

CHAPTER 4 STORAGE DEVICES



P-1

Q1. Describe in detail the purpose and working of the main memory?

Purpose: Computer needs a storage device to store programs/data.

Working: Programs are loaded into the main memory, and then instructions are executed one by one. It is the main working area of the computer. It is very fast but limited in capacity. A computer can't work without main memory. Main memory consists of millions of cells capable of storing a bit i.e. 0 or 1. These cells are logically organized into group of 8 bits called a byte.

Q2. Describe in detail the purpose and working of the (a). Floppy disk (b). Hard Disk.

a). Floppy Disk

Purpose: Floppy disks are used to store and transfer data from one computer to another.

Working: It has low storage capacity and is very slow.

Following Operations are performed while data writing on Floppy Disk.

- Program passes an instruction to the hardware to write a data file on a floppy disk.
- **Floppy-Disk-Drive** controller starts the motor to spin the floppy disk.
- A Stepper motor rotates a worm-gear shaft that matches the spacing between tracks.
- The **read/write heads** stop at the track and the **Read Head** checks (a). The prewritten address (b). Correct side of the diskette. (c). and is at the proper track.



The data is written to the required address.

- The small indicator light stays on during all of the above operations



Q3. Describe in detail the purpose and working of (a). Compact disk (b). Magnetic Tape.

a). Compact Disk (CD): A plastic disk, 5 inches diameter, uses optical storage techniques to store up to 700 MB. CDs provide read-only data storage. The computer can read information from the disk, but you can't change this information. That is why it is called CD-ROM (*compact disk read-only memory*). Erasable optical disk drives are available now days.

b). Magnetic Tape:-An old form of mass storage device that uses magnetic tape. Data is stored on magnetic coated plastic tape. To access data, tape is mounted on a tape drive that can read, write, and rewind the tape. It is cheap, slow and can hold several gigabytes of data.

Q4. Explain, using a labeled diagram, the concepts of track and sector, describing magnetic disk storage.

Ans: Data is stored on surface of disk platter in **Sectors** and **Tracks**. Tracks are concentric circles, which are further divided into 8 sectors. Each track can store 512 bytes. (See figure 4.10 at P-50)

Q5. Explain the purpose of (a). Cache Memory (b). Hard disk (c). Magnetic Tape

- a). Cache Memory:** Cache memory is a special type of fastest memory. It is used to transfer instructions to the processor. It also increases throughput (performance) of a computer system.
- b). Hard disk:** Hard disk contains several disk platters stacked on a single rotating spindle. It is used to store data permanently.
- c). Magnetic Tape:** A device that reads and writes data on a magnetically sensitive tape. It is used to get backup of data.

Q6. Explain why secondary memory is needed in a computer system.

Ans: Secondary memory is needed to store digital data permanently. Hard disk, Floppy Disk and CDs are the main secondary storage devices which has the ability to store data permanently. In secondary memory, data can be stored optically or magnetically according to the storage media.

Q7. Explain the purpose of (i). High Level formatting (ii). Low level formatting (iii).RAM & ROM.

i). High Level formatting:

- * To make the boot record
- * To make the file allocation table (FAT)
- * To make the root directory on a disk.
- * To prepares the disk to hold data.

(ii). Low level formatting:

- * To make the tracks and sectors on a disk.
- * To format the disk physically.
- * Write starting & ending points of each sector onto the platter.
- * To prepare the disk drive to hold data.

(iii). **RAM:** RAM is a Random Access Memory. It is a temporary memory. It consists of blank chips. It is used to store and retrieve information. RAM is a volatile memory because all stored information is lost when we shut down the computer. RAM has much better access time and higher transfer rate. Larger the RAM size, faster the processing speed.

(iv). **ROM:** ROM is a Read Only Memory. It is a non-volatile memory. ROM is used to store frequently used programs, which control the basic I/O operations of the computer. Program stored in ROM is called firmware. ROM is a nonvolatile memory because all the stored information does not lost when we shut down the computer.

Q8. A 9th class student has a home computer system. What storage devices, the student will use on the home computer system. Explain why these devices are needed?

Ans: Student will use Hard disk, Floppy disk and Compact disk as secondary storages devices. He will also need primary memory (RAM and ROM) to speed up his computer.

Why these devices are needed? These devices are needed to store data and programs permanently.

General Questions

Chapter. 4

- 1. What is Main Memory:** It is the main working area of the computer. It is very fast but limited in capacity. A computer can't work without main memory. Main memory consists of thousands or millions of cells capable of storing a bit i.e. 0 or 1. These cells are logically organized into group of 8 bits (**Binary digits**) called a byte.
- 2. What is memory Address:** Each byte in memory has a unique number called address of a byte.
- 3. Explain Direct Access Storage:** Any byte from main memory can be accessed directly by specifying its address. So it is called direct access storage.
- 4. What are Read & Write Operations of RAM:** RAM is a Random Access Memory. It is a volatile memory. It is used to store data temporarily. READ and WRITE operation are as follow.
READ Operation: contents of memory location are copied to the CPU register.
Write Operation: The contents of the CPU register are copied to the memory location.
 1. The contents of the memory are lost when the electricity is failed so it is **volatile**.
 2. RAM is also called **Read/Write** memory.
 3. RAM is **random access means** any part of RAM can be accessed randomly/directly.
- 5. What is DRAM (Dynamic RAM):** Commonly used technology of RAM chips. It is cheap and slows because it needs to be refreshed again and again.
- 6. What is SRAM:** It is faster than DRAM but it is more expensive. Contents of SRAM do not need to refresh again and again. This memory is also known as **Cache Memory**.
- 7. What is PROM:(Programmable Read Only Memory)** This form of ROM is a blank and the user can write his own data/program on it by suing special device. Once the data is written can't be changed or deleted.
- 8. What is EPROM:(Erasable Programmable Read Only Memory)** It is initially a bank chip, data can be written by the manufacturer or by the user with special devices. Same Special devices and ultraviolet rays can erase data. So data written on it can be changed easily.
- 9. What is EEPROM:(Electrically Erasable Programmable Read Only Memory).** This kind of ROM can be re-written by electrical devices and data can be easily modified. EEPROM can be very useful for taking backup of data.

10. What is meant by computer storage?

Ans: Computer storage is an electronic file in which data is stored until needed.

11. Name 4 memory units in which memory of a storage device is measured?

Ans: i) **Bit** stands for binary digit (1 or 0)
 ii) A **Nibble** is a group of four bits.
 i) A **Byte** is a group of eight bits. A byte can store only one character like A, B, 4, 5... etc.
 ii) A **Word** is a group of bits representing data. A word may have a length of 16 bits, 32 bits or more.

12. What is the relation between nibble and a byte?

Ans: **Byte** is a sequence of **eight bits** and a **Nibble** is a sequence of **four bits**. Therefore two nibbles = 1 byte.

13. Why RAM is a volatile memory?

Ans: RAM is a volatile memory because all stored information is lost when we shut down the computer.

14. What is Cache memory?

Ans: Cache memory is a fastest memory for frequently used data. It is used for speeding up the data transfer rate of the CPU. Cache memory is used to increase computer performance. It is a volatile memory.

15. What is a Flash memory?

Ans: Flash memory is fastest non-volatile memory. The user can change its contents easily. Flash memory has eliminated the time consuming and costly ways of data transfer methods.

16. What are SIMMs and DIMMs?

Ans: **SIMM** stands for Single Inline Memory Module. It is a type of RAM attached to the motherboard with pins. Most SIMMs has 32-bit word size

DIMM stands for Dual Inline Memory Module. It is dual-sided memory chips that hold twice data as a SIMM. DIMMs are 32-bit, but more are 64-bit and only have to be installed in Pentium computers.

17. Differentiate between Sequential Access Devices and Random Access Devices.

Ans: **Sequential access devices:** Magnetic Tap

Random Access/Direct Access devices: Magnetic disks RAM, ROM.

18. What is Cylinder? Same track Numbers of all the plates makes a cylinder.**19. What is Seek Time?** The time used to move the heads to the appropriate track after reading the address is called seek time.**20. What is Data Rate?** The number of bytes per-second delivered to the CPU is called data rate. (5 to 40 M.Bytes P/S is common)**21. What is Rotational Delay?** After reaching the required track, Read/Write heads has to wait for some time so that the required sector comes under it, due to the rotation of the platters.**22. What is Transfer Delay?** When the required sector comes under the Read/Write head it reads the data from the disk and sends to the CPU. Time consumed in this process is called **Transfer Delay**.**23. What is Access Time?** Access Time = Seek Time + Rotational Delay + Transfer Delay**24. Differentiate between Floppy and Hard Disks.**

Floppy Disc	Hard Disc
1. Less Storage Capacity	1. Big Storage Capacity
2. Interchangeable	2. Not interchangeable
3. Consists of only one platter	3. Consists of more than one platter
4. Inexpensive	4. Expensive as compared to FD
5. Unreliable	5. Reliable
6. Available in two sizes 3.5" and 5.25" (SS/DD/DS/HD)	6. Not flexible
7. 5.25" can hold data up to 360KB to 1.2MB, and 3.5" can hold data up to 720KB to 1.44MB.	7. Available up to 4 GB to 80 GB storage capacity