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Chapter=6 (1 or 2 Q)

Optical Storage Media

1) What is Optical ~~Storage~~ Disk? Write advantages and limitations of optical disk.

Ans: Optical disk is a computer storage disk that uses low power laser beams to read and write data.

-> It uses the optical technology in which laser light is centered to the spinning tracks.

-> The tracks are ~~constructed~~ in spiral shape.

-> In the optical disk the data is sequentially accessed.

-> Examples: CD (Compact Disk), DVD (Digital Video Disk) and Blue-Ray Disk.

Advantages

i) Portable & used to save music, video, audio.
ii) Cheap and longer life span
iii) Easy to handle and store.
iv) It cannot be damaged easily.

Disadvantages

i) There is a risk to lose data.
ii) Prone to scratches, dust, etc.
iii) Takes time to copy data
iv) ~~Limited capacity~~ Limited Capacity

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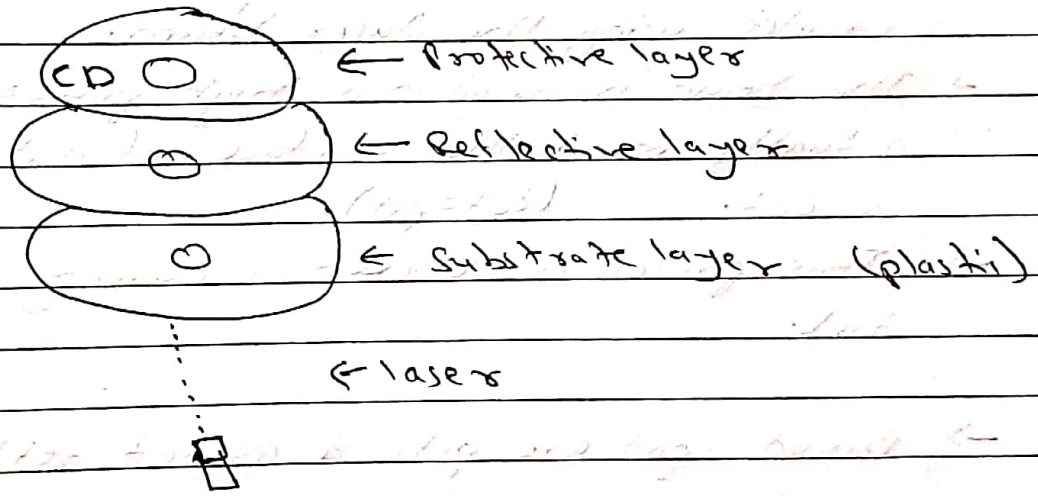
Optical Disk layers

→ It has 3 layers

1) Protective layer
2) Reflective layer
3) Substrate layer



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11 2) How is the information stored in optical disk?

Ans: Optical disk is a computer storage disk that uses low power laser beams to read and write data.

To store data

→ To store data in a optical disk, dots are created using the laser beam.

→ The beam is used in a high power mode to actually mark the surface of a disk, making a dot. (dot = pit).

→ This process is known as burning data onto a disk.

→ Burned spot are pits & doesnot reflect light i.e it represents 0

→ Unburned areas reflects light i.e it represents 1

Detail explanation of representing data.

→ When the light from the laser is pointed over the unburned area (land) the light gets reflected & is detected by a light detector.
i.e it represent 1

→ When the light is incident on (burned area) pits the light is not reflected or scattered.
i.e it represents 0

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(3) Explain the working principle of CD-DA

Ans: CD-DA stands for Compact Disk Digital Audio

-> It is designed for audio only

-> It can be played on any standard CD player.

-> Music is stored in CD-DA as uncompressed digital data, no data is lost and quality is very high.

-> It is the standard format for audio compact discs.

-> ~~It can~~ ~~store~~ It's capacity is 74 minutes. i.e it can store audio upto 74 minutes.

-> It uses 8 to 14 modulation.

-> It has error handling mechanism which detects and corrects error.

-> It cannot be used to save video.

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4) What is the principle of CD-ROM.

Ans: CD-ROM stands for Compact Disk - Read Only Memory

→ It is an optical disc that has data written onto it when it was manufactured.

→ The data stored in CD-ROM can only be read. It cannot be deleted or changed.

→ It can store 700 mb of data.

→ It is commonly used to store multimedia or software.

Advantages

→ least expensive way to store large amount of data and information.

→ durable & easy to handle information

Disadvantages

→ data cannot be edited.

→ retrieves data slowly.

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15) Explain the CD-ROM Mode 1 and CD-ROM Mode 2 with block diagram.

CD-ROM Mode 1

-> The block contains 2,048 bytes for information storage out of the available 2,352 bytes.

-> The 2,352 bytes are split into the following groups:

Sync	Header	User Data	EDC	Blanks	ECC
12	4	2048	4	8	276

← 2,352 bytes →

Fig: CD-ROM Mode 1 block layout

1) 12 bytes for synchronization i.e for the ~~begin~~ detection of the block beginning.

2) 4 bytes for the header which carries ~~the an~~ a specification of the block.
   - First byte stores minutes
   - Second byte stores seconds
   - Third byte contains the block number
   - Fourth byte includes the mode specification

3) 2,048 bytes for the user data

4) 4 bytes for error detection

5) 8 unused bytes

6) 276 bytes for Error Correction.
   - Hence an error rate of 10^{-12} can be achieved.

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CD-ROM Mode 2

→ Here, each block contains 2,336 bytes for information storage.

→ The synchronization and header are processed in the same way as in Mode 1.

→ Error detection and Error correction doesnot exist.

Sync	Header	User Data
12	4	2,336

← 2,352 bytes →

fig: CD-ROM Mode 2 block layout

1) 12 bytes for synchronization.
2) 4 bytes for the header
3) 2,336 bytes for the user data

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6) Explain the form 1 and form 2 formats of CD-ROM / Extended Architecture.

or

Explain the CD-ROM / XA form 1 and form 2 with block diagram.

{XA → Extended Architecture}

Ans: CD-ROM/XA uses CD-ROM mode 2 to define actual blocks.

→ CD-ROM/XA differentiates blocks with form 1 and form 2 formats.

→ They are similar to CD-ROM modes.

i) Form 1

→ This CD-ROM mode 2 XA form 1 provides improved error detection and correction.

→ It is similar to CD-ROM mode 1.

→ Contrary to CD-ROM Mode 1, the unused eight bytes of mode 1 are used for sub headers.

Sync	Header	Sub-header	User Data	EDC	ECC
12	4	8	2048	4	276

← 2,352 bytes →

fig: CD-ROM / XA form 1 block layout

1) 12 bytes for Synchronization
2) 4 bytes for Header
3) 8 bytes for sub-header
4) 2,048 bytes for user data
5) 4 bytes for Error detection
6) 276 bytes for Error correction

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ii) Form 2

→ This CD-ROM mode 2 XA format provides ~~2,352~~ 2,324 bytes of user data out of 2,352 bytes.

→ This is gained at the expense of worse error handling.

Sync	Header	Sub-header	User Data	EDC
12	4	8	2324	4

← 2,352 bytes →

fig: CD-ROM / XA form 2 block layout

1) 12 bytes for synchronization
2) 4 bytes for header
3) 8 bytes for sub-header
4) 2,324 bytes for user data
5) 4 bytes for Error detection

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III 7) Explain the working principle of CD-WO with suitable diagram

Ans: So far, all the CD technologies do not allow the user to write to the disk. Thus, application scope is limited.

→ This has led research laboratories to develop compact disks that can be recorded once or several times.

→ The Compact Disk-Write Once (CD-WO), like CD-WORM (Compact Disk-Write Once Read Many), allows the user to write once to a CD and read it many times.

Principle of CD-WO

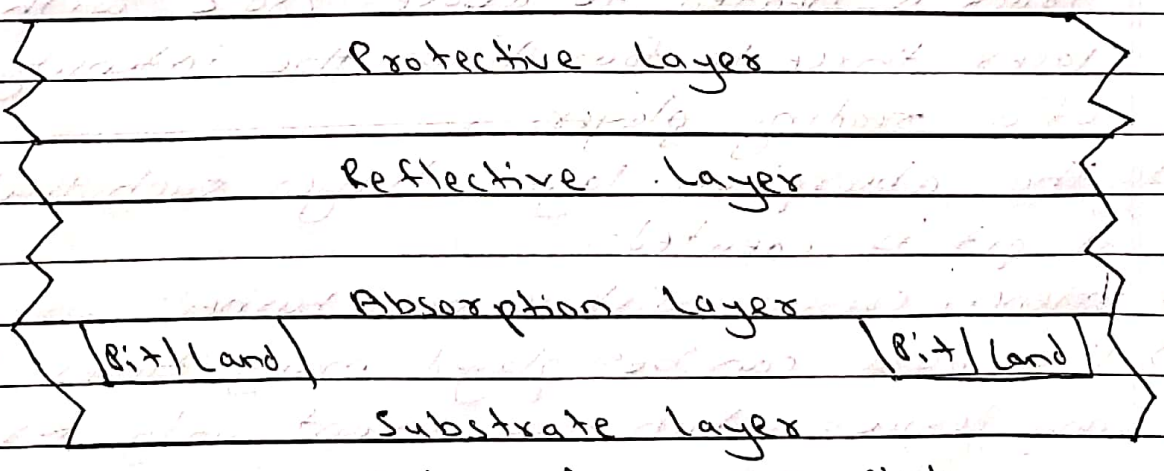

Fig: Cross section of a CD-WO disk

→ Figure shows a cross section of a CD-WO disk.

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→ In the case of CD-ROM (Compact Disk-Read Only Memory) the substrate lies directly next to the reflection layer.

→ In the case of a CD-WO, an absorption layer exists between the substrate and the reflection layer.

→ This absorption layer can be permanently modified through strong thermal influence, which changes the reflection properties of the laser beams.

→ In the original state, a CD-WO disk has a track consisting only of lands. The CD-WO. player recognizes it.

→ The absorption layer in the pre-grooved track is heated to above 250°C with a laser three to four times the intensity of a reading player.

→ The absorption layer changes such that a pit is created.

→ Hence, CD-WO disk is now burned.

→ The data can be played many times by any devices which are meant only for read-only CDs

Q) Explain the working principle of CD-WORM

→ Same as CD-WO. Explain Q.N.7

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Q8) Explain the working principle of CD-MO (Compact Disk- Magnetic Optical)

Ans. The CD-MO (Compact Disk-Magneto Optical) has a high storage capacity and allows one to write multiple times to the CD.

→ CD-MO is a rewritable disk which is less expensive and have better writing time and reliability.

→ The magnetic optical method is based on the polarization of the magnetic field where the polarization is caused by the heat.

→ During writing, the surface is heated to above 150°C. Simultaneously, a magnetic field approximately 10 times the strength of the earth's magnetic field is created.

↳ Lands and Pits are created

→ During reading, the surface is illuminated with laser beams, the polarization of the light changes according to the existing magnetization.

→ For a delete activity, a constant magnetic field is created in the area of a block and the sector is simultaneously heated.

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→ A CD-MO consists of an optical read-only area and a write-many (recordable) area.

→ The read-only area includes data.

→ The CD-MO read only area can be read by available playback devices.

→ The recordable area of a CD-MO cannot be played.

→ Unfortunately, this technology is incompatible with all other CD system.

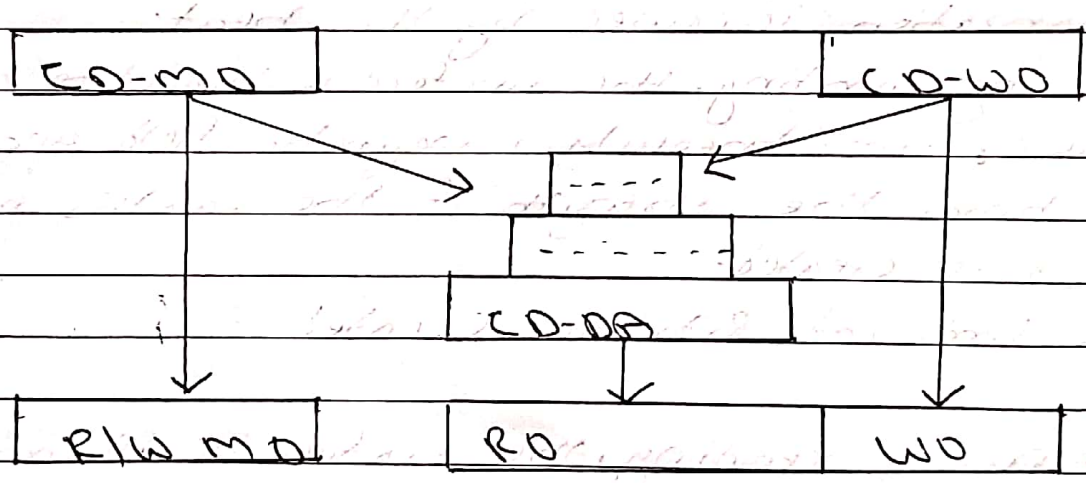

fig: CD-WO and CD-MO in relation to other CD technologies

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119) USB (USB drive/Flas drive)

Ans: USB flash drive is a device used for data storage that includes a flash memory and an integrated USB interface.
(USB → Universal Serial BUS)

→ It is simply known as pendrive.
→ They are removable and rewritable.
→ They are small, durable & reliable.
→ They are mechanically very robust because there are no moving parts.
→ ~~It can~~ It can store data upto 256 GB.
→ USB flash drives are supported by all operating systems and BIOS.
→ USB flash drives are often used for the same purposes for which floopy disks or CDs were once used i.e for storage, data backup and transfer of computer files.
→ Compared to CDs and floopy disk, USB flash drives can store more data and also transfer it at a faster rate.

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