SANKAT MOCHAN DE. RA. MA. VI.

Janakpurdham - 4

1st Terminal Examination Question Solution 2079

Faculty: **Science**	Class: **I. Sc./I. Com XI**	F.M.: **75**
Subject: **Computer**	Time: **3:00 Hrs.**	P.M.: **27**

Candidates are required to give their answers in their own words as far as practicable.

Group – A (7.5x4=30)

1. What is computer? Describe about the characteristics of Computer.

A computer can be more accurately defined as an electronic device that takes data as input, stores and processes it and displays the output according to either the given instructions or the instructions stored in their memory unit.

The physical parts that make up a computer (the central processing unit, input, output, and memory) are called hardware. Programs that tell a computer what to do are called software. A set of instructions that perform a particular task is called a program, software program, or software. Peripherals are any hardware device connected to a computer, any part of the computer outside the CPU and working memory. Some examples of peripherals are keyboards, the mouse, monitors, printers, scanners, disk and tape drives, microphones, speakers, joysticks, plotters, and cameras. Computer is an advanced electronic device that takes raw data as input from the user and processes these data under the control of set of instructions (called program) and gives the result (output) and saves output for the future use. It can process both numerical and non-numerical (arithmetic and logical) calculations.

The major characteristics of a computer can be classified into speed, accuracy, diligence, versatility, and memory which are as follows:

***Speed**: The computer can process the data and give the output in fractions of seconds such that required information is given to the user on time enabling the user to take the right decisions at the right time. A powerful computer can execute about 3 million calculations per second.*

***Accuracy**: Inspire of its high speed of processing, the computers accuracy is consistently high enough which avoids any errors. If there are any errors, they are due to errors in instructions given by the programmer or input data.*

***Versatility**: The computer is versatile in nature in the sense of working and purpose. What that means is we can use the computer in any way we want. For example, if we need some graphics work, we can install the graphics software and we can design and accomplish our*

graphics work at the same time. Later if we need some report writing we can certainly install the word processing software and accomplish that also on the same computer we have used as a graphics designer. Similarly, we can do any work if the application for the same is available to us. That's why the computer is said to be versatile.

***Automation**: Once the instructions are fed into the computer it works automatically without any human intervention until the completion of execution of program until meets logical instructions to terminate the job.*

***Reliability**: The output generated by the computer is very reliable, but it is reliable only when the data which is passing as input to the computer and the program, which gives instructions are correct and reliable.*

***Diligence**: A computer can perform millions of tasks or calculations with the same consistency and accuracy. It doesn't feel any fatigue or lack of concentration. Its memory also makes it superior to that of human beings.*

***Storage**: The computer has a provision to store large volumes of data in the small storage devices, which have the capacity to store huge amounts of data and help the retrieval of data an easy task.*

2. What are the measurements unit of processing speed and storage unit? Describe the relationship between various storage units.

The central processing unit (CPU) of a computer is the part of the machine that retrieves and executes instructions. An arithmetic and logic unit (ALU), a control unit, and multiple registers make up the system. The processor is a common term for the central processing unit (CPU). These are also called the unit of electromagnetic (EM) wave frequency.

The different measurement units and their relationship are as follows:

1,000 H_z = 1 Kilo Hertz (10^3 H_z)

1,000 KH_z = 1 Mega Hertz (10^6 H_z)

1,000 MH_z= 1 Giga Hertz (10^9 H_z)

1,000 GH_z= 1 Tera Hertz (10^{12} H_z)

The size of the device in computers does not reflect the space available to store data in it. There are larger devices that can store only a few data were as many tiny devices as possible that store an unbelievable amount of data. It is also one type of measurement unit.

Hence, we need to find some other way to measure space. All the digital computers use binary numbering systems (though there are some exceptions).

The binary numbering system consists of only two digits – 0 and 1 to represent any quantity. 10 in binary is equal to the 2 and 100 to 5. Everything in computers is represented in strings of binary numbers. For example, capital A is interpreted by the computer as 0100 0001 and B is 0100 0010. All characters, numbers, symbols, images, sounds, animations, videos, and everything is converted into suitable binary code to store on a computer or processed by computer.

So, if there is any device that can store one binary digit (whether 0 or 1), its storage capacity is 1 bit. Here, we have larger units that represent a group of lower units. A group of 4 binary digits is called a nibble (4 bits = 1 Nibble). Similarly, a group of 8 bits is called a byte (1 byte = 8 bits).

As you have seen in the example above, each character requires 8 bits which are 1 byte. So, 1 character requires 1-byte space. Now, if you have a text file whose size is 32 bytes, it means there are 32 x 8 binary digits (0s and 1s) stored in it.

Following table lists the different units and their values:

Storage Measurement Units:

Units		*Equivalent*
0 or 1	=	*1 Bit*
4 Bites	=	*1 Nibble*
8 Bites	=	*1 Byte*
1024 Bytes	=	*1 Kilobyte (KB)*
1024 Kilobytes	=	*1 Megabyte (MB)*
1024 Megabytes	=	*1 Gigabyte (GB)*
1024 Gigabytes	=	*1 Terabyte (TB)*
1024 Terabytes	=	*1 Petabyte (PB)*
1024 Petabytes	=	*1 Exabyte (EB)*

3. What are the different types of computers based on size and power?

Computer can be classified in many ways. The common way is to classify the computer according to working principle, purpose, and size. There are different types of computers.

Size and power wise computers can also be classified into four types:

1. *Micro Computer or personal computers:*

   A microcomputer is a computer whose CPU is a microprocessor. A microprocessor is a processor all whose components are on a single integrated circuit chip.

   Personal computers are a kind of kind of microcomputer. Personal computers are called so because they are designed for personal use of individual or individual small business units' office automation unit or professionals. Pc can be used for variety of applications like computer literacy, fun and games, business applications, programming etc.

   Types of Micro Computer or personal computers

   - *Desktop Computer*
   - *Laptop Computer*
   - *Palmtop Computer, Digital Diary, Notebook, PDAs.*

2. *Minicomputer:*

   They are smaller versions of the mainframes. Generally, they offer the same computing power as bigger counterparts. The most important advantage of a minicomputer over the main frame is that it is cheaper in cost, smaller in size and reliable. It does not require air conditioning and can be operated in room temperature.

   Main used of these systems is in education in local government word processing etc. in business they are being used for involving stock payroll etc. it is generally used as server system on networks with personal computers as nodes.

   Some typical machines– TDC 316, PDP 11/70, Honeywell (XPS-100), HCL-4.

3. *Mainframe Computer:*

   They are very big in size and offer the maximum computing power. Many peripherals can be attached to them. They are generally used in large networks of computers with the mainframe being the model point of the network. They used satellites for networking.

A typical application is the airline system. It has a mainframe computer at their head office where information on all the fights is stored. Small computers are installed at the booking offices are attached to central data bank, so that up-to-date information of all flights is always available.

Some computers are – Univac 1100/10, Univac 1100/60, Honeywell DSP 88/860, IBM 270/168 etc.

4. *Supercomputer:*

They are the most expensive of all the computers. These computers are big general-purpose computers capable of executing more than 10,000 million instructions per second and have storage capacities of millions of bits per chip. These computers are used to solve multi-variate mathematical problems such as atomic nuclear and plasma physics seismology, aerodynamics etc.

Supercomputers are typically capable of handling hundreds of millions of floating points operations per second (MFLOPS). The speed of super computers generally measured in "FLOPS" (Floating Point Operations Per Second).

Super computers are used for highly calculation- intensive tasks such as weather forecasting, climate research, molecular modeling, physical simulation, and cryptanalysis and military and Scientific agencies are heavy users.

Some super computers are – Cray 1, Cray 2, Cray 3 perform 10 billion operation per second, Param, Cyber 810&830 etc.

4. What is the difference between Hardware and Software?

Difference between Hardware and Software:

S.N.	*Basis of Comparison*	*Hardware*	*Software*
1	*Definition*	*Hardware is a physical part of the computer that causes the processing of data.*	*Software is a set of instructions that tells a computer exactly what to do.*
2	*Physical existence*	*Hardware is physical in nature and hence one can touch and see hardware.*	*The software cannot be physically touched but still can be used and seen.*
3	*Development*	*It is manufactured.*	*It is developed and engineered.*

4	*Construction or Design*	*Developed using electronic and other materials.*	*Developed writing using instructions using a programming language.*
5	*Dependency*	*Hardware cannot perform any task without software.*	*The software cannot be executed without hardware.*
6	*Tangible*	*Hardware is tangible as hardware is a physical electronic device, that can be touched.*	*Software is intangible as we can see and use the software but can't touch them.*
7	*Repair*	*When damaged, it can be replaced with a new component.*	*When damaged it can be installed once more using a backup copy.*
8	*Virus/Infection*	*Hardware cannot be infected by Viruses.*	*The software can be infected by Viruses.*
9	*Durability*	*Hardware will physically wear out over time.*	*Software does not wear out, but it can be affected by bugs and glitches.*
10	*Examples*	*An example of Hardware is hard drives, monitors, CPU, scanners, printers etc.*	*An example of software is Windows 10, Adobe Photoshop, Google Chrome etc.*

Group – B (9x5=45)

1. What do you mean by the generation of Computer? Write different types of generation of Computer?

Generation in computer terminology is a change in technology a computer is/was being used. Initially, the generation term was used to distinguish between varying hardware technologies. Nowadays, generation includes both hardware and software, which together make up an entire computer system.

There are five computer generations known till date. Each generation has been discussed in detail along with their time and characteristics. In the following table, approximate dates against each generation have been mentioned, which are normally accepted.

The following are the main five generations of computers:

- *First Generation: The period of first generation: 1946-1959. Vacuum tube based.*
- *Second Generation: The period of second generation: 1959-1965. Transistor based.*
- *Third Generation: The period of third generation: 1965-1971. Integrated Circuit based.*
- *Fourth Generation: The period of fourth generation: 1971-1980. VLSI microprocessor based.*
- *Fifth Generation: The period of fifth generation: 1980-onwards. ULSI microprocessor based.*

2. What do you mean by mobile computing? Explain its application and use cases.

Mobile computing is human–computer interaction in which a computer is expected to be transported during normal usage, which allows for the transmission of data, voice, and video. Mobile computing involves mobile communication, mobile hardware, and mobile software. Communication issues include ad hoc networks and infrastructure networks as well as communication properties, protocols, data formats, and concrete technologies. Hardware includes mobile devices or device components. Mobile software deals with the characteristics and requirements of mobile applications: -

Main Principles –

- *Portability: Devices/nodes connected within the mobile computing system should facilitate mobility. These devices may have limited device capabilities and limited power supply but should have a sufficient processing capability and physical portability to operate in a movable environment.*
- *Connectivity: This defines the quality of service (QoS) of the network connectivity. In a mobile computing system, the network availability is expected to be maintained at a high level with a minimal amount of lag/downtime without being affected by the mobility of the connected nodes.*
- *Interactivity: The nodes belonging to a mobile computing system relate to one another to communicate and collaborate through active transactions of data.*

- *Individuality: A portable device or a mobile node connected to a mobile network often denotes an individual; a mobile computing system should be able to adopt the technology to cater to the individual needs and to obtain contextual information of each node.*

3. What do you mean by word length in computer?

The word length of the processor in a computer refers to the maximum number of bits it can take as input. It is the number of bits processed by a computer CPU in a single pass. The computer further takes this input for process and gives the output. We have word lengths such as 8, 16, 32, 64 bits and so on in the computers. The word length is further used in computing data bus, address size, instruction size and they are mostly the multiples of a CPU's word size.

"Word size" refers to the number of bits processed by a computer's CPU in one go (these days, typically 32 bits or 64 bits). Data bus size, instruction size, address size are usually multiples of the word size.

4. What is the difference between input and output devices?

Differences between input and output devices are listed below:

S.N.	*Input Devices*	*Output Devices*
1	*It accepts data from user.*	*It reflects processed data to user.*
2	*It converts user friendly instruction into machine friendly.*	*It converts machine's instructions to user intelligible.*
3	*It takes the data from the user and sends it to the processor for execution.*	*It takes the processed data from the processor and sends it back to the user.*
4	*It helps the computer is accepting the data.*	*It helps the computer is displaying the data.*
5	*Ex: Keyboard, Image Scanner, Microphone, Pointing device, Graphics tablet, Joystick.*	*Ex: Monitor, Printers, Plotters, Projector, Speakers.*
6	*Input devices translates user-friendly inputs into machine-understandable inputs.*	*Output devices translate machine-friendly outputs into user-understandable outputs.*

5. List and explain the various components of a computer.

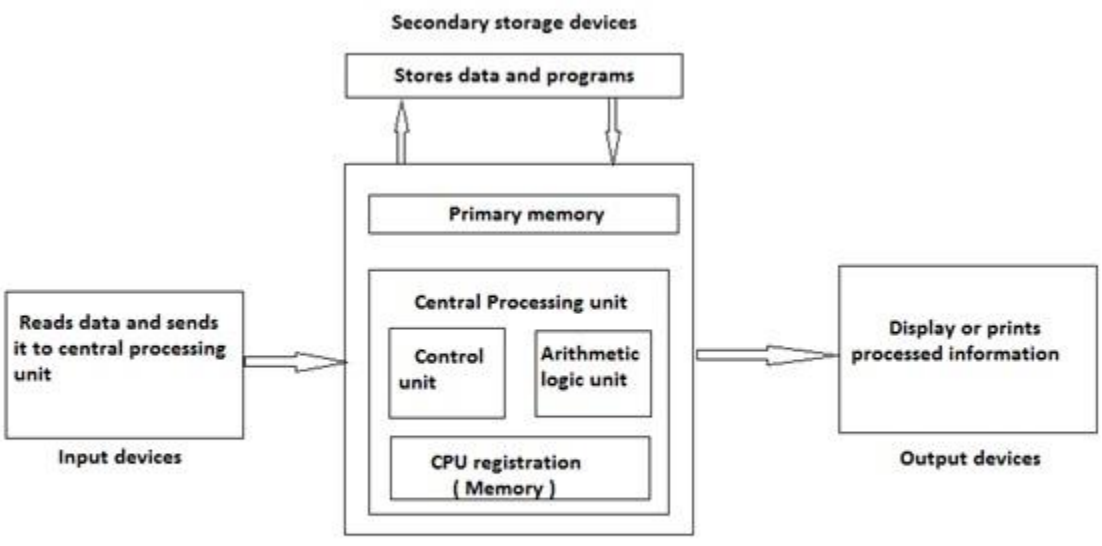
The main things that comprise a computer are – motherboard, CPU, GPU, RAM, and Hard disk drive for the storage of all the data. We will discuss all these components of the computer in detail below:

Motherboard: *A motherboard is a circuit board through which all the different components of a computer communications and it keeps everything together. The input and output devices are plugged into the motherboard for function.*

Input Unit: *Computers respond to commands given to them in the form of numbers, alphabets, images etc. through input units or devices like – keyboard, joystick etc. These inputs are then processed and converted to computer language and then the response is the output in the language that we understand or the one we have programmed the computer with.*

Output Unit: *The result of the command we provide the computer with through the input device is called the output. The most used is the monitor since we give commands using the keyboard and after the processing, the result or outcome is displayed on the monitor.*

Central Processing Unit (CPU): *The CPU is called the brain of the computer since no action can take place without its permission and execution as the main processing unit. It communicates with all the other components of the computer and has 3 components that help with the smooth functioning of the CPU. Components of the CPU are:*



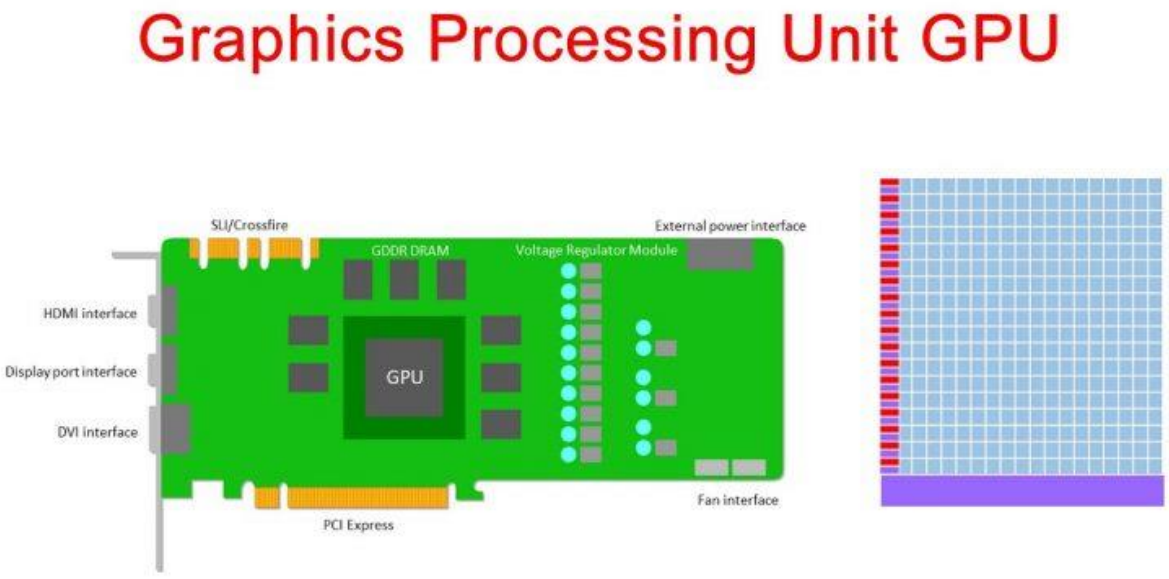
Central Processing Unit and its interaction with other units

Memory Unit: *The information entered through the input devices is saved in the memory of the CPU and then passed on to the other parts. Similarly, when the output is ready it is saved in the memory before the result is given to the user.*

Control Unit: *This unit controls the functioning component of the computer. It collects the data entered, leads it on for processing after the processing is done, receives the output and provides it to the user. So, getting instructions, decoding it, signaling the execution, and receiving the output is done by the control center and hence it is called the center of all processing actions that happen in the computer.*

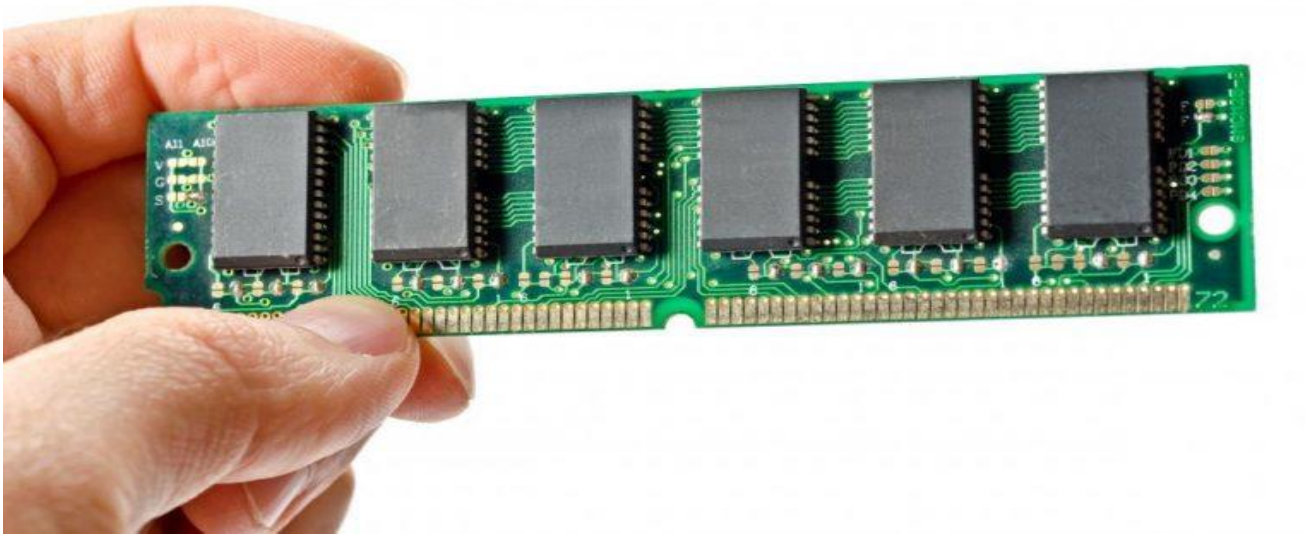
Arithmetic and Logical Unit: *This unit does mathematical calculations, arithmetic operations, comparison of data and decision making. It has circuits that are built for addition, subtraction, multiplication, division, and other calculations.*

Graphics Processing Unit (GPU): *Another vital component of the computer is GPU. The Graphics Processing Unit or the video card helps generate high-end visuals like the ones in video games. Good graphics like these are also helpful for people who must execute their work through images like 3D modelers and others who use resource-intensive software. It generally communicates directly with the monitor.*



Random Access Memory (RAM): *RAM is the most referred component in a computer. The RAM is also known as the volatile memory since it gets erased every time the*

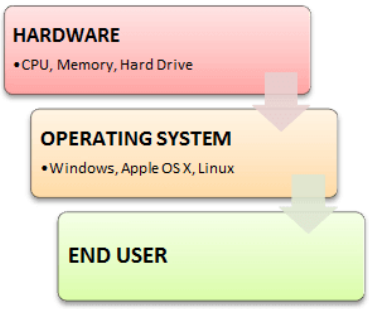
computer restarts. It stores the data regarding the programs which are frequently accessed programs and processes. It helps programs to start up and close quickly. It being slower has made it more obsolete these days.



6. What is an operating system? Write with examples.

An Operating System (OS) is a software that acts as an interface between computer hardware components and the user. Every computer system must have at least one operating system to run other programs. Applications like Browsers, MS Office, Notepad Games, etc., need some environment to run and perform its tasks.

The OS helps you to communicate with the computer without knowing how to speak the computer's language. It is not possible for the user to use any computer or mobile device without having an operating system:



An operating system brings powerful benefits to computer software and software development. Without an operating system, every application would need to include its own UI, as well as the comprehensive code needed to handle all low-level functionality of the underlying computer, such as disk storage, network interfaces and so on. Considering the vast array of underlying hardware available, this would vastly bloat the size of every application and make software development impractical.

Common desktop operating systems include the following:

- *Windows is Microsoft's flagship operating system*
- *Mac OS is the operating system for Apple's Macintosh line of PCs and workstations.*
- *Unix is a multi-user operating system designed for flexibility and adaptability. Originally developed in the 1970s, Unix was one of the first operating systems to be written in the C language.*
- *Linux is a Unix-like operating system that was designed to provide PC users a free or low-cost alternative. Linux has a reputation as an efficient and fast-performing system.*
- *Mobile OSes like android, Symbian, IOS etc.*

7. What do you mean by the dual-core CPU?

A single chip that contains two distinct processors which work simultaneously resulting double in performance. IBM introduced dual cores in its Power 4 chips in 2000. In 2004, Sun and HP introduced their first dual core CPUs. Dual core means that two processors are embedded into one integrated circuit, so their caches and caches controllers are combined into single chip. Both processors are linked with each other, and due to this linkage, dual core can execute their operations twice as fast compared to single core processor. Dual core processors are more useful for multitasking environment because both processors perform their operations independently. It can execute 64-bit instructions as well as hyper threading supportive. Dual core processors have excellent performance compared to single core processors. It is capable of spit their data for processing by several units. Dual core processor must move between different types of threads compared to single core processor because single core processor can manage two threads at once. But some time, single core can perform outstanding to dual core when CPU's clock speed is getting higher that is measured into GHz.

8. What is the full form of CPU, OCR, IC, SSD and ALU?

Full forms of asked terms can be written as below:

1. *CPU: Central Processing Unit*
2. *OCR: Optical Character Recognition*
3. *IC: Integrated Circuits*
4. *SSD: Solid State Drive*
5. *ALU: Arithmetic Logic Unit*

9. Write short notes on the evolution of computer technology.

The computer is well-known to us, the first counting device our ancestors used in the early decades. But also, before that, they utilized sticks, bones, and stones as their counting implements. As the evolution of the human mind and technology improved with time, the existence of more computing devices increased. In this section, we will get to know details on the History of computers and the Timeline according to the subsequent years.

First Computer Design

In the 19th century, a renowned Mathematician Charles Babbage developed and partly built a Victorian-era computer named the Analytical Engine. The fundamental component of the oldest machine was the input, having the programs and data that the user had to provide to the Analytical Machine through punched cards, a technique being employed at the time to handle mechanical looms like the Jacquard loom. The creation of the design of the Analytical Engine; was initiated by the year 1833.

The computer was born not for amusement or email but out of a requirement to solve a complicated number-crunching crisis. By 1880, the U.S. population had expanded so vastly; that it bore more than seven years to tabulate the U.S. Census consequences. The government pursued a quicker method to acquire the job done, offering an upgrade to the punch-card-based computers that grabbed up total room space.

From the 19th century to the present day, the role of the computer in its users' life is crucial. However, in today's generation, this computer may work a little differently and more advanced than in the 19th century. But it served the purpose it is to its users and remained the same. This tutorial describes various generations of computers in detail.

List of Five Generations of Computers

The journey of five generations of computers begins with vacuum tube circuitry from the 1940s and goes beyond the methods and approaches of artificial intelligence (AI) to the present day. These are as follows:

First Generation of Computers:

By the year 1940, Vacuum tubes, an electronic device that regulates the flow of electrons in a vacuum, were used. These were the first computer systems that the users utilized for circuitry and magnetic drums and were usually massive, capturing up an entire room. These computers were very costly to operate in the spare of employing a great deal of electricity. At that time, the most common computer language that the first-

generation computers depended on was the machine language, the lowest-level programming language that the computers understood for executing operations. The UNIVAC and ENIAC computers are specimens of the first-generation computing devices.

Characteristics of First Generation of Computers

- *The main electronic component of first-generation computers is the vacuum tubes.*
- *It operated in machine language.*
- *Its primary memories were the Magnetic tapes and magnetic drums.*
- *It employed its Input/output devices as Paper tape and punched cards.*

Second Generation of Computers:

In 1956, the technology of transistors replaced the bulkier generation of vacuum tubes. After the invention of these transistors, the dimensions of the computer also reduced. Second-generation computers evolved smaller in size compared to first-generation computers. Second-generation computers developed from enigmatic binary machine language to representational symbolic systems, or assembly languages, that authorized the programmers to appoint instructions in words or phrases. IBM1400 series, PDP-8, IBM 7090 and 7094, UNIVAC 1107, CDC 3600, etc., are a few examples of the Second-generation.

Characteristics of Second Generation of Computers

- *The main electronic component of second-generation computers is electronic transistors.*
- *It operated in Machine language and assembly language.*
- *Its primary memories were the Magnetic core and magnetic tape or magnetic disk.*
- *Its Input/output devices were the Magnetic tape and punched cards.*

Third Generation of Computers:

This generation started developing integrated circuits in 1964. Instead of using punch cards and printouts, users were able to interact with third-generation computers via keyboards and monitors and interfaced with an operating system. For the first time, computers reached a mass audience, as they were smaller and cheaper than the past prototypes. Jack Kilby of Texas Instruments and Robert Noyce of Fairchild Semiconductor developed integrated circuits by 1950.

Characteristics of Third Generation Computers

- *The main electronic component of third-generation computers is integrated circuits.*
- *It operated in High-level language.*
- *Its primary memories were the large magnetic core and magnetic tape/disk.*
- *Its Input/output devices were the Magnetic tape, monitor, keyboard, printer, etc.*

Fourth Generation of Computers:

By 1971, users operated the first microprocessors, the Large-Scale Integration (LSI) circuits created on one chip called microprocessors. The microprocessor was conducted in the fourth generation of computers, as developers built thousands of integrated circuits onto a single silicon chip. What if the first generation served an entire room that could currently accommodate within a palm? The Intel 4004 chip, developed in 1971, located all the computer components from the Central Processing Unit and memory to input or output authorities on a single chip.

Characteristics of Fourth Generation of Computers

- *The main electronic component of fourth-generation computers is Very Large-Scale Integration (VLSI) and the microprocessor (VLSI contains thousands of transistors inside a single microchip).*
- *It operated in High-level language.*
- *Its primary memories were the semiconductor memory (mainly RAM, ROM, etc.)*
- *Its Input/output devices were the pointing devices, optical scanning, keyboard, monitor, printer, etc.*

Fifth Generation of Computers:

The technology on which the fifth generation of computers relies is AI. It authorizes computers to conduct like humans. Today's computers are so developed; that the users utilize them in every distinct field, primarily accounting, constructing buildings, space research, engineering technologies, and other types of analysis. The principal purpose of fifth-generation computing is to create devices that react to natural language input, competent in learning and self-organizing.

Characteristics of Fifth Generation of Computers

- *The main electronic component of fourth-generation computers is Ultra Large-Scale Integration (ULSI) and the parallel processing technique.*
- *It operated in natural human language.*
- *Its Input/output devices were the Trackpad, touch screen, pen, speech input, light scanner, etc.*

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