the most frequently used HD signal for transferring both high definition audio and video over a single cable. It is used both in the commercial AV sector and is the most used cable in homes connecting devices such as digital TV, DVD player, Blu-ray player, Xbox, PlayStation and Apple-TV with the television.

Figure9: An example of HDMI cable

More and more home AV devices are being connected using this simple, effective cable, but now HDMI is also featuring on laptops and PCs and therefore becoming the standard for the corporate and commercial markets – for education, presentation, digital signage and retail display to transmit high quality audio video signals from device to device.

- ✓ **USB cable**

The term USB stands for **"Universal Serial Bus"**. USB cable assemblies are some of the most popular cable types available, **used mostly to connect computers to peripheral devices** such as cameras, camcorders, printers, scanners, and more. Devices manufactured to the current USB Revision 3.0 specification are backward compatible with version 1.1.

Figure10: USB Cable

- ✓ **Serial cable**

A serial cable is a cable used to transfer information between two devices using a serial communication protocol. The form of connectors depends on the particular serial port used. A cable wired for connecting two DTEs directly is known as a null modem cable.

Figure11: An example of a serial cable

- ✓ **Parallel cable**

In computing, a parallel port is a type of interface found on computers (personal and otherwise) for connecting peripherals. The name refers to the way the data is sent; parallel ports send multiple bits of data at once (parallel communication), as opposed to serial communication, in which bits are sent one at a time. To do this, parallel ports require multiple data lines in their cables and port connectors and tend to be larger than contemporary serial ports, which only require one data line.

Figure12: Pin Parallel Male to Female Extension Cable

- Content/Topic 2 Description of I/O devices

Input devices

Computer input device is any hardware device that sends data to a computer, allowing you to interact with and control it.

The following are the most commonly used input devices:

- ✓ **Mouse** – an input device used to control the cursor and coordinates. It can be wired or wireless. It allows the user to do the following:

- Move the mouse cursor
- Select

- Scroll
- Open or execute a program
- Drag-and-drop
- Hover
- Perform other functions with the use of additional buttons
- A laptop uses a touchpad as the mouse. A Smartphone and tablet use a touch screen as primary input device and the user's finger is used as the mouse.

✓ **Keyboard** – one of the primary input devices used to input data and commands. It has function keys, control keys, arrow keys, keypad and the keyboard itself with the letters, numbers and commands. Keyboards are connected to the computer through USB or Bluetooth. A laptop keyboard is more compact than a desktop keyboard to make the laptop smaller and lighter. Smart phones and tablets use on-screen keyboard to input messages and select commands.

✓ **Microphone** – an input device that allows users to input audio into their computers. Here are some uses of the microphone:

- Audio for video
- Computer gaming
- Online chatting
- Recording musical instruments
- Recording voice for dictation, singing and podcasts
- Voice recorder
- Voice recognition
- VoIP – Voice over Internet Protocol

✓ **Digital Camera** – is an input device that takes pictures digitally. Images are stored as data on memory cards. It has an LCD screen that allows users to preview and review images. Digital cameras have become popular over film cameras because of the following features:

- LCD screen – allows users to view the photos and videos immediately
- Storage – can store thousands of pictures
- Picture development – allows users to choose and pick which pictures to develop
- Size – takes up less space and can be easily carried

- ✓ **Scanner** – is an input device that reads an image and converts it into a digital file. A scanner is connected to a computer through USB. There are different types of scanners:
  - Flatbed scanner – uses a flat surface to scan documents
  - Sheet-fed scanner – like a laser printer where paper is fed into the scanner
  - Handheld scanner – the scanner is dragged over the page to be scanned
  - Card scanner – for scanning business card

- ✓ **Touch screen** – is an input device that allows users to interact with a computer using their fingers. It is used widely in laptop monitors, smart phones, tablets, cash registers and information kiosks. Most common functions of touch screens are as follows:
  - Tap
  - Double-tap
  - Touch and hold
  - Drag
  - Swipe
  - Pinch

- ✓ **Barcode Reader** – also known as barcode scanner or point of sale (POS) scanner, is an input device capable of reading barcodes.

- ✓ **Webcam** – is an input device connected to the computer and the internet that captures still picture or motion video.

- ✓ **Biometric devices** – is an input device used to input biometric data into a computer. Here are the types of biometric devices:
  - Face scanner
  - Hand scanner
  - Finger scanner
  - Voice scanner

- ✓ **Stylus** – is a pen-shaped input device used to write or draw on the screen of a graphic tablet or device. Initially it was just used for graphic tablets and PDAs, but now, it has become popular on mobile devices as a replacement for the user's fingers. It's used for more accurate navigation and to keep oils from user's fingers off the device screen.

- ✓ **Card reader-** A card reader is a data input device that reads data from a card-shaped storage medium. The first were punched card readers, which read the paper or cardboard punched cards that were used during the first several decades of the computer industry to store information and programs for computer systems. Modern card readers are electronic devices that can read plastic cards embedded with either a barcode, magnetic strip, computer chip or another storage medium.

Output Devices

Output devices are the electronic parts of the computer or computer peripherals which converts the information into readable form. It can be text, graphics, audio, or video.

The most commonly used output devices are the following:

- ✓ **Computer Monitor**

Monitors are the most important output devices of computer, without it, the computer is incomplete. The monitor is a **universal** device of the computer for visual display of all types of information. The monitor is designed to display symbolic and graphical information. It displays all the data and information as Soft Copy on its screen. It **acts** as an interface between the CPU and the user.

- ✓ **Printer**

A printer is an electronic external output devices of computer used to print digital information on paper as a hard copy. Since the main task of printers is to ***convert the data from soft copy to hard copy*** on the computer**.**

The printer prints the files stored in a computer (data can be in text form), it can be small or big as per to the page size. Printers are used to **print signs, office documents at offices, homes, PPT, and business establishments.**

The resolution or clarity of images produced by a printer is measured in **DPI (dots per inch)** resolution. The more dots per fleas a printer has, the better quality of the image can be printed and seen more clearly.

- ✓ **Projector**

The multimedia screen projector is also an output device. A multimedia projector is a miracle of technology, and it is a very useful and multi-functional device.

In the conditions of having a limited area like an apartment, there, you can organize home theater, because the projection of the image allows us to view the video on the screen over the entire wall.

Using the projector for educational purposes, projects, data graphs, or showing documentaries makes it possible to broadcast video in a wide format for a better understanding of information by viewers.

- ✓ **Speaker**

A speaker is a hardware output device connected with a computer to produce the audios. The sound produced by computer speakers is done by a hardware component whose name is a **sound card** that pre-installed with the computer.

The word "**speaker**" is not a technical term, the real name of the device is "**dynamic head** ". This speaker can now be found on many devices, for example, on a TV, radio, telephone, children's toys, and others.

- ✓ **Headphones**

Headphones are also known as earphones. Headphones are output devices with which you can listen to any sound signals transmitted by an electronic device. These are hardware devices that produce audio privately after being connected to any smartphone or computer through a wireless connection.

The main purpose of using headphones or earphones is to listen to the audio privately mainly in a crowd and avoid disturbing others. The headphone takes the audio input from the sound card (any connected device) and converts it into audio output in the form of wave sound.

- Content /Topic3 Description of connectors/ports

In computer hardware, a port serves as an interface between the computer and other computers or peripheral devices. In computer terms, a port generally refers to the part of a computing device available for connection to peripherals such as input and output devices**.**

- **VGA connector:** A Video Graphics Array (VGA) connector is a standard connector used for computer video output. It is a three-row, 15-pin D-sub miniature connector referred to variously as DE-15, HD-15 or DB-15. DE-15 is the most accurate common nomenclature under the D-sub specifications: an "E" size D-sub connector, with 15 pins in three rows.

Figure13: VGA Male and Female connectors

- ✓ **USB connector:** A universal serial bus (USB) connector is a connector between a computer and a peripheral device such as a printer, monitor, scanner, mouse or keyboard. It is part of the USB interface, which includes types of ports, cables and connectors. The USB connector was developed to simplify the connection between computers and peripheral devices. Prior to the USB interface, peripheral devices had a multitude of connectors. The USB interface provides various benefits, including plug-and-play, increased data transfer rate (DTR), reduced number of connectors, and addressing usability issues with existing interfaces.
- ✓ **Serial Port/Connector:** A serial port is an interface that allows a PC to transmit or receive data one bit at a time. It is one of the oldest types of interfaces and at one time was commonly used to connect printers and external modems to a PC. Modern serial ports are used in scientific instruments, shop till systems such as cash registers and applications like industrial machinery systems.
- ✓ **Parallel Port:** In computing, a serial port is a serial communication interface through which information transfers in or out sequentially one bit at a time. This is in contrast to a parallel port, which communicates multiple bits simultaneously in parallel. Throughout most of the history of personal computers, data has been transferred through serial ports to devices such as modems, terminals, various peripherals, and directly between computers.
- ✓ **HDMI port:** In computing, a serial port is a serial communication interface through which information transfers in or out sequentially one bit at a time. This is in contrast to a parallel port, which communicates multiple bits simultaneously in parallel. Throughout most of the history of personal computers, data has been transferred through serial ports to devices such as modems, terminals, various peripherals, and directly between computers.
- ✓ **DVI port:** Digital Visual Interface (DVI) is a video display interface developed by the Digital Display Working Group (DDWG). The digital interface is used to connect a video source, such as a video display controller, to a display device, such as a computer monitor. It was developed with the intention of creating an industry standard for the transfer of digital video content.
- ✓ **Microphone jack:** A microphone jack is a small round outlet, usually on a computer, camcorder, or stereo, into which a microphone cord is plugged. The jack, sometimes called a mic jack, is an input connector that works much like an electrical socket. Plugging a microphone into a jack enables it to send its sound into the computer or other device.
- ✓ **Speaker jack:** It is a socket for plugging in an audio source. Audio jacks are found on many types of audio equipment and musical instruments that accept external sound sources. In a car or truck, an

audio jack, also called a "media jack" or "auxiliary (AUX) jack," is a mini-phone socket that connects any portable music player to the vehicle's amplifier and speakers.

- ✓ **Ethernet port:** An Ethernet port (also called a jack or socket) is an opening on computer network equipment that Ethernet cables plug into. Their purpose is to connect wired network hardware in an Ethernet LAN, metropolitan area network (MAN), or wide area network (WAN). An Ethernet port accepts a cable that has an RJ-45 connector.

- Content /Topic4 Description of Drives

A computer drive is a location (medium) that is capable of storing and reading information that is not easily removed, like a disk or disc. All drives store files and programs used by your computer. For example, when you write a letter in a word processor, the program is loaded from the hard drive. When you save the document, it's saved to the hard drive or other disk or drive.

- ✓ **DVD/CD**- this is a good example of computer drive is an Optical disc drives that reads and writes all common CD and DVD formats. All modern optical drives that come with personal computers are CD/DVD drives.
- ✓ **SD/SSD**- another example of computer drive. Solid-State Drive (SSD) is a solid-state storage device that uses integrated circuit assemblies to store data persistently, typically using flash memory, and functioning as secondary storage in the hierarchy of computer storage. It is also sometimes called a solid-state device or a solid-state disk, even though SSDs lack the physical spinning disks and movable read–write heads used in hard disk drives (HDDs) and floppy disks.

Before move on let say on Hard disk drive (HDD) which is a non-volatile data storage device. It is usually installed internally in a computer, attached directly to the disk controller of the computer's motherboard. It contains one or more platters, housed inside of an air-sealed casing. Data is written to the platters using a magnetic head, which moves rapidly over them as they spin.

LO 2.2 – Installation and configuration of PC peripherals

- Content/Topic 1 Description of motherboard and its components

- ✓ **Definition of Computer motherboard**

The motherboard is a printed circuit board and foundation of a computer that is the biggest board in a computer chassis. It allocates power and allows communication to and between the CPU, RAM, and all other computer hardware components.

Overview

A motherboard provides connectivity between the hardware components of a computer, like the processor (CPU), memory (RAM), hard drive, and video card. There are multiple types of motherboards, designed to fit different types and sizes of computers. Each type of motherboard is designed to work with

specific types of processors and memory, so they don't work with every processor and type of memory. However, hard drives are mostly universal and work with the majority of motherboards, regardless of the type or brand.

Below is a picture of the ASUS P5AD2-E motherboard with labels next to each of its major components.

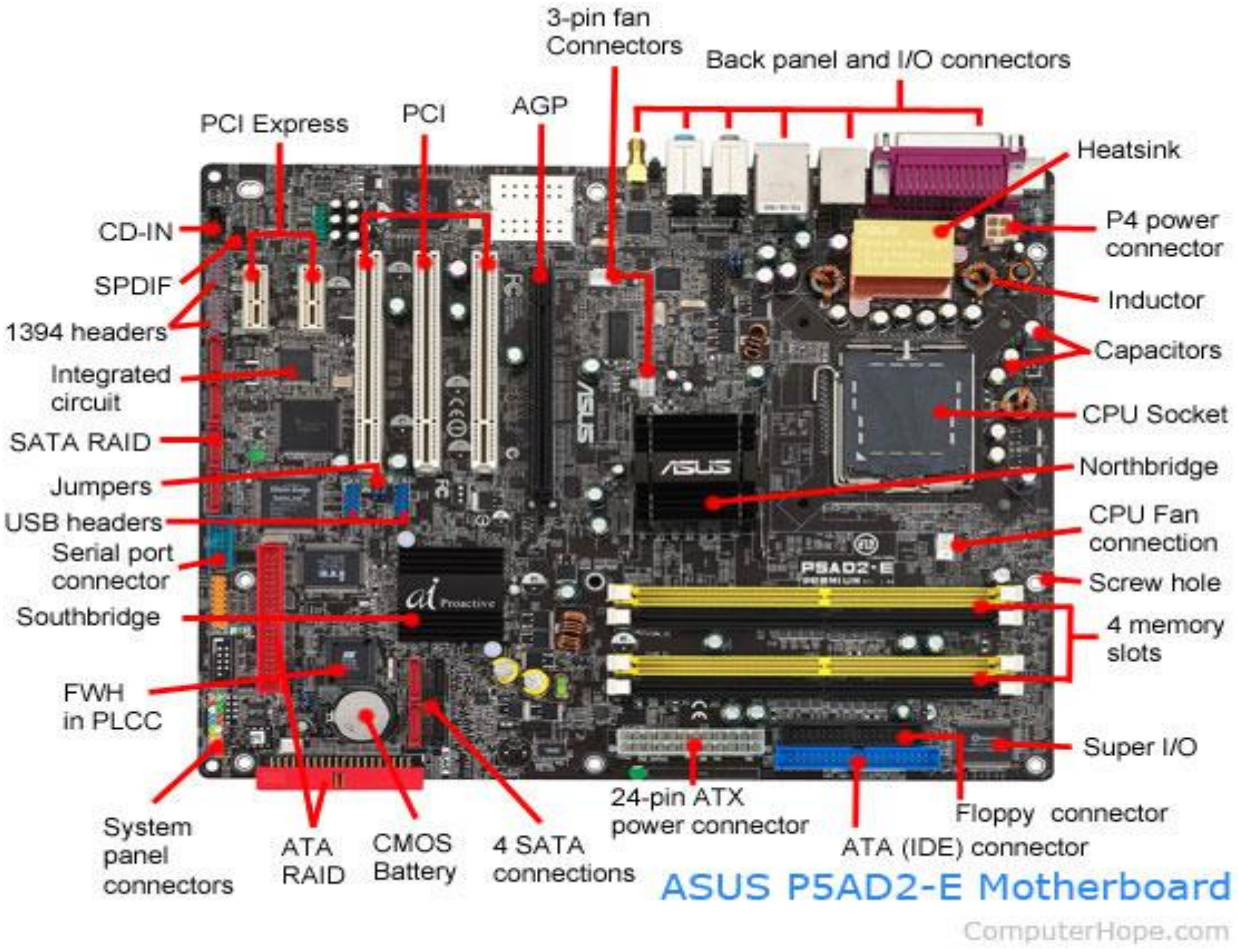

Figure14: An example of a computer motherboard

Below is the list of some popular manufacturers of the motherboard:

Intel

ASUS

AOpen

ABIT

Biostar

Gigabyte

MSI

Location of motherboard

A computer motherboard is located inside the computer case and is where most of the parts and computer peripherals connect. With tower computers, the motherboard is on the left or right side of the tower and is the biggest circuit board.

Components of motherboard

- ✓ **Expansion slots**

Alternatively known as a bus slot or expansion port, an expansion slot is a connection or port inside a computer on the motherboard or riser card. It provides an installation point for a hardware expansion card to be connected. For example, if you wanted to install a new video card in the computer, you'd purchase a video expansion card and install that card into the compatible expansion slot.

Below is a listing of expansion slots commonly found in a computer and their associated devices.
Accelerated Graphics Port (AGP): Video card.
Audio/Modem Riser (AMR): Modem, sound card.
Communications and Networking Riser (CNR): Modem, network card, sound card.
Extended Industry Standard Architecture (EISA): SCSI, network card, video card.
Industry Standard Architecture (ISA): Network card, sound card, video card.
Peripheral Component Interconnect (PCI): Network card, SCSI, sound card, video card.
PCI Express: Video card, modem, sound card, network card.
Video Electronics Standards Association (VESA): Video card.

- **Case fan:** Alternatively referred to as a system fan, a case fan is located inside a computer, attached to the front or back of its case. Case fans help bring cool air into and blow hot air out of the case. They are available in a wide variety of sizes, but 80mm, 92mm, and 120mm (12cm) with a width of 25mm are the most common.
- **USB** (Universal serial bus): USB is Universal serial bus. It is used for connection for PC. There are different devices which are used to connect with USB port such as mouse, keyboards, scanners, cameras, and even printers. USB connector is used to connect computer motherboard and a peripheral device.

- **Parallel port:** Most of old printers are used to connect by parallel port. Parallel port used more than one wire for sending or receiving multiple bits of data at once, while serial port uses only one wire. Parallel ports use a 25-pin female DB connector.
- **CPU Chip:** CPU refers to a processor, the central processing unit; also called the microprocessor performs the entire task that takes place inside a computer system. It is also known as brain of computer.
- **RAM slots:** RAM slots is for attaching RAM on it in general desktop we can see two slot of RAM but in server motherboard we can see 4+ slot of RAM.RAM comes in different size(memory).
- **Floppy controller:** In old motherboard the floppy drive connects to the computer via a 34-pin ribbon cable, one end of ribbon cable is connecting to floppy drive and other is connected to the motherboard.
- **IDE controller:** IDE that is Integrated Drive Electronics, also called as ATA or Parallel ATA (PATA).IDE controller is responsible for controlling the hard drive. Today's computers no longer come with an IDE controller.
- **CMOS Battery**: CMOS is complementary metal-oxide-semiconductor is used to store BIOS setting in computer motherboard. CMOS Battery also store date and time.
- **Power supply plug in:** The Power supply provides the necessary electrical power to make the computer system operate. The power supply takes standard 110-V AC power and converts into +/-12-Volt, +/-5-Volt, and 3.3-Volt DC power.

- Content/Topic 2 Description of drives

A drive is a computer component used to store data. It may be a static storage device or may use removable media. All drives store non-volatile data, meaning the data is not erased when the power is turned off. Over the past several decades, drives have evolved along with other computer technologies. Below is a list of different types of computer drives.

5.25-inch floppy drive - uses flexible removable media drive, stores up to 800 KB per floppy disk, popular in the 1980s

3.5-inch floppy drive - uses more rigid removable media, stores up to 1.44 MB per disk, popular in the 1990s

Optical drive - uses removable optical media such as CDs (800 MB), DVDs (4.7 - 17 GB), and Blu-ray discs (25-50 GB), available in both read-only and writable models, popular in the 2000s

Flash drive - a small, highly portable storage device that uses flash memory and connects directly to a USB port

HDD (hard disk drive) - the most common internal storage device used by computers over the past several decades, can store several terabytes (TB) of data

SSD (solid state drive) - serves the same purpose as a hard drive but contains no moving parts; uses flash memory and provides faster performance than a hard drive

- Content/Topic 3 Description of cable

Definition: a computer cable alternatively referred to as a cord, connector or plug, a cable is one or more wires covered in plastic that transmit power or data between devices or locations.

There are two main types of computer cables, a data cable and a power cable.

- ✓ **Data cable** is a cable that provides communication between devices. For example, the data cable (i.e., DVI, HDMI, or VGA) that connects your monitor to your computer allow it to display a picture on the monitor. Other popular examples of data cables include the CAT5, IDE/EIDE, SATA, and USB cables.
- ✓ **Power cable** is any cable that powers the device. For example, the power cord that connects to your computer and a Molex style cable inside the computer are both good examples of power cables.

Below, is a listing of the most common types of cables found with computers and electronics and examples of devices that use them.

- **AT** - Used with early keyboards
- **ATA** - Used with hard drives and disc drives
- **Cat 5** - Used with network cards
- **Coaxial** - Used with TV and projectors
- **Composite** - Used with TV, projectors, and consoles. Also known as RCA cables.
- **DisplayPort** - Used with computer monitors
- **DVI** - Used with monitors, projectors, and other displays
- **e-SATA** - Used with external drives
- **Fire wire** (**IEEE-1394**) - Used with digital cameras and external drives
- **HDMI** - Used with monitors, projectors, DVD/Blu-ray players, and other displays
- **MIDI** - Used with musical keyboards and other equipment
- **Mini plug** - Used with headphones, microphones, speakers
- **Molex** - Power cable used inside your computer

- **IDE/EIDE** - Used with hard drives and disc drives
- **Parallel** - Used with printers
- **PS/2** - Used with keyboards and mice
- **S-Video** - Used with projectors, digital cameras, and other displays
- **S/PDIF** - Used with DVD and surround sound.
- **SATA** - Used with hard drives and disc drives
- **SCSI** - Used with hard drives, tape drives, and disc drives
- **Serial** (**RS-232**) - Used with a mouse and Modem.
- **Thunderbolt** - Primarily used with Apple displays and devices
- **USB** - Used with keyboard, mouse, printer, MP3 players, and thousands of other devices
- **VGA/SVGA** - Used with monitors and projectors

- Content /Topic4 Installation and configuration of PC peripherals

The installation of a peripheral device is a process of getting the peripheral attached to the computer. However, with any installation there are procedures which need to be considered. Firstly, it is important to figure out when will be the most suitable time to install the device. Not only do you need to consider your own schedule, you need to realize the user's schedules, timeframes available and how you will cause the least disruption. When installing there will be a number of steps that need to be taken including attaching the device to the computer, installing drivers, customizing the device and thoroughly testing.

- ✓ **Connecting and installing device drivers to PC**

Before you start

You should already be familiar with a computer peripheral devices (eg printer, scanner), hardware components (eg monitor, keyboard, mouse), and obtaining requirements from a client/user, obtaining suitable peripherals, booting the operating system, using keyboard and mouse and accessing the Internet.

General Steps of installing computer peripherals

1 Plug in the cable between the device and the computer.

2 Power on the device.

3 Install any drivers.

4. Print the test page

5 Troubleshoot installation if necessary.

6 Customise the device settings.

7 Test the device for required performance

Let take an example of a printer and follow the steps that involves to its installation, customization, testing and use it after being successfully installed. Read the installation guide for your printer if you have it. Some printers require a particularity in their installation, and if you have an installation guide you should follow its exact instructions before referring to these general instructions.

Step1: Plug the printer into your computer. Make sure to plug it into a USB port directly on your computer, and not a USB hub.

Step2: Turn the printer on. You should hear the page feed mechanism start and the printer should light up.

Step3: Wait for your operating system to detect and install the printer. All modern versions of Windows and OS X should be able to automatically detect the printer and install the necessary drivers for you. If this is the situation jump to the **step 5 then step 7.**

Step4: Install the software that came with the printer. This will usually install any drivers that weren't installed automatically by Windows, and may install extra printing software that allow you to take advantage of additional features on your printer. Download the drivers from the manufacturer's website. If you don't have the disc and the printer wasn't installed automatically, you can download the drivers directly from the manufacturer. You will need to know your printer's model number, which should be prominent on the printer itself.

Step5: Print a test page to see whether your installation is successful or not, if yes move to the **step7** else continue with **step 6.**

Step6: Troubleshoot installation

Step7: Customize the device settings.

Step8: Test the device for required performance

- ✓ **Configure IP address of a device/Peripheral**

Let's maintain our example (printer) to learn how to configure a network peripheral.

Before using your printer in a network environment, you must configure the TCP/IP settings. In this section, you will learn the basic steps required to print over the network using the TCP/IP protocol.

We recommend that you use the installer application on the CD-ROM (printer drivers) that is provided with the printer. By using this application, you can easily connect your printer to your network and install the network software and printer driver which you need to complete the network configuration.

IP addresses, subnet masks and gateways

To use the printer in a networked TCP/IP environment, you need to configure the IP address and subnet mask. The IP address you assign to the print server must be on the same logical network as your host computers. If it is not, you must properly configure the subnet mask and the gateway address.

IP address

An IP address is a series of numbers that identifies each computer connected to a network. An IP address consists of four numbers separated by dots. Each number is between 0 and 255.

• Example: In a small network, you would normally change the final numbers.

- 192.168.1.1
- 192.168.1.2
- 192.168.1.3

How the IP address is assigned to your printer?

If you have a DHCP server in your network (typically a UNIX/Linux, Windows 2000/XP, Windows Vista, or Windows Server 2003 network) the printer will automatically obtain its IP address from the server after being connected to the network, only the requirement is to enable the DHCP mode in the printer settings.

Notes

- On smaller networks, the DHCP server may be the router.
- If a printer's IP address is not static, the IP address may eventually be changed by your DHCP server. The IP address may change after the printer has been to sleep, been powered off, or disconnected from the network. How quickly it happens depends on the lease time set in the DHCP server. If the printer's IP address changes all print queues that points to the network printer will stop working and show the printer as offline. This is a universal challenge with network connected printers referenced by IP address. Best practice is to either

  1) Reserve the printer's IP address in your DHCP server, or

  2) If your network can resolve the printer's hostname, then enter the hostname, and not the IP address, when you add the printer.

Steps to assign a Static IP Address to the printer at the Control Panel

1. Press the **Home** button.
2. Touch **Device > Connectivity > Ethernet > IPv4**.
3. To Enable IPv4, select the toggle button.
4. Touch **Mode**, then touch **Static**. The previous settings will be erased.
5. Touch **Continue**.

6. Touch the **IPv4 Address** field.
7. Using the keypad, enter the address as **X.X.X.X**, where X is a number from 0-255, then touch **Enter**.
8. Touch the **Subnet Mask** field.
9. Using the keypad, enter the address as **X.X.X.X**, where X is a number from 0-255, then touch **Enter**.
10. Touch the **Gateway Address** field.
11. Using the keypad, enter the address as **X.X.X.X**, where X is a number from 0-255, then touch **Enter**.
12. Touch **Restart**.
13. Two minutes after the printer restarts, to verify the new settings, print a Configuration Report.

✓ **Customize device settings**

Settings customization is a process by which the default settings of a device are changed to meet with the user requirements. A user may want to change the Device Settings according to system requirement or his/her own because some applications and devices do not support or match the operating system. So Device Setting is used to run those applications which are not supporting the default settings of devices.

LO 2.3 – Test PC peripherals

- Content/Topic 1 Hardware testing Methods, Techniques and Factors impacting PC peripherals function

Methods of testing a device

Hardware Testing is a method to check whether the actual hardware device matches expected requirements and to ensure that is Defect free. There are two types of testing method which are Black-box testing and White-box testing.

✓ **Black-box testing** is usually described as focusing on testing functional requirements, these requirements being defined in an explicit specification. It treats the item being tested as a "black-box," with no examination being made of the internal structure or workings of the item. Rather, the nature of black-box testing is to develop and utilize detailed scenarios, or test cases. These test cases include specific sets of input to be applied to the item being tested. The output produced by the given input is then compared to a previously defined set of expected results.

✓ **White-box testing** allows one to peek inside the "box", and focuses specifically on using knowledge of the internals of the item being tested to guide the testing procedure and the selection of test data.

Some comparisons:

- Black-box testing is more generic. The tests can be designed directly from the specifications, and are applicable to all candidate items within the scope of the tests. White-box testing, by its very nature, must be customized to the items tested.
- Black-box testing is, in a sense, more unbiased because the test designer and the operational tester are independent of each other.
- The black-box tester does not need knowledge of any specific hardware design or programming language.
- Black-box operational testing can be performed relatively quickly. Frequently, it can even be automated. White-box testing is generally more tedious.
- On the other hand, black-box tests are notoriously difficult and labor intensive to design.
- Black-box testing of every possible collection of input is unrealistic.
- White-box testing can go into a greater level of detail than black-box testing, and thus is often more suitable for individual components of a system.
- Black-box testing is usually more suitable for testing integrated systems.
- White-box testing can discover extra non-specified functions that black-box testing wouldn't know to look for. Such extras can only be discovered by inspecting the internals.

Techniques of testing a device

There are two testing technique as defined in the following:

- ✓ **Comparison testing**

Comparison testing is all about assessing the strengths and weaknesses of a hardware device with respect to other device of the same category existing in the market. The goal of comparison testing is to provide pivotal and critical information to the business to unravel the device's competitive advantage in the market.

- ✓ **Model based testing**

Model based testing is a testing technique where run time behavior of a device under test is checked against predictions made by a manufacturer. A model is a description of a device's behavior. Behavior can be described in terms of input/output, processing time and flow of data from input to output.

- ✓ **Factors impacting PC peripheries function**

You may be wondering why your computer peripheral is slow at times and there are other times when it is fast in processing. This could be caused by a number of factors. They include: the speed of the CPU, the

space on the hard disk, the size of the RAM, the type of the graphics card of the computer that your peripheral is attached to, as well as it could be caused by the peripheral its self. This is in terms of its processing chip set, memory and graphic card.

- Content/Topic 2 Identification of Common useful hardware tools and their uses

Computers are a necessity everywhere; from homes to offices, schools, colleges, hospitals, banks, railway stations, etc., computers have become an indispensable part of all spheres of our lives. There are a several number of hand tools available in the market and online today. Hand tools enable you to perform manual jobs quickly and efficiently. Choosing the right set of hand tools for your computer repair kit is crucial to getting you through a large number of hardware malfunctions very easily and swiftly.

Hire below are the common useful hardware hand tools and their uses:

Phillips Screwdriver (Non-Magnetic)

This tool is probably the most important to have. Pretty much all computer parts are fastened to the computer through some form of a screw. It's important that the screwdriver not have a magnetic tip. Having a magnetized object inside of the computer case can damage some circuits or drives. It's not likely, but best not to take the chance.

Hex Driver

Not many people have seen these outside of a computer toolkit. A hex driver looks like a screwdriver except it has a head like a socket wrench. You can find two typical sizes of hex screws inside computers: 3/16" and 1/4". The 3/16" one is more common. The smaller hex driver usually installs the brass screw standoffs inside of the case that the motherboard resides on.

Tweezers

The most frustrating aspect of building a computer is dropping a screw inside the case, especially if it rolls into the tightest corner so you can't reach it. Tweezers are helpful when working in tight spots or for retrieving that lost screw inside of a computer case.

Lint-Free Cloth

Lint and dust can cause lots of problems inside of computers. In particular, they build up inside the case and deposit on fans and air slots. These contaminants will directly impact the flow of air inside the computer and can lead to overheating and failure of components.

Grounding Strap

Static electricity can cause severe damage to electrical components due to the short, high-voltage burst of a discharge. The easiest way to deal with this risk is to use a grounding strap. This tool is generally a strap

with a metal contact fixed to a wire that you clip to an external metal part to help discharge any static charge that may build up on your body.

Canned Air/Vacuum

Again, dust is a major problem for computer systems over time. If this dust gets bad enough, it can cause overheating and potential part failures. Most computer stores sell cans of compressed air that are useful for blowing dust out of parts like a power supply but a vacuum is very best as it pulls the dust off the components and out of the environment.

- Content /Topic3 Familiarization with basic computer copyright laws and security issues

What is copyright?

Copyright is a form of protection granted by law for original works of authorship fixed in a tangible medium of expression. Copyright covers both published and unpublished works.

What does copyright protect?

Copyright, a form of intellectual property law, protects original works of authorship including literary, dramatic, musical, and artistic works, such as poetry, novels, movies, songs, computer software, and architecture. Copyright does not protect facts, ideas, systems, or methods of operation, although it may protect the way these things are expressed.

How is a copyright different from a patent or a trademark?

Copyright protects original works of authorship, while a patent protects inventions or discoveries. Ideas and discoveries are not protected by the copyright law, although the way in which they are expressed may be. A trademark protects words, phrases, symbols, or designs identifying the source of the goods or services of one party and distinguishing them from those of others.

Intellectual Property

Intellectual Property is “a work or invention that is the result of creativity, such as a manuscript or a design, to which one has rights and for which one may apply for a patent, copyright, trademark, etc.”

In hardware, Intellectual Property Cores defines chips, integrated circuits, and other designs owned by a company, designer, or manufacturer. IP Cores can be licensed and used by others, similar to how software is licensed and used. The licensing of an IP Core allows companies and designers to profit from their designs without having to worry about their designs being stolen. And for the users licensing the IPs, this helps them skip steps of having to reinvent the wheel every time they want to make something new.

Computer copyright laws

A Copyright is a protection for any published work that helps to prevent that work from being used without prior authorization. A Copyright may be indicated by the word "Copyright," or a C surrounded by a circle (©). The Copyright might also be followed by the published date and the author of the work.

When work is copyrighted, it may not be reproduced in any fashion unless the owner of the work grants proper rights. Computer Hope is not meant for legal representation, and how a Copyright is interpreted could vary. If you have additional questions or concerns about legalities, consult a legal consultant or attorney.

Computer security issues

A computer security risk is really anything on your computer that may damage or steal your data or allow someone else to access your computer, without your knowledge or consent. There are a lot of different things that can create a computer risk, including malware, a general term used to describe many types of bad software. We commonly think of computer viruses, but, there are several types of bad software that can create a computer security risk, including viruses, worms, ransom-ware, spyware, and Trojan horses. Misconfiguration of computer products as well as unsafe computing habits also pose risks

Learning Unit 3 – Document the work done

LO 3.1 – Documentation of the review process

- Content/Topic 1 Description of PC peripherals before and problem found

  ✓ **Status of PC peripherals**

Before starting a repair of computer peripheral device a technician must document the status of the device upon he/she arrived. It is this document that elaborates in which status the device was before and the problem found. This documentation is then used as a reference after the repair for verifying that whether the problem has been solved persisting.

A technician must document all repairs process and peripheral problems. The documentation can then be used as a reference for future problems or for other technicians who may not have encountered the problem before. The documents can be paper based, but electronic forms are preferred because they can be easily searched for specific problems. It is important that a technician document all services and repairs. The documentation can then be used as reference material for similar problems that are encountered in the future. Good customer service includes providing the customer with a detailed description of the problem and the solution.

  ✓ **Problem finding**

Before you start trying to troubleshoot any issue, you want to have a clear understanding of what the problem is, how it came up, who it's affecting, and how long it's been going on.
By gathering the right information and clarifying the problem, you'll have a much better chance of resolving the issue quickly, without wasting time trying unnecessary fixes.
On this level, you have to suggest the solutions to the problem found by explaining clearly the task to be accomplished regarding to the devices, equipment, and materials to be used.

- Content/Topic 2 Reviewing user manual and previous report

A user guide, also commonly called a technical communication document or manual, is intended to give assistance to people using a particular system. It is usually written by a technical writer, although user guides are written by programmers, product or project managers, or other technical staff, particularly in smaller companies.

User guides are most commonly associated with electronic goods, computer hardware and software, although they can be written for any product. Most user guides contain both a written guide and associated images. In the case of computer applications, it is usual to include screenshots of the human-machine interface(s), and hardware manuals often include clear, simplified diagrams. The language used is matched to the intended audience, with jargon kept to a minimum or explained thoroughly.

Personal reference tools include troubleshooting guides, user manuals, quick reference guides, and repair journals. In addition to an invoice, a technician keeps a journal of upgrades and repairs.

Benefit from a reviewing a user manual

User manual provides important information on 'how to use a product' to end-users. With proper use of a device there is much less risk of bringing the device out-of-order unintentionally, thus leading to lower RMA rates and significantly less expenses related to it. However, this is not the only benefit, though probably the biggest.

Other positive aspects of correctly written manual are: **Limiting legal liability related to misuse of a product**. This is important to products, which can cause serious injuries or death, when used improperly. Technical areas which come to mind first – high voltage devices, lasers or other intensive light sources, heat and fire generating devices, various mechanical tools, etc. Placing appropriate tags within a manual warn the end-user and protect the manufacturer from serious legal consequences. In addition to that, warning stickers shall be applied in clearly visible places on the product, especially next to openings enclosure openers and interlocks.

- Content /Topic3 Suggestion of solution on problem found and solution implementation

✓ **Suggestion of solution on problem found**

After completing a full diagnostic of a device and clear identification of problem, a technician must make suggestion of solution according to the problem found during the diagnostic. This suggestion should contain also the list of requirements and spare parts to be used to implement the solution.

✓ **Description of Solution implementation**

Implementation is the culmination of all your work in solving a problem and requires careful attention to detail. It is the last step in the problem-solving process is to execute (or implement) your solution.

There are three basic stages involved:

Planning and preparing to implement the solution

Implementing and monitoring the action

Reviewing and analyzing the success of the action.

Organizations demand reliable device maintenance support services that help to get their job done, this involves:

- Being committed to a solution.
- Accepting responsibility for the decision.
- Identifying who will implement the solution.
- Resolving to carry out the chosen solution.
- Exploring the best possible means of implementing the solution.

LO 3.2 – Reporting the procedures of the task accomplished are in place and used

- Content/Topic 1: Procedures and Effective report of the task accomplished

✓ **Procedures of the task accomplished**

Procedure is a sequence of steps that include preparation, conduct and completion of a task. Each step can be a sequence of activities and each activity a sequence of actions.

Procedures are needed when you have to perform the complex task or when the task is routine and you want it to be performed consistently. Procedures are driven by completion of the task; it includes:

- Meet with the teams responsible for the procedure
- Start with a short introduction
- Make a list of required resources
- Document the current procedure
- Add supporting media
- Include any relevant resources
- Check the procedure is accurate
- Test in a controlled environment
- Make improvements if necessary
- Deploy

✓ **Effective report of the task accomplished**

The documentation in the journal includes descriptions of the problem, possible solutions that have been attempted, and the steps taken to repair the problem. Note any configuration changes made to the equipment and any replacement parts used in the repair. This documentation is valuable when you encounter similar situations in the future.

- **Notes:** Make notes as you go through the troubleshooting and repair process. Refer to these notes to avoid repeating previous steps and to determine what steps to take next.
- **Journal:** Document the upgrades and repairs that you perform. Include descriptions of the problem, possible solutions that have been tried to correct the problem, and the steps taken to repair the problem. Note any configuration changes made to the equipment and any replacement parts used in the repair. Your journal, along with your notes, can be valuable when you encounter similar situations in the future.
- **History of repairs:** Make a detailed list of problems and repairs, including the date, replacement parts, and customer information. The history allows a technician to determine what work has been performed on a specific device in the past.

LO 3.3 – Write the technical journal and recommendation

Technical journal and recommendation report

After your work, you have to describe current device status by showing clearly the problems solved with more explanation, and give recommendation for further usage. The following is an example of the report forms that summarizing the status of device before and after the work a repair technician.

WORK REPORT OF A TECHNICIAN

Company/Technician Address	
Company /Technician Name:	
Website /Email address:	
PO BOX :	
Office /Mobile Phone Contact :	
Company/Technician office Location:	
Customer Address	
Customer Name:	
Website /Email address	
PO BOX :	
Office /Mobile Phone Contact :	
Customer office Location:	
Status Before Work:	
User manual and previous report:	

Problems found :	
Solution and Implementation:	
Procedures of the task accomplished:	
Spare part, equipment and materials used:	
Status After Work:	
Observations /Recommendations:	
Customer Verification	
Names:	
Signature /stamp Date:	
Company /Technician Verification	
Name:	
Signature/stamp Date:	

When it comes to the writing of a technical journal and recommendation report, the format is very important because it is unique from other reports in that it carries technical information. A technical journal and recommendation report contains technical information which should be planned well. You need to understand all the structure to achieve your objective. It should contain the following:

The title page

The title page comes first when you write your technical journal report. The title page contains the title of the journal report the date and the institution details. This first page is also referred to as the cover page. The title is a separate entity when it comes to word count, so you should not include it on your word count.

Introduction

In the introduction, you are supposed to highlight the main aims of the journal report to the reader. Let the reader understand the purpose of you writing. You can also comment on the flow of the journal report so that the reader can know what to expect. You should avoid copying the introduction given in the lab hand out and instead come up with your own.

Experimental details

This is the part that you need to state every detail of the experiment starting from the equipment that you used to the procedure for the test. This section can be omitted if the report did not involve an experiment at all.

Results and discussions

This is where you are expected to explain the results that you obtained from your experiments. You should give a clear explanation so that the reader cannot ask themselves any question on your results.

The body

The body is the most important part of your journal report because it carries your content. You should introduce small subheadings in your journal report as per the point being put across. This will make your work look more presentable as the reader will be guided with this subheading what point you are talking about.

You can also place your points in number form or list so that it becomes easier for your reader to understand what you are talking about. You should also separate your points to avoid bringing confusion in your work; each point should be under its subtopic.

Conclusions

When it comes to the writing of your conclusion what you need to do is write a summary of the main points in the body of your report and wrap it up. In conclusion, you also need to use words that suggest you are concluding your work to prepare the reader psychologically, that you are about to finish. Remember also that the conclusion should be short and precise avoid a lot of stories in your concluding paragraph, spare all the stories for the body of your report.

Recommendations

The recommendation usually comes after the conclusion. In the recommendation, you are supposed to suggest solutions to the challenges that are there in the body. This is where your opinion is welcomed.

Reference

In the reference, you need to list all the materials that you used in your research. You may have quoted some text somewhere, so it is at this point that you need to list it so that it does not become a plagiarized work. When you write the reference, you acknowledge that the content that you used is from a certain source.

Appendices

You may have used other materials to put across your points in the journal report such as graphs or diagrams but are not necessarily required in the report. This is the place where you should mention them.

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