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**Syllabus-wise exam Preparation
for Computer Teacher**

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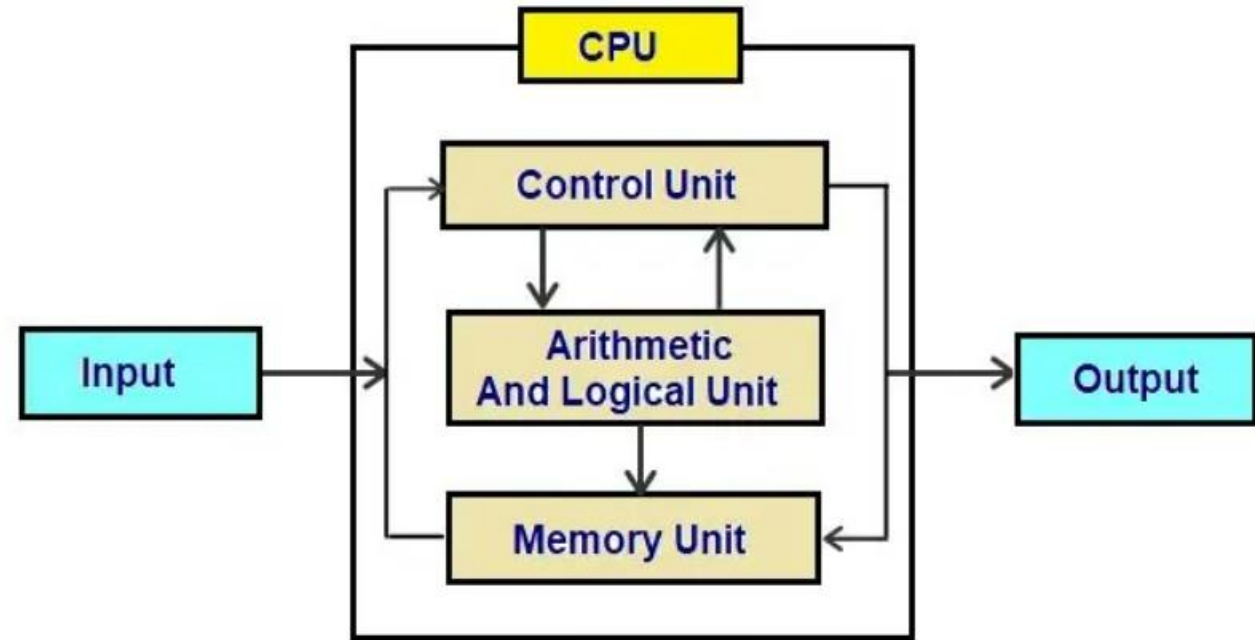
Fundamentals of Information Technology

Contents to be Covered

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01

Block Diagram of elements of digital computer & their functions.



Block Diagram of a Computer

Input

All the data received by the computer goes through the input unit. The input unit comprises different devices like a mouse, keyboard, scanner, Microphone, etc. The computer accepts the raw data in binary form from the User & then it processes the raw data into Machine-Readable data and then produces the desired output.

CPU – Central Processing Unit

Central Processing Unit or the CPU, is the brain of the computer. It works the same way as a human brain works. As the brain controls all human activities, similarly the CPU controls all the tasks. Moreover, the CPU conducts all the arithmetical and logical operations in the computer. Now the CPU comprises of two units, namely – ALU (Arithmetic Logic Unit) and CU (Control Unit). Both of these units work in sync. The CPU processes the data as a whole.

01

Block Diagram of elements of digital computer & their functions.

ALU – Arithmetic Logic Unit

The Arithmetic Logic Unit is made of two terms, arithmetic and logic. There are two primary functions that this unit performs.

- 1.Data is inserted through the input unit into the primary memory. Performs the basic arithmetical operation on it. Like addition, subtraction, multiplication, and division. It performs all sorts of calculations required on the data. Then sends back data to the storage.
- 2.The unit is also responsible for performing logical operations like AND, OR, Equal to, Less than, etc.

CU – Control Unit

The control unit as the name suggests is the controller of all the activities/tasks and operations. All this is performed inside the computer. The memory unit sends a set of instructions to the control unit. Then the control unit in turn converts those instructions. After that these instructions are converted to control signals.

These control signals help in prioritizing and scheduling activities. Thus, the control unit coordinates the tasks inside the computer in sync with the input and output units.

Memory Unit

All the data that has to be processed or has been processed is stored in the memory unit. The memory unit acts as a hub of all the data. It transmits data to the required part of the computer whenever necessary.

1.Primary memory – This type of memory cannot store a vast amount of data. Therefore, it is only used to store recent data. The data stored in this is temporary. It can get erased once the power is switched off. Therefore, is also called temporary memory or main memory. RAM stands for Random Access Memory. It is an example of primary memory. This memory is directly accessible by the CPU. It is used for reading and writing purposes. For data to be processed, it has to be first transferred to the RAM and then to the CPU.

2.Secondary memory – As explained above, the primary memory stores temporary data. Thus it cannot be accessed in the future. For permanent storage purposes, **secondary memory** is used. It is also called permanent memory or auxiliary memory. The hard disk is an example of secondary memory. Even in a power failure data does not get erased easily.

Output

- There is nothing to be amazed by what the output unit is used for. All the information sent to the computer once processed is received by the user through the output unit. Devices like printers, monitors, projectors, etc. all come under the output unit.
- The output unit displays the data either in the form of a soft copy or a hard copy. The printer is for the hard copy. The monitor is for the display. The output unit accepts the data in binary form from the computer. Then it converts it into a readable form for the user.

02

Memory

Memory:-

- A memory is just like a human brain. It is used to store data and instructions.
- Computer memory is the storage space in the computer, where data is to be processed and instructions required for processing are stored.
- The memory is divided into large number of small parts called cells. Each location or cell has a unique address, which varies from zero to memory size minus one.
- Memory is primarily of three types –
 - > Cache Memory
 - > Primary Memory/Main Memory
 - > Secondary Memory

Cache Memory:

- Cache memory is a very high speed semiconductor memory which can speed up the CPU.
- It acts as a buffer between the CPU and the main memory.
- It is used to hold those parts of data and program which are most frequently used by the CPU.
- The parts of data and programs are transferred from the disk to cache memory by the operating system, from where the CPU can access them.

Advantages of Cache Memory:

The advantages of cache memory are as follows –

- Cache memory is faster than main memory.
- It consumes less access time as compared to main memory.
- It stores the program that can be executed within a short period of time.
- It stores data for temporary use.

02

Memory

Primary Memory (Main Memory):

- Primary memory holds only those data and instructions on which the computer is currently working.
- It has a limited capacity and data is lost when power is switched off.
- It is generally made up of semiconductor device.
- These memories are not as fast as registers.
- The data and instruction required to be processed resides in the main memory.
- It is divided into two subcategories RAM and ROM.

RAM(Random Access Memory):

- It is a volatile memory. Volatile memory stores information based on the power supply. If the power supply fails/ interrupted/stopped, all the data and information on this memory will be lost.
- RAM is used for booting up or start the computer. It temporarily stores programs/data which has to be executed by the processor.
- RAM is of two types:

S RAM (Static RAM): S RAM uses transistors and the circuits of this memory are capable of retaining their state as long as the power is applied. This memory consists of the number of flip flops with each flip flop storing 1 bit. It has less access time and hence, it is faster.

D RAM (Dynamic RAM): D RAM uses capacitors and transistors and stores the data as a charge on the capacitors. They contain thousands of memory cells. It needs refreshing of charge on capacitor after a few milliseconds. This memory is slower than S RAM.

02

Memory

ROM (Read Only Memory):

- It is a non-volatile memory. Non-volatile memory stores information even when there is a power supply failed/ interrupted/stopped.
- ROM is used to store information that is used to operate the system. As its name refers to read-only memory, we can only read the programs and data that is stored on it.
- It contains some electronic fuses that can be programmed for a piece of specific information. The information stored in the ROM in binary format. It is also known as permanent memory.
- ROM is of four types:

MROM (Masked ROM): Hard-wired devices with a pre-programmed collection of data or instructions were the first ROMs. Masked ROMs are a type of low-cost ROM that works in this way.

PROM (Programmable Read Only Memory): This read-only memory is modifiable once by the user. The user purchases a blank PROM and uses a PROM program to put the required contents into the PROM. Its content can't be erased once written.

EPROM (Erasable Programmable Read Only

Memory): EPROM is an extension to PROM where you can erase the content of ROM by exposing it to Ultraviolet rays for nearly 40 minutes.

EEPROM (Electrically Erasable Programmable Read Only

Memory): Here the written contents can be erased electrically. You can delete and reprogram EEPROM up to 10,000 times. Erasing and programming take very little time, i.e., nearly 4 -10 ms (milliseconds). Any area in an EEPROM can be wiped and programmed selectively.

02

Memory

Secondary Memory:

- This type of memory is also known as external memory or non-volatile.
- It is slower than the main memory.
- These are used for storing data/information permanently.
- CPU directly does not access these memories, instead they are accessed via input-output routines.
- The contents of secondary memories are first transferred to the main memory, and then the CPU can access it.
- For example, disk, CD-ROM, DVD, etc.

Types of Secondary Memory

1. **Magnetic Tapes:** Magnetic tape is a long, narrow strip of plastic film with a thin, magnetic coating on it that is used for magnetic recording. Bits are recorded on tape as magnetic patches called RECORDS that run along many tracks. Typically, 7 or 9 bits are recorded concurrently. Each track has one read/write head, which allows data to be recorded and read as a sequence of characters. It can be stopped, started moving forward or backward, or rewound.
2. **Magnetic Disks:** A magnetic disk is a circular metal or a plastic plate and these plates are coated with magnetic material. The disc is used on both sides. Bits are stored in magnetized surfaces in locations called tracks that run in concentric rings. Sectors are typically used to break tracks into pieces. Hard discs are discs that are permanently attached and cannot be removed by a single user.
3. **Optical Disks:** It's a laser-based storage medium that can be written to and read. It is reasonably priced and has a long lifespan. The optical disc can be taken out of the computer by occasional users.

02

Memory

Types of Optical Disks:

CD – ROM

- It's called compact disk. Only read from memory.
- Information is written to the disc by using a controlled laser beam to burn pits on the disc surface.
- It has a highly reflecting surface, which is usually aluminum.
- The diameter of the disc is 5.25 inches.
- 16000 tracks per inch is the track density.
- The capacity of a CD-ROM is 600 MB, with each sector storing 2048 bytes of data.
- The data transfer rate is about 4800KB/sec. & the new access time is around 80 milliseconds.

WORM-(WRITE ONCE READ MANY)

- A user can only write data once.
- The information is written on the disc using a laser beam.
- It is possible to read the written data as many times as desired.
- They keep lasting records of information but access time is high.
- It is possible to rewrite updated or new data to another part of the disc.
- Data that has already been written cannot be changed.
- Usual size – 5.25 inch or 3.5 inch diameter.
- The usual capacity of 5.25 inch disk is 650 MB,5.2GB etc.

DVDs:

- The term “DVD” stands for “Digital Versatile/Video Disc,” and there are two sorts of DVDs:
 1. DVDR (writable)
 2. DVDRW (Re-Writable)

02

Memory

DVD-ROMS (Digital Versatile Discs):

- These are read-only memory (ROM) discs that can be used in a variety of ways.
- When compared to CD-ROMs, they can store a lot more data.
- It has a thick polycarbonate plastic layer that serves as a foundation for the other layers.
- It's an optical memory that can read and write data.

DVD-R:

- DVD-R is a writable optical disc that can be used just once.
- It's a DVD that can be recorded.
- DVD-ROMs have capacities ranging from 4.7 to 17 GB.
- The capacity of 3.5 inch disk is 1.3 GB.

03

CPU

Central Processing Unit (CPU):

- CPU is considered as the brain of the computer.
- A Central Processing Unit is also called a processor, central processor, or microprocessor.
- It carries out all the important functions of a computer.
- It receives instructions from both the hardware and active software and produces output accordingly.
- It then performs calculations, manipulates data, and produces output based on those instructions.
- It stores all important programs like operating systems that manage the computer's resources and allows you to interact with it and application software that you use to perform tasks like word processing, web browsing, and gaming.
- Your computer couldn't execute these essential programs without the CPU.
- CPU itself has following three components.
 1. Memory or Storage Unit
 2. Control Unit
 3. ALU(Arithmetic Logic Unit)

04

INPUT/OUTPUT DEVICES

Sl No.	Input Device Name:	Descriptions:
01	Keyboard	<ul style="list-style-type: none">• Keyboard is the most common and very popular input device which helps to input data to the computer.• The keyboard is a basic input device that is used to enter data into a computer or any other electronic device by pressing keys.• Keyboards are of two sizes 84 keys or 101/102 keys, but now keyboards with 104 keys or 108 keys are also available for Windows and Internet.• It has different sets of keys for letters, numbers, characters, and functions.• Keyboards are connected to a computer through USB or a Bluetooth device for wireless communication.

04

I/O Devices

2) Mouse:

- The mouse is a hand-held input device which is used to move cursor or pointer across the screen.
- It is designed to be used on a flat surface and generally has left and right button and a scroll wheel between them.
- Laptop computers come with a touchpad that works as a mouse. It lets you control the movement of cursor or pointer by moving your finger over the touchpad.
- Some mouse comes with integrated features such as extra buttons to perform different buttons.
- The mouse was invented by Douglas C. Engelbart in 1963. Early mouse had a roller ball integrated as a movement sensor underneath the device.
- Modern mouse devices come with optical technology that controls cursor movements by a visible or invisible light beam.
- A mouse is connected to a computer through different ports depending on the type of computer and type of a mouse.

04

I/O Devices

03. Joystick:

- Joystick is also a pointing device, which is used to move the cursor position on a monitor screen. It is a stick having a spherical ball at its both lower and upper ends. The lower spherical ball moves in a socket. The joystick can be moved in all four directions.
- The function of the joystick is similar to that of a mouse. It is mainly used in Computer Aided Designing (CAD) and playing computer games.

04. Light Pen:

- Light pen is a pointing device similar to a pen. It is used to select a displayed menu item or draw pictures on the monitor screen. It consists of a photocell and an optical system placed in a small tube.
- When the tip of a light pen is moved over the monitor screen and the pen button is pressed, its photocell sensing element detects the screen location and sends the corresponding signal to the CPU.

05. Track Ball:

- Track ball is an input device that is mostly used in notebook or laptop computer, instead of a mouse. This is a ball which is half inserted and by moving fingers on the ball, the pointer can be moved.
- Since the whole device is not moved, a track ball requires less space than a mouse. A track ball comes in various shapes like a ball, a button, or a square.

04

I/O Devices

06. Scanner:

- Scanner is an input device, which works more like a photocopy machine. It is used when some information is available on paper and it is to be transferred to the hard disk of the computer for further manipulation.
- Scanner captures images from the source which are then converted into a digital form that can be stored on the disk. These images can be edited before they are printed.

07. Digitizer:

- Digitizer is an input device which converts analog information into digital form. Digitizer can convert a signal from the television or camera into a series of numbers that could be stored in a computer. They can be used by the computer to create a picture of whatever the camera had been pointed at.
- Digitizer is also known as Tablet or Graphics Tablet as it converts graphics and pictorial data into binary inputs. A graphic tablet as digitizer is used for fine works of drawing and image manipulation applications.

08. Microphone:

- Microphone is an input device to input sound that is then stored in a digital form.
- The microphone is used for various applications such as adding sound to a multimedia presentation or for mixing music.

04

I/O Devices

09. Magnetic Ink Card Reader (MICR):

- MICR input device is generally used in banks as there are large number of cheques to be processed every day. The bank's code number and cheque number are printed on the cheques with a special type of ink that contains particles of magnetic material that are machine readable.
- This reading process is called Magnetic Ink Character Recognition (MICR). The main advantages of MICR is that it is fast and less error prone.

10. Optical Character Reader (OCR):

- OCR is an input device used to read a printed text.
- OCR scans the text optically, character by character, converts them into a machine readable code, and stores the text on the system memory.

04

I/O Devices

11. Bar Code Readers:

- Bar Code Reader is a device used for reading bar coded data (data in the form of light and dark lines). Bar coded data is generally used in labelling goods, numbering the books, etc. It may be a handheld scanner or may be embedded in a stationary scanner.
- Bar Code Reader scans a bar code image, converts it into an alphanumeric value, which is then fed to the computer that the bar code reader is connected to.