

# II Unit

04

MARCH 2015

WEDNESDAY

TATA HITACHI

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## ★ CPU (Central Processing Unit) -

- Central processing unit basically combine with two unit -
  - i) Arithmetic logical unit (ALU)
  - ii) Control unit (CU)
- CPU have all types of performance such as Logical, Arithmetic etc.
- CPU receive all type of information by user and process them according to given user data and give output to user.
- CPU have all controlling on processing inputs, outputs and other type.
- In CPU all information have stored in memory.

## ★ Memory →

- A memory is just like a human brain. it is used to store data and instructions.
- Computer memory is the storage in computer where data is to be processed and instructions required for processing and stored.
- Computer memory is any physical device capable of storing information temporarily or permanently.

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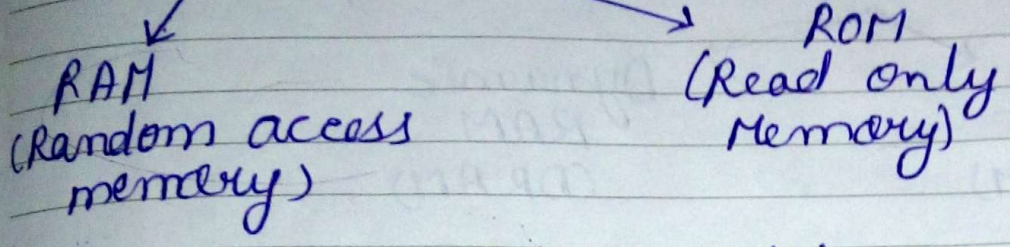
## ★ Types of Memory -

Primary memory

Secondary memory



Main memory or primary can be divided into two parts



Volatile and Non-Volatile Memory —  
 Memory can be either volatile or non-volatile memory.

Volatile memory is a temporary memory that loses its content when the computer or hardware loses its power supply or switched off.  
 Computer RAM (Random access memory) is a volatile memory.

RAM contains all type of data information when power supply is on.

→ Non-Volatile Memory —

Sometimes abbreviated, Non-volatile memory keep its content even if the power is lost.

RAM →

RAM (Random access memory) is the internal memory of the CPU for storing data, programme & instructions.

It is read and write memory which stores data until the machine is working condition. As soon as the machine is switched off data is erased.

RAM is a volatile memory.

RAM is small both in terms of its physical size and in the amount of data it can store.

Data in RAM can be accessed randomly but it is



expensive.

RAM can be divided into two parts -

Static  
RAM  
(SRAM)

Dynamic  
RAM  
(DRAM)

temporary

1) Static RAM → The word static indicates that the memory retains its content as long as power is being supplied.

• However, data is lost when the power gets down due to voltage nature.

Static RAM need not have to be refreshed on a regular bases.

• Because of the extra space in the matrix static RAM uses more chip than dynamic RAM. For the same amount storage space.

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→ Characteristics of Static RAM →

- (1) It has long life
- (2) There is no need to refresh.
- (3) Faster
- (4) Used as Cache memory
- (5) Large size
- (6) Expensive
- (7) High power consumption

Dynamic - RAM → It is also temporary like SRAM, but in DRAM contents

can delete spontaneously after some time. There are some refresh

Circuits are present in DRAM.

These refresh circuit use to empty it.



\* ROM

- ROM stands for read only memory.
- The memory from which we can only read but cannot write on it.
- This type of memory is non-volatile memory the information is stored permanently in such memories during main feature of it is non-volatile.
- ROM stores such instructions that are required to start a computer this operation is referred to as boot step.
- ROM chip are not only used in the computer but also in other electronics items like washing machine microwave oven etc.
- ROM chip also known as BIOS chip.

① MROM (Maskable Read Only Memory or Mask Read only Memory) →

The very first ROM were had wired device that contain a programme set of data or instructions.

- Those kind of ROM are known as masked read only memory which are inexpensive.
- In MROM stored data and instructions cannot be erased.

② PROM (Programmable Read Only Memory)

- PROM is read only memory that can be modified only once by a user.
- The user buy a blank PROM and enters the desire contains using PROM programme.
- Inside the PROM chip there are small fuses which are burnt open during programming it can be programmed once and is not erasable.



### (3) EPROM (Erasable Programmable Read only Memory) —

EPROM can be erased by using UV rays/light beam for duration up to 40 minutes.

Usually an EPROM eraser achieves this function.

During programming an electrical charge is trapped in an insulated gate region.

The charge is retained for more than 10 years bec. the charge has no leakage path.

For erasing this charge UV rays is passed through a quartz crystal window.

### (4) EEPROM (Electrically Erasable Programmable ROM).

• EEPROM is programmed & erased electrically.

• It can be erased & reprogrammed about 10,000 times.

• Both erasing and programming take about 4 to 10 milli sec.

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• In EEPROM any location can be selectively erased and programmed.

• EEPROM can be erased 1 bite at a time rather than erasing the entire chip.

• Hence the process of reprogramming is flexible but slow.

#### ⇒ Advantage of ROM:—

(i) Non-Volatile nature cheaper than RAMs.

(ii) These cannot be accidentally change

(iii) Easy to test.

(iv) These are static and do not require refreshing

(v) More reliable than RAMS.

(vi) Its contents are always and can be verified.

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Bit (0, 1)

1 KB = 1024 Byte

1 MB = 1024 KB

1 GB = 1024 MB

1 TB = 1024 GB

1 PB = 1024 TB  
 (PentaByte)

Bit = 0.1

Nibble = 4 Bit

Byte = 8 Bits

Word = (Group of Bytes as words)

(2) Dynamic RAM → Dynamic RAM (DRAM) unlike static RAM must be continually refreshed in order to maintain the data. This is done by placing the memory on a refresh that rewrites the data 700 times per/Sec.

DRAM is used for most system memory because it is cheap and small in size.

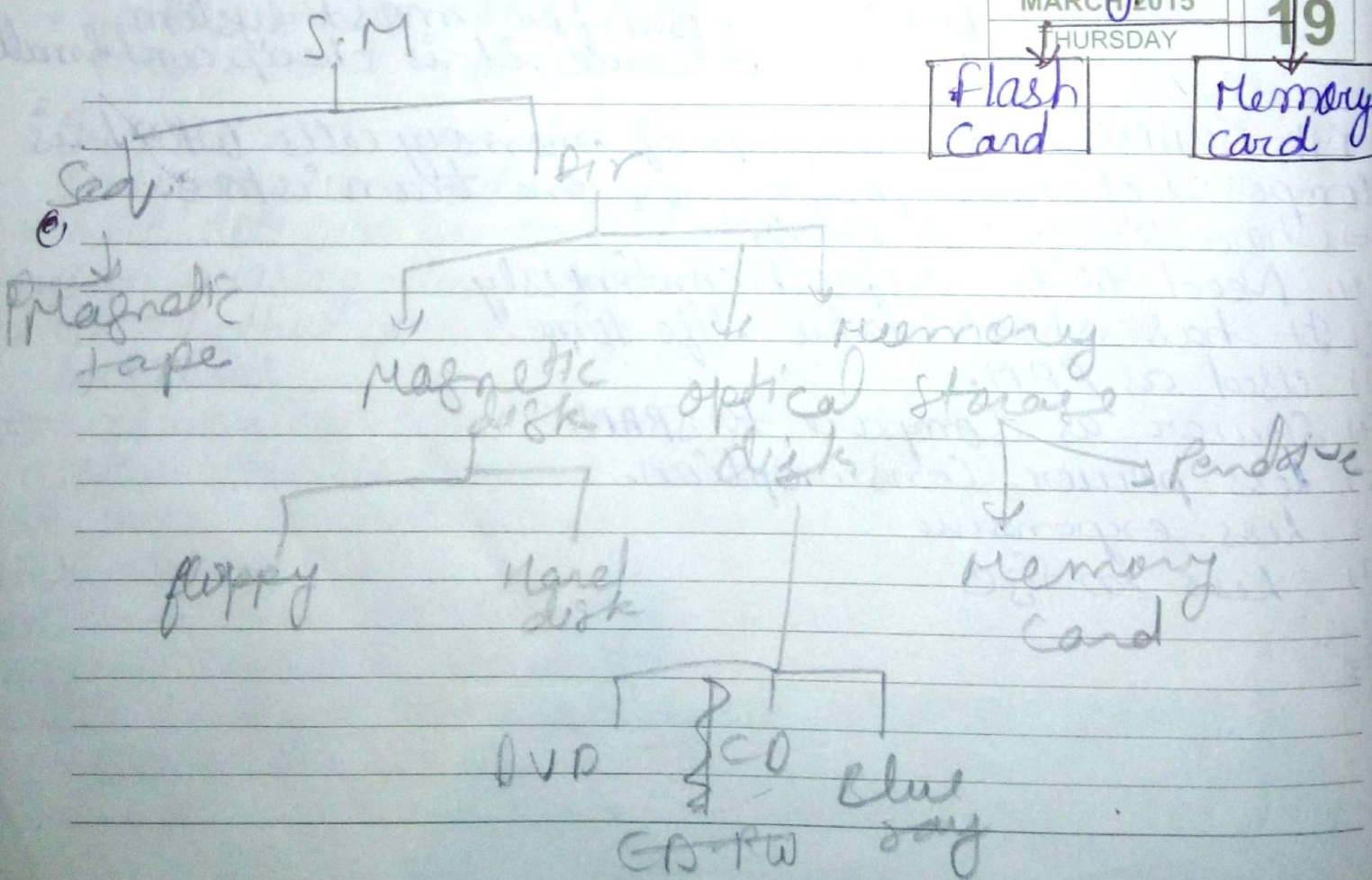
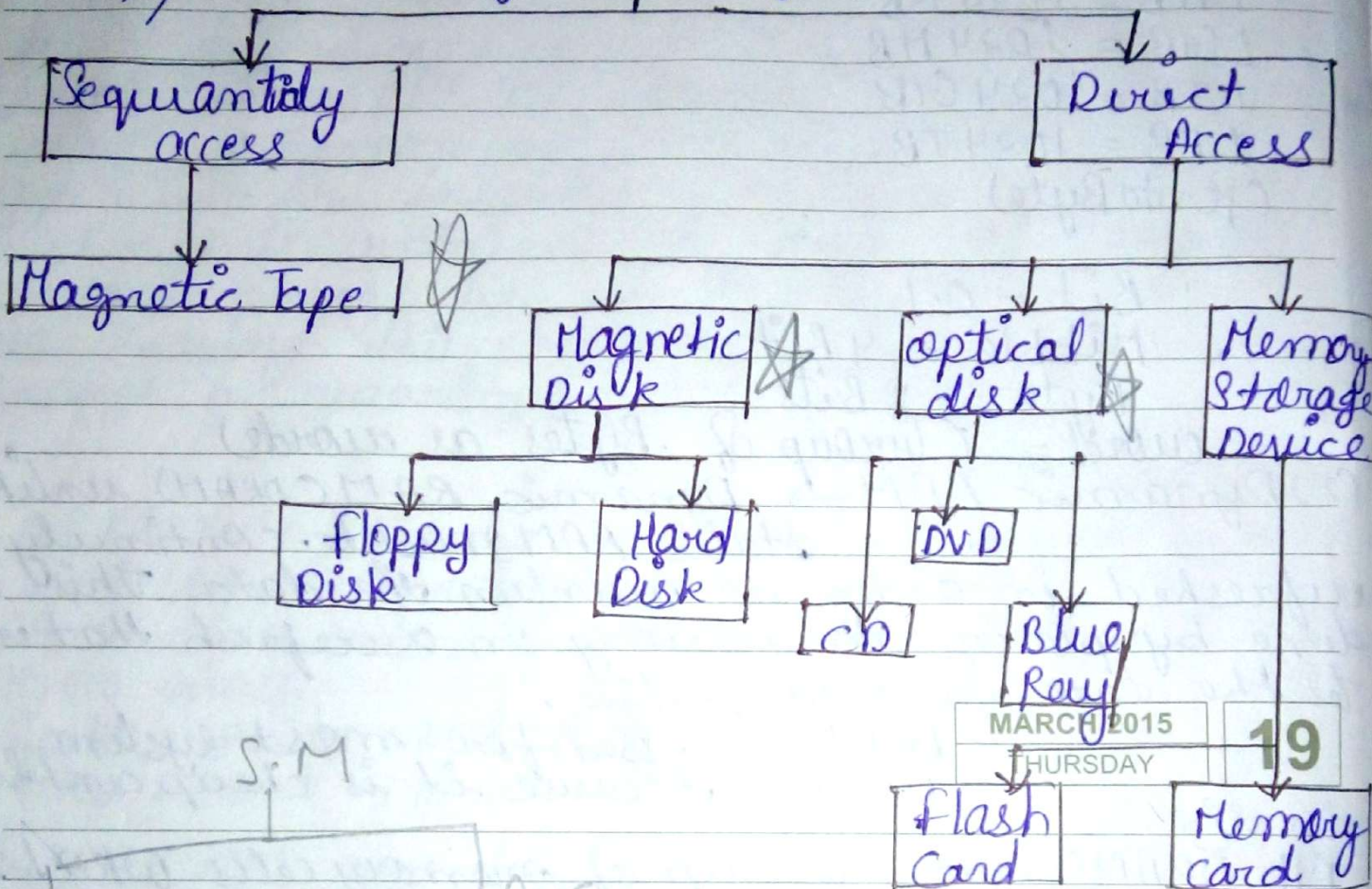
All DRAMs are made up of memory cells which is composed of one capacitor or one transistor.

⇒ Characteristics of DRAM —

- (1) Need to be refresh continuously.
- (2) It has short data life time.
- (3) Used as RAM.
- (4) Slower as compare to SRAM.
- (5) less power consumption.
- (6) less expensive
- (7) less in size



# Secondary Memory (Storage)





(1) Sequentially access →

- Sequentially access are also known as Serial access.
- In Sequentially access Data or information access by Sequentially method.
- In Data are access in Sequentially method from storage device.
- In Sequentially access must read or move through an information up to the end point of it.
- Data are return in Sequentially in storage device.

(2) Direct Access -

A direct access device is one in which any location in the device may be selected and random access or direct access.

★ Sequentially Access -

(i) Magnetic Tap →

- Magnetic tap begin as a medium for audio recording in the 1930.
- It is low cost, portability, unlimited offli storage capacity and standardised format. That make tapes inter changeable.

Laus of operation (logic gates),  
 Boolean Algebra, SOP → SSOP,  
 POS → SPOS, Demorgan's theorem



# (1) Magnetic Tape —

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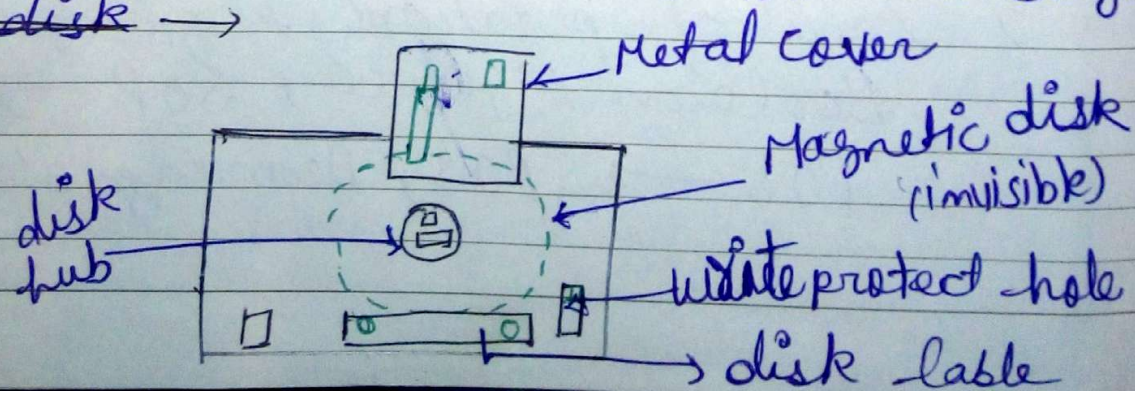
- A tape drive is a device that stores comp. data on a magnetic tape specially for back up.
- Like an ordinary tape recorder a tape drive records data on a loop of flexible & Celluloid like material that can be read and also erase.
- Drives can be rewinding where the device issues a rewinded command at the end of a session or non rewinding end.
- Tape drive works either by using a traditional helical scanner where the recording and playback heads touch the tape or linear tape technology where the head never actually touch the tape.
- The disadvantage of tape drive is that they are sequentially access drives which means that they read any particular block of data.

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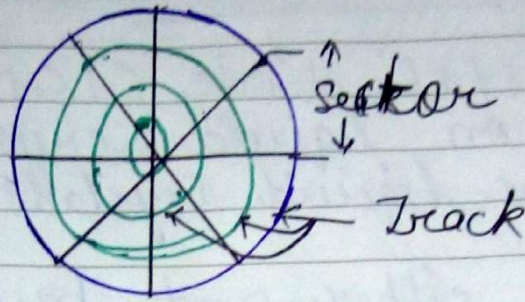
# (2) Magnetic Disk →

- Hard disk, floppy disk and digital audio tape are types of magnetic storage media.
- Magnetic media function similar, thus @ @ end audio cassette player there is a device called a read write head which creates and read magnetic impression on the disk.
- Magnetic disk can be divide in two categories

## (i) floppy disk →







- (1) 3.5" → 12 MB
- (2) 2.5" → 1.44 MB
- (3) 8" → Special type disk for requirement



## Ind Unit

### ★ Floppy Disk →

- A floppy disk is a soft magnetic disk and a floppy drive is a mechanism that reads and write data or information on a floppy.
- Unlike most hardisk and a floppy disk are portable because we can remove them from a disk drive.
- floppy disk are slower to access as compare to hardisk and have less storage capacity but they are much lesser expensive or cheaper.
- A floppy disk can be used it must be formatted the surface of the disk is divided into a number of tracks and each track subdivided into sectors.

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### ★ Hard Disk →

- Hard disk drive is the main and usually largest data storage device in a comp. It is non-volatile random access digital magnetic data storage device.
- Hard disk hold more data and are faster than floppy disk.
- A hard disk drive is made up of platters which store data read / write.
- Heads to transfer data. It is secondary store device or auxiliary.
- In hard disk data are direct random axis.
- In hard disk two type of heads are available.



- (i) fixed Heads → fixed heads share a read/write head for each track on hard disk.
- (ii) Moving head → A moving head hard disk is one in which one or more read/write heads are attached to a moveable arm which allow each head to cover many tracks of information.

### Types of hard disk

Acc. to use there are two types.

Internal → Hard disk are used in computer desktop, laptop

Acc. to functionality 2 type

(1) SATA → Serial Advanced Technology Attachment. It is four pin hard disk and faster as compare to PATA.

External → Hard disk are used for backup purpose it is also known as portable haddisk. It is costly.

(2) PATA → Parallel Advanced Technology Attachment It have 40 pins and slow in speed as compare to SATA.

SATA hard disk have low power consumption.

### \* Optical disk →

optical disk can store information or data at much high density than floppy disk. They are used for multimedia application such as ~~integers~~ images, animation, movies, sound, etc.

Optical drivers are slower than hard drives.



An optical disk drive uses a laser beam to read data from and write data to an optical disk.

## Optical Disk

CD, CD±R  
(702 MB)

DVD±R  
(4.7 GB - 8.7 GB)  
double

Blue Ray±R  
(upto 50 GB)

CD-RW, DVD-RW

i) CD → Compact Disk: —

- Compact disk is made of poly carbonate plastic & thin layer of pure aluminium is applied to make the surface reflective.
- One CD can hold 702 MB data & 3 lakh pages of text.

Compact disk is used for a drive i.e. called C.D-ROM.

Data is permanently can be stored & read any number of times

Compact disk can be made multi session disk.

Compact disk or CD a wavelength of 780 nm is used.

Compact disk are available in different speed such as 1X, 2X, ..., 12X, 16X, ..., 18X, 52X

Compact disk recordable record data.

CD±R in two formats are available some CD have -R and other some CD have +R.

CD+R → Can overwrite data → 702 MB

CD-RW can be format



ReWritable

• CD-RW → Compact disk ReWritable.

Compact Disk RW drives can erase data and reuse data on CD-RW disk

The alloy phase change recording layer which is commonly a mix of silver, indium, antimony, and Tellurium is used to dielectric layers, to erase or write over recorded data the high temperature laser beam is used

(ii) DVD → Digital video disk  
 OR  
 Digital versatile disk

A DVD-ROM is a type of optical disk technology similar to the CD-ROM.

In DVD where length of wave is 650nm is used in single side data. Dvd hold data upto 4.7GB and both side or double layer data can stored 8.5GB.

DVD also available in market in DVD+R and DVD-RW format.

DVD+R Capacity → 4.7GB, wavelength  
 → 650nm

Blu-ray → 50GB → 405nm

Blu-ray disk → In Blu-ray disk available in market in diff. ~~stor~~ storage capacity.

Blu-ray disk have higher storage capacity upto 50GB.

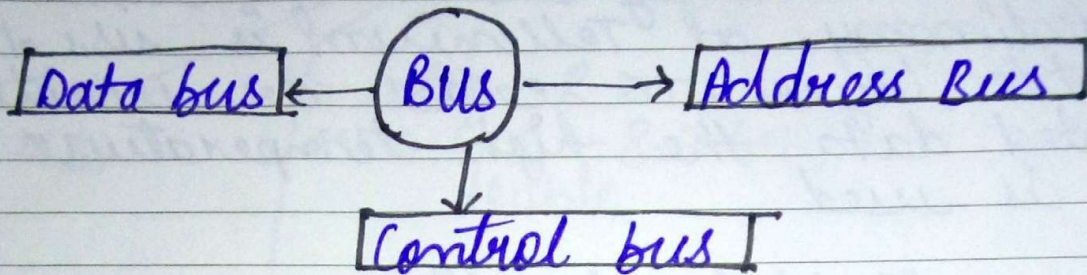
Blu-ray disk wavelength is 405nm is used



# ★ Memory storage device

Flash device  
(pendrive)

Memory card



ci) Pendrive (flash drive) → A universal serial bus (USB).

• flash drive is a small portable device that play and plug into a computer USB Code.

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• A flash drive is a small external device critically the size of human thumb that consist of flash memory.

• USB flash drive are removable & rewritable, read and write flash drive memory.

• The flash drive are a solid state medium that both inexpensive & durable.

• The USB drive or flash drive are available in two categories by speed.

2.0  
(480 milli/Sec)

3.0  
(500 bigabit / Sec)

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Flash drives are available in different storing capacities. 1GB, 2GB... - 198GB.



(ii) Memory Card →

- Memory Card made up by semiconductor materials it is used in many electronic devices such as mobile, hardcap, tablet, etc.
- It is available in different storage capacities and size.
- It is small in size like as a chip.
- Memory cards store data or information such as audio, video, picture, photo, text, document as in binary format.
- Memory card direct access multimedia storage device.

Number System

① Decimal Number

- ② Binary Number → 0, 1, base → 2
- ③ Octal Number
- ④ Hexa Number
- ⑤ Bsky Number
- ⑥ Gray Code Number
- ⑦ 1's complement
- ⑧ Two's complement

$r = \text{num} \% 2$

Decimal to octal → 85 →

8	85	5
8	10	2
	1	

← start  
 ⇒ (125)<sub>8</sub>

Octal to decimal → 0 - 7 base 8  
 $5 \times 8^0 + 2 \times 8^1 + 1 \times 8^2$   
 $5 + 16 + 64 = 85$



Hexa number (0-9)

10 - A

11 - B

12 - C

13 - D

14 - E

15 - F

Ex → 999

16	999	7
16	63	14
	3	

$$\begin{aligned}
 3E7 &\Rightarrow 3 \times 16^0 + E \times 16^1 + 7 \times 16^2 \\
 \downarrow &\Rightarrow 3 + 224 + 768 \\
 14 &\Rightarrow 999
 \end{aligned}$$

Octal to binary →

Ex → ~~027~~ (125)<sub>8</sub>

★ fraction decimal no → Binary

(i)

0.625	
x 2	
1.250	1
x 2	
2.500	0
x 2	
5.000	1

⇒ 101

(ii) 11.025 → 2 / 11 /



fraction

\* Decimal to Octal →

\* Binary to Octal →

- 0 → 000
- 1 → 001
- 2 → 010
- 3 → 011
- 4 → 100
- 5 → 101
- 6 → 110
- 7 → 111

Ex →

Binary → 2<sup>2</sup>  
Octal → 8 → 2<sup>3</sup>

← start

$$(101011)_2 \rightarrow (53)_8$$

Ex →  $(1101.1101)_2 \rightarrow (001101.110100)_8$   
 $\Rightarrow (15.64)_8$

\* Binary to Hexa →  
 $(10110010)_2$



\* Octal of Binary -

Ex-  $(705)_8 = (\underline{111} \underline{000} \underline{101})_2$

$(2043.536)_8 \Rightarrow (010000100011.10101110)_2$

Hexa to Binary  $\rightarrow$

Ex  $\rightarrow (5AC)_{16} \Rightarrow$

\* Octal to Hexa  $\rightarrow$

$(251)_8 \rightarrow$







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26	27	28	29	30									

Excess 3 → 0110 → any No.  
 ↳ +0011  
1001

\* Gray-code →

0	$G_3$	$G_2$	$G_1$	$G_0$
0	0	0	0	0
1	0	0	0	1
2	0	0	1	1

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