TOPIC 5: COMPUTER HARDWARE

Define the term "Computer Hardware"
Computer hardware refers to the physical/tangible components or parts of the computer. They can be physically seen and touched.

Explain the following categories of computer hardware components.
(a) **Input devices:** *These are computer components that are used to enter/insert data, instructions and commands into the computer. E.g Keyboard, Mouse, Joystick etc.*
(b) **Processing Devices**:*These are hardware devices that transform,convert, manipulate, and interpret data, instructions and commands entered into the computer to meaningful information/output.*
(c) **Storage devices:** *These are devices that hold /store data and information temporarily or permanently in the computer.*
(d) **Output devices.** *These are devices that are used to convey/display information to the user.*
(e) **Communication devices.** *These are devices that are used in transmission of data and information from one computer to another.*
(f) **Peripheral devices.** *These are devices that are connected to the computer externally on the computer and if removed the computer continues to work. E.g Flash disks, External hard disk.*

Explain the importance of the following input devices as used in data input in the computer.
Mouse:*This is an input pointing device that used to control the movement of the mouse pointer on the computer screen.*

Describe a computer keyboard
This is a primary text input device

List down any three advantages of using a computer keyboard
- *Enables fast entry of new text into a document*
- *Well tried technology and well known method of entry*
- *Most people find them easy to use*
- *Easy to do verification check as data is entered, as it appears on the screen simultaneously*

Give any two disadvantages of using a computer keyboard.
- *Users with limited arm/wrist use can find keyboards hard to use*
- *Entering data is slow when compared to direct data entry (e.g. Optical mark recognition)*
- *They use up desk space as they are quite large*

Mentiontwofunctionsofamouse.
- *Movethe cursoron the GUI.*
- *Manipulatea computergame.*
- *Drawobjectslikearectangle.*
- *Usedto controlmusicplayersby clicking.*
- *Usedto scrollthe page.*

Suggest three advantages of using a computer mouse.
- *Faster to select an option by a mouse than a keyboard*
- *Enables rapid navigation through applications and the internet*
- *Mice are small and don't take much area*

Explain three disadvantages of using a computer mouse.
- *People with restricted hand/wrist movement can find it hard to operate a mouse*
- *Easily damaged and can easily be clogged up with dirt*
- *They are hard to use if there is no flat surface available*

Briefly describe the following input devices

*A **trackball** is a stationary pointing device with a ball mechanism on its top.*
Joystick
*A **joystick** is a pointing device with a vertical lever mounted on a base to control the position of the cursor.*
Light pen
A light pen is a handheld pen like pointing device that has a light sensitive point to select options on the screen.
Touch screen
A touch screen is an input device that permits the entering or selecting of commands and data by touching the surface of a sensitized video display device with a finger or a pointer.
Touch pad
A touch pad is a small flat rectangular pointing device that is sensitive to pressure and motion.
Stylus and a digital pen
Looks like a ballpoint pen, but uses pressure to write textand draw lines

Explain any five image input devices that you know
- *A **bar code reader**, is an optical reader that uses laser beams to read bar codes that are printed on items usually in super markets*
- *Image scanneris a device that optically converts images, printed text, handwriting, or an object, and converts it to electronic/digital form. Or reads and input text or graphics from hard copies (printed) into electronic format.*
- *A **digital camera** is an image input device that takes video or still photographs, or both, and recordsthem on a light-sensitive sensor.*

List any three popular types of scanners that you know.
- *A **flatbed scanner** works like a copy machine except that it creates a file of the document rather than a paper copy.*
- *A **sheet feed scanner** has motorized rollers that can feed the source document across the scanning head during the scanning process.*
- *A **handheld scanner** can be manually passed over the image to be scanned.*

What are the advantages of a digital camera over a traditional film camera?
- *Ability to store images on media*
- *Ability to edit images*
- *Faster at taking images*
- *Images can be sent to other devices via a network*

Give the disadvantages of using digital Cameras.
- *The camera user needs to be computer literate to use the camera properly*
- *There is some artistry lost since clever software corrects errors in the photographs*
- *The resolution is not yet as good as traditional cameras*
- *Images often need to be compressed to reduce the amount of memory used*
- *It is possible to fill up computer memory very quickly with several photos of the same subject(in order to find the perfect snap shot)*

List any three input devices.

- *Mouse*
- *Keyboard*

- *Scanner*
- *Joystick*
- *Digital cameras*
- *Track ball*

Give the function of any two devices listed in (a) above

- **Keyboard.***To enter data by texting text*
- **Mouse.** *For controlling a pointer/cursor on the screen*
- **Scanner .***Capturing data from an object and converting it into digital format.*
- ***Joystict.** It purposely used for playing computer games*
- **Digital camera.***Capture images and store them in digital format.*

List the advantages of LCD over CRT monitors.

- *LCD monitors require less than one-third the power of a CRT.*
- *LCD monitors take up less desk space than traditional CRT monitors.*
- *Radiation emitted by LCD monitors is neglectable that CRTs.*
- *They have a narrow viewing angle compared to CRT monitors.*
- *They have a higher refresh rate compared to CRT monitors.*
- *They have a higher and colour rich resolution than CRTs.*

Give the advantages of CRT over LCD monitors.
- *Produce higher quality images than LCDmonitors*
- *Angle of viewing is better than a LCD monitors*
- *They work with light pens in CAD and CAM applications (Computer Aided Design/Manufacturing*)

State the factors to consider before buying a monitor.

- *Size*
- *Resolution*
- *Aspect Ratio*
- *Backlighting*
- *Twisted Nematic (TN) or In-plane switching (IPS)*
- *Video input*
- *Ergonomic flexibility*
- *Needs of the organization.*

Mentionanytwopracticalusesof the lightemittingdiode
- *Showswhetherthe deviceis ready.*
- *Showswhetherthe deviceisidle.*
- *Showswhetherthe deviceison.*
- *Showswhetherthereisaprobleme.g. paperjam.*
- *Showswhetherthe printertrayhasrunoutofpaper*

Define the term Printer.
This is an output device that produces text and graphics on a physical medium such as a paper.

Differentiate between impact and Non-Impact Printers
- ***Impact printers** are those types of printers that forms characters and graphics on a piece of paper by striking a mechanism against an ink ribbon that physically contacts the paper. While*

- ***Non-Impact Printers*** *forms characters and graphics on a piece of paper without actually striking the paper like through use of light and laser.*

State two features of impact printers.

- *They create the characters by striking the paper*
- *They print on most types of paper*
- *Multiple (carbon) copies may be printed at once*
- *They tend to be considerably noisy*
- *They are relatively slow*
- *They do not print transparencies*

List the examples of Impact Printers that you know.

- *Dot-matrix Printers*
- *Line Printers*
- *Daisy-Wheel printers*
- *Ball printers*
- *Braille Printers*
- *Drum printer*

State the characteristics of Non-Impact Printers
- *Produce very high-quality hard copy output*
- *Print rate per page is fast if a large number of pages are being printed*
- *Rely on large buffer memories – the data for the whole document is stored before pages can be printed out*

Give the advantages of Laser Printers that you know

- *Printing is fast for high volumes, slightly faster than inkjet if only a few pages are to be printed*
- *Can handle very large print jobs*
- *Quality is consistently high*
- *Toner cartridges last for a long time; laser printers can be a cost effective option if colour outputs are not required*

List the examples of Non-Impact Printers that you know
- *Laser Jet printers*
- *Ink Jet Printers*
- *Desk jet printers*
- *Thermal printers*
- *Plotters*

Give two factors to consider before buying a printer.
- *Printing speed*
- *Print quality*
- *Supported operating systems*
- *Ease of use*
- *Flexible paper handling*
- *Interface connections*

- *Energy savings*
- *Economical printing*
- *Supplies management*
- *Accessibility of the printer and other accessories.*

What is a printer driver?
Is a computer program that is used to configure or attach a printer in order to work with a computer.

State the difference between a hardcopy and a softcopy.
Hardcopy refers to the page of work printed on paper or any other printing medium,
while; Softcopy refers to a page of work displayed on a computer's screen.

State two devices that can be used as both input and output.
- *An all in one printer.*
- *Digital camera.*
- *Smartboard.*
- *Touchscreen.*

Use the following words to fill in the table below.
Light Emitting Diode, LCD, Speakers, Relay Switches and Motors, Printers
(a). *A **Light Emitting Diode** indicates that a device is available, ready, e.t.c.*
*(b). A **speakers** produced analogue impulses from speeches, music, e.t.c.*
(c). **Printers** can be used to produce a hard copy.
*(d). **Relay Switches and Motors** are used in garages to accurately spray car body Shells.*
(e). **LCD** provide a display using a wide viewing angle

Give the difference between Primary and secondary devices
Primary storage devices *hold /store data and information temporarily for during processing by the CPU. While*
Secondary storage devices *refer to the devices that store data, information and instructions permanently for future use in the computer.*

Give two differences between RAM and ROM.
- *Content in RAM is temporary, while, contents in ROM are permanent.*
- *RAM is used to store files and programs currently the computer is working with, while, ROM stores its content for good.*
- *RAM is volatile and ROM is non-volatile.*
- *RAM can be discussed when buying a computer, while, ROM is not mentioned at all.*
- *The amount of RAM can influence speed and performance of a computer, while, ROM has no relationship with the computers' speed.*
- *System requirements always emphasise and mention the amount of RAM the system should have as minimum for the proper performance of a software or hardware, while, ROM is not mentioned anywhere under the system requirements.*

Give two advantages of using secondary storage to a computer user.

- *They store large amounts of data.*
- *They are used to transfer data from one computer to another.*
- *They are used to store data for future use.*
- *They key computer files needed for the system to work.*
- *They are cheaper per unit storage capacity.*

State two devices that use magnetic storage technology.

- *Magnetic tapes.*
- *Hard disk.*
- *Floppy diskette.*
- *Jazz disc.*
- *LS200*

Differentiate between backing-up and back up.

Backing-up is *the process of making copies of data or data files to use in the event the original data or files are lost or destroyed. It also involves keeping the duplicated files on another storage medium. While*

Back-up *refers to the duplicate/copied data or files from the original file and always stored on a different storage media*

Give reasons why one would want to back--up his/her data?

- *Data could be lost due to failure of the original storage device, hardware failure*
- *Hackers may corrupt or even cause you to lose the data completely*
- *Viruses: usually caused by hackers to delete and destroy your data in a storage device*
- *Might need backup if files need to be used elsewhere – original files are then protected against possible corruption or loss*

Name the three categories of backing storage media.

- *Optical storage*
- *Magnetic storage*
- *Solid State storage*

Mention four uses of a fixed hard disk.

- *Used to store operating systems and working data*
- *Used for storing application software*
- *Real time systems and online systems use fixed hard drives*
- *Used in file servers for computer networks*

What is meant by magnetic data storage devices?

These are devices that store data, instructions, files and information using a magnetized medium

Give the examples of Magnetic data storage media.

- *Magnetic tape*
- *Hard disk drive*
- *Floppy Disks.*
- *Audio Cassettes*
- *Video cassettes.*

What are Optical Data Storage Devices

These are storage devices in which data is written and read with a laser for archival or back-up process.

Mention the examples of Optical Data Storage Devices.

- *Compact Disk-Read Only Memory.(650-800MB)*
- *Digital Versatile Disk-Read Only Memory.(4.7GB)*
- *Blu-Ray Disks(25-50GBs)*
- *Compact Disk-Recordable(CD-R) and Digital Versatile Disk-Recordable(DVD-R)*
- *Compact Disc-Rewritable(CD-RW) and Digital Versatile Disc-Rewritable(DVD-RW)*
- *Digital Versatile Disc-Random Access Memory.*

What are solid State Storage Devices?

These are devices that store data and information by use of non-moving flash memory technology.

Outline the examples of solid-state storage devices that you know.

- *Solid state hard drives*
- *Memory stick/ Pen drive*

- *Flash Memory cards*
- *Flash disks*
- *Micro-Memory cards.*

Under what circumstance may a user opt for a compact disk for data storage?
- *When one wants to keep a copy permanently.*
- *When one wants to keep a portable copy of the work.*
- *When one wants to keep a lot of work in one location.*
- *When one wants to keep data for distribution e.g. software, e.t.*

Mention any two devices that can be used to transfer data from one laptop to another

- *External hard disk.*
- *Flash disk.*
- *Memory cards.*
- *Compact disk.*
- *Digital versatile disk.*
- *Blu-ray disk.*
- *Magnetic tapes.*
- *Floppy diskettes.*
- *Blue tooth*

Define the system unit.
This is the enclosure that contains the main components of the computer. It is also referred to as the a computer case/chassis or tower.
Mention the functions of the system unit.
- *To hold all other computer components together.*
- *To protect the sensitive electronic internal components of the computer.*
- *To allow upgrades of hardware peripheral devices.*
- *It gives the physical appearance of the computer.*

List the examples of hardware devices enclosed in the system unit.
- *Central processing unit*
- *Microprocessors chips*
- *Motherboard*
- *Internal hard disks*
- *Random Access Memory chips*
- *Read Only Memory chips*
- *Expansion Slots*
- *Video card Adapters*
- *Network Interface Cards.*
- *Power supply.*
- *Cooling fans*
- *Connectors*
- *Optical drives.*

Define the Power supply Unit of the computer.
This is an electronic device of the computer that converts alternating current (AC) to direct current (DC) and supplies electronic current to all parts of the computer.

Mention two main functions of the power supply unit to the computer.
- *It converts alternating current (AC) to direct current (DC).*
- *It supplies electric current to all other computer components of the computer.*

Define the term motherboard?

A piece of silicon or semiconducting material onto which integrated circuits or other electric components are embedded/printed/fixed.

A circuit board found inside the system unit that holds a number of electronic components attached to the computer.

Identify the components housed on the motherboard

- *Microprocessor*
- *BIOS chip*
- *Display adapters*
- *NIC*
- *Heat sink*

- *Built in VGA*
- *AGP and PCI expansion slots*
- *CMOS battery*
- *Buses*
- *Transistors*

Describe the meaning of the term Central Processing Unit (CPU)?
It is sometimes referred to as the brain of the computer. This is a piece of computer hardware that carries out interpretation, manipulation /processing of data into information. It performs the basic arithmetical, logical, input and output operation of the computer.

Explain the meaning of the following parts of the system unit.
  (a) **Control Unit.**
      It directs and coordinates most of the operations in the computer.
  (b) **Arithmetic and Logical Unit.**
  It performs the arithmetic, comparison, and logical operations. Arithmetic operations include addition, subtraction, multiplication, and division
  (c)Registers.
  Arehigh-speedtemporarystoragelocationsusedto holddataandinstructions.

Describe the four processes of the machine cycle of the Central Processing unit.
  (a) **Fetching**
      This is the process of getting an instruction from the memory to execute it. This process is done by the control unit.
  (b) **Decoding**
      This process of interpreting/translating the instruction into commands the computer can understand and execute.
  (c) **Executing**
      This is the process of carrying out the commands.
  (d) **Storing**
      This is the process of holding the instruction either on the register or memory.

Explain the types of Registers found in the Central Processing Unit.
  (a) **Memory Address Register (MAR):**
      This register holds the address of memory where CPU wants to read or write data. When CPU wants to store some data in the memory or reads the data from the memory, it places the address of the required memory location in the MAR.
  (b) **Memory Buffer Register (MBR):**
      This register holds the contents of data or instruction read from, or written in memory. The contents of instruction placed in this register are transferred to the Instruction Register, while the contents of data are transferred to the accumulator or I/O register.In other words you can

say that this register is used to store data/instruction coming from the memory or going to the memory.

(c) **I/O Address Register (I/O AR):I/O** *Address register is used to specify the address of a particular I/O device*

(d) **I/O Buffer Register (I/O I3R)**
I/O Buffer Register is used for exchanging data between the I/O module and the processor

(e) **Program Counter (PC)**
Program Counter register is also known as Instruction Pointer Register. This register is used to store the address of the next instruction to be fetched for execution. When the instruction is fetched, the value of IP is incremented. Thus this register always points or holds the address of next instruction to be fetched.

(f) **Instruction Register (IR):**
Once an instruction is fetched from main memory, it is stored in the Instruction Register. The control unit takes instruction from this register, decodes and executes it by sending signals to the appropriate component of computer to carry out the task.

(g) **Accumulator Register:**
The accumulator register is located inside the ALU, It is used during arithmetic & logical operations of ALU. The control unit stores data values fetched from main memory in the accumulator for arithmetic or logical operation. This register holds the initial data to be operated upon, the intermediate results, and the final result of operation. The final result is transferred to main memory through MBR.

(h) **Stack Control Register:**
A stack represents a set of memory blocks; the data is stored in and retrieved from these blocks in an order, i.e. First In and Last Out (FILO). The Stack Control Register is used to manage the stacks in memory. The size of this register is 2 or 4 bytes.

(i) **Flag Register:**
The Flag register is used to indicate occurrence of a certain condition during an operation of the CPU. It is a special purpose register with size one byte or two bytes. Each bit of the flag register constitutes a flag (or alarm), such that the bit value indicates if a specified condition was encountered while executing an instruction

Define the term data processing.?
Data processing *is the process of converting, manipulating, of data into meaningful information in the computer.*

What is meant by a bus?
Bus: *A communication system/highway/shared flow/path through which data/information/instructions travels to and from different parts of a computer*

State the difference between an address bus and a data bus.
An address bus *consists of all the signals necessary to define any of the possible memory address locations within the central processing unit,* ***while***
A Data Bus *sometimes referred to as memory bus, the data bus is used to transfer instructions from memory to the CPU for execution. It carries data (operands) to and from the CPU and memory as required by instruction translation.*

Mention one component that can be replaced or upgraded to improve the general performance of the CPU.

- *RAM.*
- *Video cards.*
- Harddrive.

State the difference between system and peripheral devices.

System devices are computer devices found and located inside a computer's system unit.**while;**

Peripheral devices are computer components that are connected to a computer's system unit e.g. a printer.

Describe the following ICT terms

(a) System unit:*Is an enclosure that contains most of the computer components*
Is a casing or box that houses the internal electronic components.

(b) Ram chip: *A primary data storage device which allows data to be accessed at a high speed in any order.A working memory of a computer which stores data temporarily.*

(c) Power supply:*A device that supplies the required amount of power to all components of a computer. It is a computer hardware that converts AC to DC for computer use*

(d). Peripheral devices:*Electronic equipment or devices connected from outside the computer and even if removed the computer continues to work. Components that are attached or removed to increase computer efficiency.*

List examples of microprocessors that you know.

Intel Microprocessors

- *Pentium Pro*
- *Pentium II*
- *Celeron*
- *Dual Core Xeon LV*
- *Intel Pentium Dual Core*
- *Intel Pentium 2 Duo Core*
- *Core 2 Quad*
- *Pentium Dual Core*
- *Pentium III*
- *I Core III, V, VII*

AMD Microprocessors

- *AMD Sempron*
- *AMD Athlon*
- *AMD Athlon 64*
- *AMD Athlon X2*
- *AMD Athlon XP*
- *AMD Duron*
- *AMD Turion*
- *AMD Opteron*
- *AMD Phenom*
- *AMD Duo Core*