

- C → calculation
- O → operation
- M → memory
- P → printing / output
- V → update
- T → Table / Tab
- E → editing
- R → Restore

Necessity is the mother of invention.

Computer is an electronic device capable of performing arithmetic and logical operations.

It accept raw data as input and process on that input and convert into result of input data.

According to the sequence of instruction given by the programme / user and provide the desired information as output.

* Evolution of computer :

Some well known early computers

- The mark I (1937 - 44)
- Other - soft Berry (1939 - 42)
- ENIAC (1943 - 46)
- EDVAC (1946 - 52)
- EDIAC (1947 - 49)
- UNIVAC (1951)
- Manchester Mark-I (1948)

electronic calculator digne to any calculations. It is well complex and bulky in size, it include approx 17,000 v.b (vacuum tube) for storage it use 10,000 capacitors and 30,000 registers.

- 4) The EDVAC (1946-52) - It stands electronic discrete reversible automatic calculator computer was digne on stored programs concept on binary digits or number (0,1). This is the first computer that could store data and instructions.
- 5) The EDSAC (1947-49) - It stands for electronic delay storage automatic calculator computer. It was also a first generation computer that was digned to launch a more advance technology means performers of arithmetic operations on a high speed and also digital based (0,1)
- 6) The UNIVAC (1951) - It stands for universal automatic computer. It was first fully digital computer. In this computer first time digned by commercial purpose use.
- 7) The manchester mark-I (1948) - It was the first stored program electronic computer. It also called MADAM. (manchester automatic digital machine)

Ex - Honeywell 400, IBM (1920), IBM (1901), CDC 1604, CDC 3600.

Note : Here is operating system were introduce in the ending phase of 2nd generation.

(3) Third generation of computer : (1964-75) In this generation computer were developed in between 1964-75.

VACUUM tube and transistors both were replaced by the integrated circuit.

The IC consist of several electronic components on a single chip of silicon and connected to each other with logical electronic circuits like transistors. (Integrate collection)

On the basis of how many number of electronic device are connected to each other with logical electronic circuits on a single chip that is categorized into two categories like -

i) SST : Small scale integration
Generally in this type of IC have < 3000 electronic components on a single IC chip.

ii) LSI : Medium scale integration
It had generally $> = 30,000$ and upto $< = 1,00,000$ electronic components on a single chip.

The third generation computer have more powerful, reliable, accurate as compare to 2nd generation.

• It is smaller in size, less expensive and has maintenance requirement as compare to second generation.

Advantages : 1) They are less electricity.

2) RAM was established as the main memory.
3) It has involve the big storage, flexibility.
4) In this generation operating system are frequently use on command based time sharing operating system.

Note : More than one person, job are execute simultaneously (at a time) using time sharing operating system.

Disadvantages : 1) Hard to maintain the IC's.

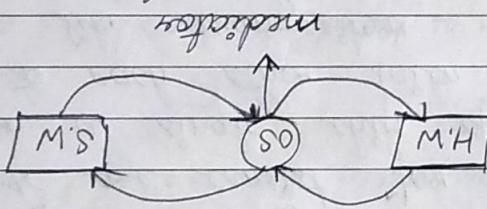
2) Heat generation is very high so it required cooling mechanism like AC, cooler.
Ex - PDP-8, PDP-11, ICL - 2900, IBM - 360 & 370

4) Fourth generation of computer : (1975-89) It was feasible to integrate one lac electronic components on a single chip known as LSI and next advance mainframe of LSI in this generation is known as VLSI (very large scale integration).
During the 4th generation magnetic storage are replaced by semi conductor memory.

Disadvantages:

- 2) High maintenance cost is still high.
- 3) It uses high limited frequencies for transmitters.
- 4) The size is less as compare to its generation.
- 5) Accesses on microseconds. (10^-6)
- 6) They could have high speed so if compared a
- 7) They produced less heat as compare to VT.
- 8) Less expensive, small in size as compare to JFET.
- 9) of frequency crowding worse like COOL, FORTTRAN etc.
- 10) In this generation assemble language
- 11) processing speed soon 10^5 , 10^6 , 10^7

Advantages:



Generation.

- 1) source more reliable as compare to first
- 2) metall stable than glass.
- 3) durability made up by germanium semi conductor
- 4) They source more hard and strong electronic
- 5) compare to vacuum tube.
- 6) they were better electron switching device as
- 7) tube (one type of transistors is equivalent to one vacuum tube).
- 8) source use transistor and self biased the vacuum
- 9) generation 1955 - 64. In this generation computer
- 10) the field of solid state
- 11) collected generation of compare

2) Collected generation of compare:

Logical steps.

(I.Q. → Intelligence quotient)

- 6) Power of remembering : It means a computer can store and recall any amount of information because of its secondary storage capability. Every piece of information can be retained as long as desired by the user and can be recall.
- 7) No-I.Q. : A computer is not a magical device. Its I.Q. level is 0 (zero) or non because of its working are defined or made by programmers.
- 8) No Feelings : Computer have no feeling until today because they are machine and machine.

* The generation of computer :

The generation of computer is a group of technology that provide framework for the group of computer industry. The computers have progressed from the long years to the present day. Now a days computer were used advance technology for processing and finally convert into result.

- 1) First generation of computer (1942-1955) : In this generation by using thousands of vacuum tube for calculation of mathematical equations. It is a fragile glass device. It was the only high speed electronic

Decimal (10)	Binary (2)	Octal (2^3) (8)	Hexa decimal (2^4)
0	0 0	0 0 0	0 0 0
1	0 1	0 0 1	0 0 1
2	(0, 1)	0 1 0	0 1 0
3		0 1 1	0 1 1
4		1 0 0	1 0 0
5		1 0 1	1 0 1
6		1 1 0	1 1 0
7		1 1 1	1 1 1
8	(0 to 7)		1 0 0 0
9			1 0 0 1
(0 to 9)			1 0 1 0 A(10)
			1 0 1 1 B(11)
			1 1 0 0 C(12)
			1 1 0 1 D(13)
			1 1 1 0 E(14)
			1 1 1 1 F(15)

* Binary n.s. (2) -

This is exactly like the decimal number system except that the base is 2 instead of 10.

Behave only 2 symbols for digits (0, 1) which can be used in this number system.

Note: Smallest value of in this is 0 and maximum value is 1 (base-1)

Each position in a binary number system represent a power of the base. In the system the right most position is the event 2^0 position. The second position from the right is 2 or

Q: Write short note on von - neumann architecture.

A) Structure: It is most simplest form of this architecture because it has sequential flow of instructions (sequencing), control unit (control), memory unit (memory), arithmetic unit (arithmetic) and output unit (output).

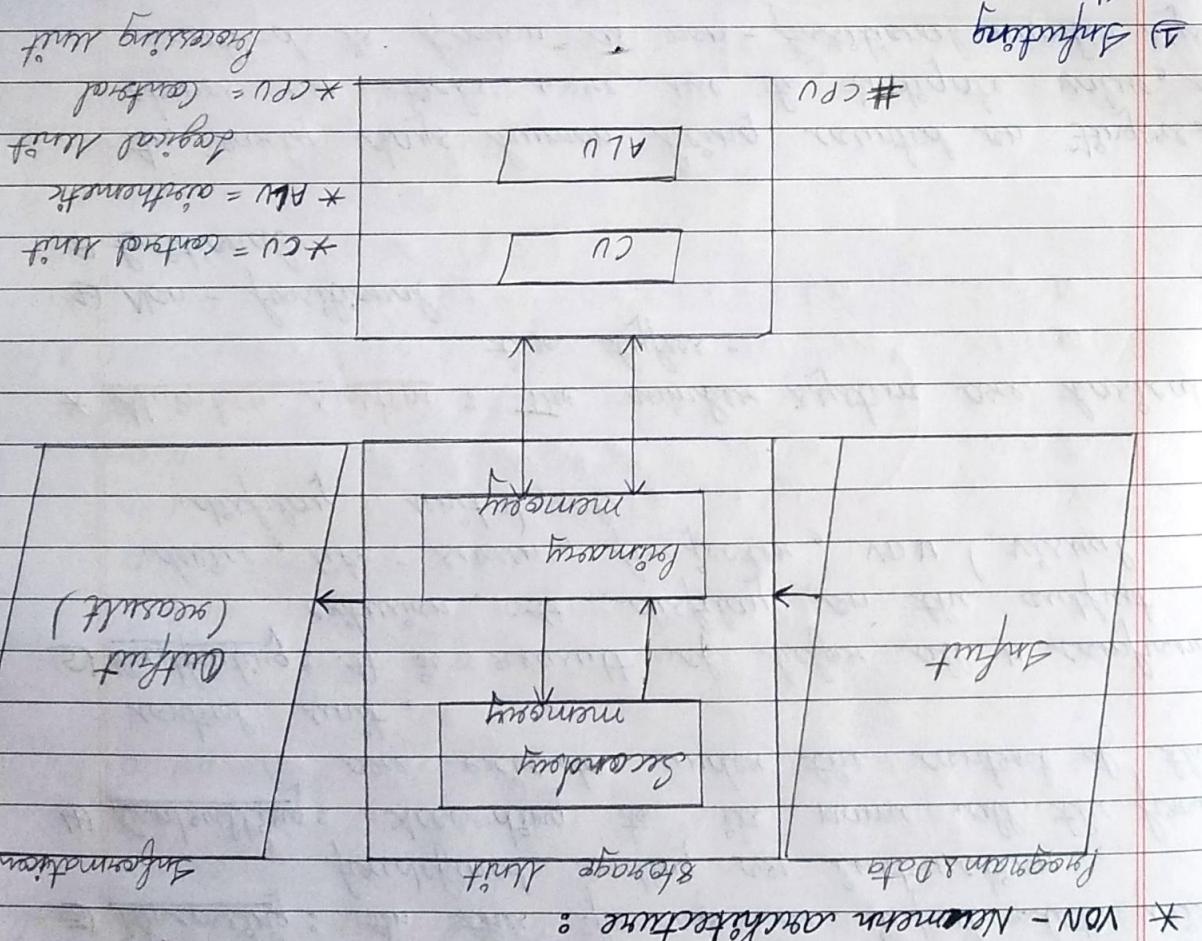
a) Sequencing:

b) Control:

c) Memory:

d) Arithmetic:

e) Output:



* VON - NEUMANN ARCHITECTURE :

Advantages: 1) They become more powerful.
like - CD, DVD, HDD & SSD, data card screen.

Disadvantages: i) In this generation they use music -
if has millions of old designs configurations are
processes of a time.
ii) High level languages are used like C, C++, Java,
VB etc.
iii) Has access of a time.

Advantages: 1) This generation they use music -
means WWW (world wide web) as well as benefit
describable by form descriptive.
ii) It is more reliable, accurate and good as compared
to the old generation.
iii) They use high as compare to the old generation
and comfortable as called PC. (Personal computer)
iv) They become easily accessible (easy to use) and if
connected less maintenance.

Ex - IBM 386, DEC 10, after 1980
5) High generation of computer: (1989 - till now) In this
the visit technology become VLSI. (Ultra large scale
circuit chip technology)
at becomes now is VLSI (Ultra - which large scale
is use AI (artificial intelligence).
it becomes comfortable this generation of VLSI
in this technology there has been introduced
the most advance comfortable has been introduced
in this technology fully uses.
They use more semiconductor function as CD-RW
compact disk - ROM.

Disadvantages: designing of micro - processor is very
expensive.
Ex - IBM 386, DEC 10, after 1980
5) High generation of computer: (1989 - till now) In this
the visit technology become VLSI. (Ultra large scale
circuit chip technology)
at becomes now is VLSI (Ultra - which large scale
is use AI (artificial intelligence).
it becomes comfortable this generation of VLSI
in this technology there has been introduced
the most advance comfortable has been introduced
in this technology fully uses.

$$16+8+0+0+1 \\ = (25)_{10}$$

- $(25)_{10} = (?)_2$

2	25	1
2	12	0
2	6	0
2	3	1
1		(11001) ₂

- $(767)_{10} = (?)_2$

2	767	1
2	383	1
2	191	1
2	95	1
2	47	1
2	23	1
2	11	1
2	5	1
2	2	0
1		(10111111) ₂

- $(10111111)_{2} = (?)_{10}$

$$1 \quad 0 \quad 1 \quad 1 \quad 1 \quad 1 \quad 1 \quad 1 \quad 1$$

$$2^9 \quad 2^8 \quad 2^7 \quad 2^6 \quad 2^5 \quad 2^4 \quad 2^3 \quad 2^2 \quad 2^1 \quad 2^0$$

$$512 \quad 256 \quad 128 \quad 64 \quad 32 \quad 16 \quad 8 \quad 4 \quad 2 \quad 1$$

$$512 \times 1 \quad 256 \times 0 \quad 128 \times 1 \quad 64 \times 1 \quad 32 \times 1 \quad 16 \times 1 \quad 8 \times 1 \quad 4 \times 1 \quad 2 \times 1 \quad 1 \times 1$$

$$512 + 0 + 128 + 64 + 32 + 16 + 8 + 4 + 2 + 1 \\ = (767)_{10}$$

Ex $(10110011)_2 = (?)_8$

$$\begin{array}{ccccccc}
 1 & 0 & . & 1 & 1 & 0 & 0 & 1 & 1 \\
 2^7 & 2^6 & 2^5 & 2^4 & 2^3 & 2^2 & 2^1 & 2^0 \\
 128 & 64 & 32 & 16 & 8 & 4 & 2 & 1 \\
 128 \times 1 & 64 \times 0 & 32 \times 1 & 16 \times 1 & 8 \times 0 & 4 \times 0 & 2 \times 1 & 1 \times 1
 \end{array}$$

$$128 + 0 + 32 + 16 + 0 + 0 + 2 + 1$$

$$(179)_{10}$$

$$\begin{array}{r|rr}
 8 & 179 & 3 \\
 8 & 22 & 6 \\
 & 2
 \end{array}$$

$$(263)_8$$

$$\begin{array}{ccc}
 2 & 6 & 3 \\
 8^2 & 8^1 & 8^0 \\
 64 & 8 & 1 \\
 64 \times 8 & 8 \times 6 & 1 \times 3 \\
 128 + 48 + 3 \\
 (179)
 \end{array}$$

$$\begin{array}{r|rr}
 2 & 179 & 1 \\
 2 & 89 & 1 \\
 2 & 44 & 0 \\
 2 & 22 & 0 \\
 2 & 11 & 0 \\
 2 & 5 & 1 \\
 2 & 2 & 0 \\
 & 1
 \end{array}$$

$$(10100011)_2$$

* Hexadecimal number system -

0 to 9

0000

001

D10

011

100

101

110

111

1000

1001

0 to 15 0 to F

1010 = 10 = A

1011 = 11 = B

1100 = 12 = C

1101 = 13 = D

1110 = 14 = E

1111 = 15 = F

$$\underline{\text{Ex}} - (\text{FBC})_{16} = (?)_{2,8}$$

$$\begin{array}{cccc}
 15 & 11 & 12 & \\
 16^2 & 16^1 & 16^0 & \\
 256 & 16 & 1 & \\
 256 \times 15 & 16 \times 11 & 1 \times 12 & \\
 3840 + 176 + 12 & & & \\
 (4028)_{10} & & & \\
 \hline
 8 & 4028 & 4 & \\
 8 & 503 & 7 & \\
 \hline
 8 & 62 & 6 & \\
 \hline
 7 & (7674)_8 & &
 \end{array}$$

$$\begin{array}{ccc}
 2 & 4028 & 0 \\
 2 & 2014 & 0 \\
 \hline
 2 & 1007 & 1 \\
 \hline
 2 & 503 & 1 \\
 \hline
 2 & 251 & 1 \\
 \hline
 2 & 125 & 1 \\
 \hline
 2 & 62 & 0 \\
 \hline
 2 & 31 & 1 \\
 \hline
 2 & 15 & 1 \\
 \hline
 2 & 7 & 1 \\
 \hline
 2 & 3 & 1 \\
 \hline
 1 & & (1111011100)
 \end{array}$$

* Shortcut method of binary to octal conversion :

$$\underline{\text{Ex}} - (011001010100)_2 = (?)_8$$

Step:1 - Divided the binary digits into group of 3 bits because of (2^3 octal bit combination) starting from right side to left hand side.

0 1 1 0 0 1 0 1 0 1 0 0

$$011 \Rightarrow 3$$

$$001 \Rightarrow 1$$

$$010 \Rightarrow 2$$

$$100 \Rightarrow 4$$

$$(3124)_8$$

Step:2 - Convert each group into 1 digit of octal using binary to decimal conversion or octal number system table.

* Logic gates :

All operations within a computer are carried out by means of combinations of signals passing through standardised blocks of built-in circuits. Which are known as logic gates.

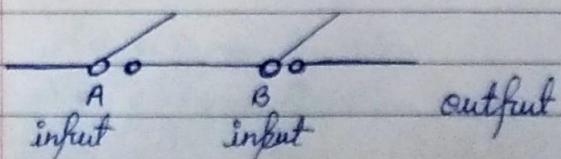
In other words logic gates is a electronic circuits which operates on one or more input signals to produce standardised output signal. Computer circuits are built up using combination of different types of logic gates necessary operations.

Types of logic gates :

- (i) AND
- (ii) OR
- (iii) NOT

(iv) AND GATE \Rightarrow And AND gate is the physical realization of the logical multiplication (AND) operation it is an electronic circuits which generate and output signal '1' only if all input is 1 that means if all inputs in and gate is 1 then output is generate 1 otherwise if any 1 input is 0 then result is generated zero.

Representation of and gate :



Ex $(10111.1101)_2 = (?)_{10}$

$$\begin{array}{r} 1 \ 0 \ 1 \ 1 \ 1 \ . \ 1 \ 1 \ 0 \ 1 \\ 2^4 \ 2^3 \ 2^2 \ 2^1 \ 2^0 \quad 2^{-1} \ 2^{-2} \ 2^{-3} \ 2^{-4} \\ 16 \ 8 \ 4 \ 2 \ 1 \quad \frac{1}{2} \ \frac{1}{4} \ \frac{0}{8} \ \frac{1}{16} \\ 16 \times 1.8 \times 0.4 \times (2 \times 1) \times 1 \end{array}$$

$$\frac{16+0+4+2+1}{23} \quad \frac{8+4+0+1}{16} = \frac{13}{16}$$

0.8125

$$= (23.8125)_{10}$$

Ex $(1011.1011)_2 = (?)_{10}$

$$\begin{array}{r} 1 \ 0 \ 1 \ 1 \\ 2^3 \ 2^2 \ 2^1 \ 2^0 \\ 8 \ 0 \ 2 \ 1 \\ 8+0+2+1 = 11 \end{array} \quad \begin{array}{r} 1 \ 0 \ 1 \ 1 \\ 2^1 \ 2^0 \ 2^{-1} \ 2^{-2} \ 2^{-3} \ 2^{-4} \\ \frac{1}{2} \ \frac{0}{2^0} \ \frac{1}{2^3} \ \frac{1}{2^4} \\ \frac{1}{2} + \frac{0}{4} + \frac{1}{8} + \frac{1}{16} \end{array}$$

$$\frac{8+0+2+1}{16} = \frac{11}{16} = 0.687$$

(b) Decimal to binary

2	1	1	
2	5		1
2	2	0	
1			(1011)

(c) Octal to decimal

Ex $(35.12)_8 = (?)_{10}$

3 5

$8^1 \ 8^0$

$8 \times 3 \ 1 \times 5$

$$24+5 = (29)_{10}$$

$1 \ 2$

$8^{-1} \ 8^{-2}$

$\frac{1}{8} + \frac{2}{64}$

$$\frac{8+2}{64} = \left(\frac{10}{64}\right)_{10} \left(\frac{5}{32}\right)_{10}$$

$$(0.156)_{10}$$

* Shortcut method of binary to hexa decimal:

(4 bit/digit combination group of binary number)

$$\underline{\text{Ex}} \quad (0000\underline{1101}\underline{1111}\underline{0010}\underline{1010}\underline{1010})_2 = (?)_{16}$$

$$0000 = 0$$

$$0110 = 6$$

$$1111 = F$$

$$1001 = 9$$

$$0101 = 5$$

$$0101 = 5$$

$$(06F955)_{16}$$

$$\underline{\text{Ex}} \quad (2AFEBC)_{16} = (?)_2$$

$$2 = 0010$$

$$A = 1010$$

$$F = 1111$$

$$E = 1110$$

$$9 = 0010$$

$$B = 1011$$

$$C = 1100$$

$$(0010101011111000101011100)_2$$

* Fractional number system -

(a) Binary to decimal

$$\underline{\text{Ex}} \quad (101.101)_2 = (?)_{10}$$

$$101.101 \\ 2^3 2^2 2^1 2^0 \quad 2^1 2^0 2^{-1}$$

$$4 2 1 \quad \frac{1}{2} + \frac{0}{4} + \frac{1}{8}$$

Left	Right
Integer	0.0 to 0.9
value	floating / float
(0 to 9)	Double
3 2 1 0	-1 -2 -3

$$4 \times 1.2 \times 0.1 \times 1 \quad \frac{4+0+1}{8} = \frac{5}{8}$$

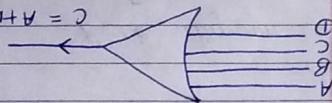
$$4 + 0 + 1$$

$$5 \quad 0.625$$

$$(5.625)_{10}$$

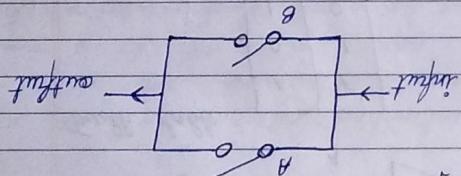
$$g_3 = 8 \text{ confirmation}$$

Truth table of OR gate:



Block diagram of the gate

There are more subtleties are connected in parallel return.



Reclassification of or grade:

That means it's or gate all inputs are 1 then result is one but more if in this any then result is zero but more if in this any input is 1 then result is 1 nearly 1 possibility if all input is 0 then generate result is 0 (zero) if all input is 0

(iii) OR GATE \Rightarrow It is an also a physical seal generator
of the digital adder and of the logic circuit which generation.
It also a useful signal of, if many input signal

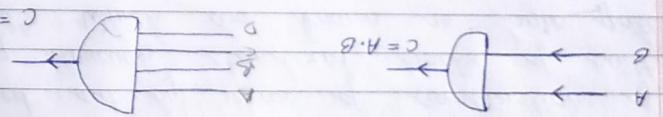
A	B	C	$\phi = A \cdot B \cdot C$
0	0	0	0
0	0	1	0
0	1	0	0
0	1	1	1
1	0	0	0
1	0	1	1
1	1	0	1
1	1	1	1

If input is in the
 $g_3 = g \text{ (constant)}$

$$Q = \text{efficiency} \times (\text{factors})$$

When *infant* is the first α = a continuation is due.

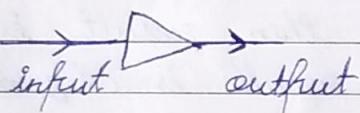
Twin-table for sand quote:



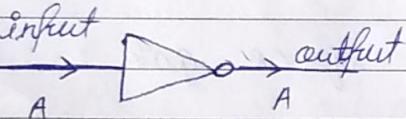
Two or more subtethes connected in series form

Note gate \Rightarrow This is a physical realization of the complementation operation. It is an electronic circuit which generates an output signal which is the reverse of the input signal so a note gate is also a (zero) known as an inverter of input to output.

Representation:



Block diagram:

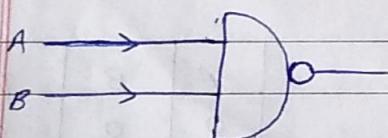


Truth table

A	A'
0	1
1	0

NAND GATE \Rightarrow

"Gate is a complemented AND gate that is the output of NAND gate will be a '1', if anyone of the inputs is a zero (0) AND will be a zero only when all the inputs are 1 the symbol \uparrow is usually used to represent a NAND gate operation."



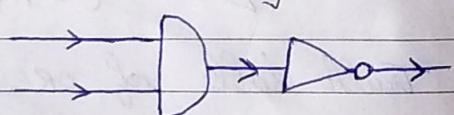
$$C = A \uparrow B$$

OR

A.B
OR

$$A + B$$

Block diagram



$$C = A \uparrow B$$

	active at this time but if stored in buffer.
3) PCR (program control registers)	It hold the address of the next instruction to be executed
4) AR (accumulator register)	It means accumulator result and value to be displayed up on.
5) IR (Instruction register)	It hold an instruction, while it is being executed.
6) I/O-R (input output register)	It use for communication with input output devices.

* Processors : CISC

RISC

EPIC

Processor :-

The operations of the ALU & CPU are performed at incredible speed.

These operations are usually synchronized by a built-in electronic clock (known as system clock) which limits millions of regular electronic pulses per second on that bases mazer speed of processor generally processor speed is measured in MHz & GHz

Types of processors :

1) CISC (Complex Instruction set computer) - CPU were designed to support a variety of addressing modes. CPU with large instruction set

relative nature.

- Character sticks -

- No need to refresh.
- Faster.
- Used as cash memory.
- Expensive.
- High power consumption.

(ii) DRAM - It must be continually required refresh to maintain the data. This is done by the memory on a circuit that's called a refresh circuit, that rewrite the data several 100 times per second. It is composed by the capacitor and transistors.

- Character sticks -

- Short data life time.
- Needs to be refresh continuously.
- Slow as compare to SRAM.
- Smaller in size.
- Less expensive.
- Less power consumption.

2) Read only memory:

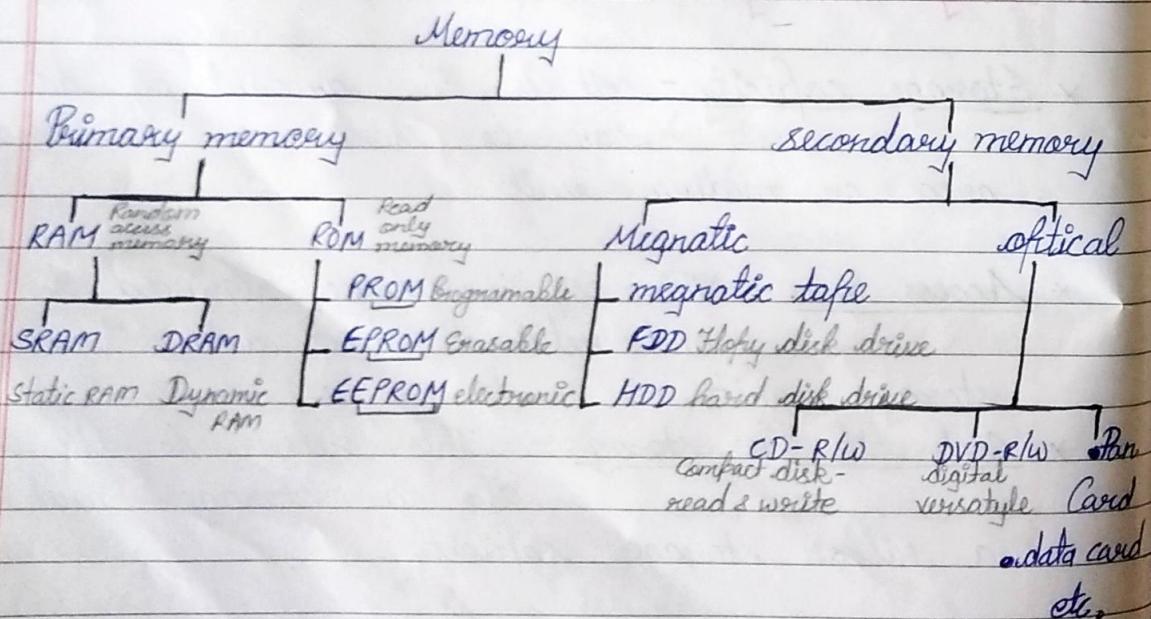
The memory from which we can only read but can not write on it. This type of memory is non-relative nature means data loss is not when power is turnoff or any kind of interruption. The information is stored permanently. On that bases there are categorised various types:-

In other word volatile storage is never recoverable because it work in primary nature.

- 8) Non-volatile : When the data or information are convert into secondary storage so that data will be recovered.

* Memory management -

- Primary memory - current processing
- Secondary memory - convert into permanent storage for long time.
- Cache memory - according to requirement borrowed memory that can used and after the released automatically. (Fast memory)



variable Length Instruction and a variety of Instruction / addressing. CISC processes it so many processing Features. They make a job of a language programming for processing various type of instruction set / addressing mode.

(It introduce in early 1980)

② RISC (reduced instruction set computer) - RISC processes have a small instruction set. They place extra demand on programmers who must consider how to implement complex computations by combining simple instructions. RISC processors are faster than CISC and less complex, less expensive as compare to CISC.

(It introduce in after 1988.)

~~EPIIC~~ (The electronic explicitly parallel Instruction complex)

③ EPIIC (The explicitly parallel Instruction computer / computing)
 In this processor more than 1 instruction set simultaneously at a time, that means the sequential nature of conventional processor architecture break the processor, so it is more easy and powerful as compare to RISC.

(This processor are mostly used in current time)

into 2 types first is magnetic and second is optical memory.

(i) Magnetic memory: In this category devices comes that uses magnetic methods of storage means storage of information in form of magnetically.

a) magnetic tape - this is used for storing large volume of data in a sequential manner storage. The tape is plastic ribbon of 1 by 1/2 inch wide which is coated by magnetic material (iron oxide) in one or both sides.

The tape ribbon is self store in grade of 50 to 2000 feet. In a small categorised.

The tape is divided into columns is called frames and horizontal row is called tracks. Magnetic tape is used for backing of data in large amount for long time and transmission speed measured in mega bits per second.

magnetic disk -



tracks , tracks number between o to n. These tracks are further divided into small elements is called sectors. These sectors determine the amount of data that can be read or write in a single record read write operation.

b) Seek time : this is a time to position read/ write over the drive track in other word you can say that if you want to move one track to another track that moment will take a particular time is known as seek time.

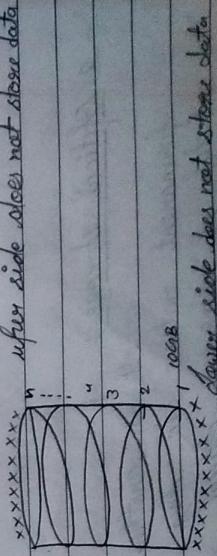
on track another track

10^{-6} or 10^{-9} only

Latency time : it is the time taken for the drive sector to pass through the read / write head. In other word you can say that if we want to move head one to another sector that will take a times is known as latency time.

one after another sector

(ii) Hard disk drive -

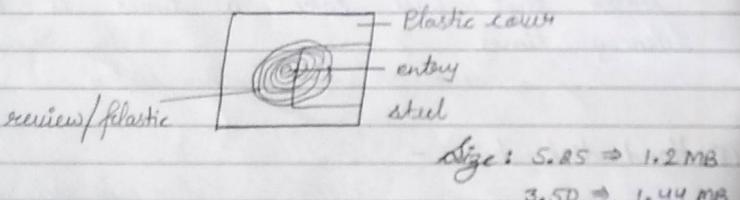


It is storage of data as a series of magnetized non-magnetized spots on flat top surface on disk. Each disk surface is comprises of several concentric paths known as tracks. These tracks are number from outer to inner

Hard disk is a permanent storage device of data in large amount. It works like a storage medium of information in long time. It's matrix like arrangement of two or more than 2 disk pack coated with a magnetic material (iron oxide) on both side of each disk. Each disk arranged in one over to another in such a manner, that they can not read lower side of first disk and upper side of last disk because these disk are single side coated with iron oxide that means no storage of data on both side because of damaging or loss of data.

Note: hard disk matrix is basically digits in cylindrically shape.

(ii) Floppy disk drive - It is also used to store data magnetically. It is plate with plastic disk enclosed with a plastic sheet to protect them.



2) Optical storage:

It is another medium of storage in permanent nature in huge (large) amount. This type of storage optical material like optical

Fiber is used and this is coated on one of disk side to store data in form of optical based.

Where is to store of information is known as files from like as a file from storage.

Block: smallest unit of any data

(i) Compact disk - ROM - In this device data can be stored only once means it not provide rewrite or erasing facilities this is called WORM (write once read many). CD-ROM organized as a spherical logical tracks. Unlike magnetic several sectors of same size and same length, so disk moves less if it is to be readed from outer track to inner track. That motorized is faster than movement of inner to outer track.

Data transfer rate of a disk is measured in 'x' means multiply define Kbps or Mbps. 100 Kbps it means drive has to go 100 so its data transfer speed is measured like 52×100 Kbps.

Note: generally a CD-ROM capacity of 600 to 800 Mbps and 30 to 80 minutes.

(ii) DVD-ROM - It is much like CD-ROM and store data optically but it can store much larger data than CD-ROM because of its layer matrix. DVD store data in layers form if storage capacity depends on how many number of layers are used to making DVD.

- (i) Typing keys: Generally these keys are included A to z and 0 to 9 same like type writer.
- (ii) Numeric keys: It use to enter the numeric data at cursor(.) moment. It consist of a set of 17 keys.
- (iii) Function keys: These are present on the keyboard nifur side from F₁ to F₁₂ or F₁₅. Each function key has a unk machine / meaning (machine code) for specific purpose.
- (iv) Control keys: (ctrl) These keys provide cursor and screen control. It included 4 arrow keys, control keys also included like home, end, insert, delete, page up, page down, ctrl, alt, escape.
- (v) Special purpose keys: Keyboard also contains some special purpose keys such as enter, shift, capslock, num lock, spacebar, tab and print screen.

* Keyboard / Input mechanism / working of keyboard:

When the user press a key on a keyboard controller, then keyboard controller identify this key and generate a scan code on that key.

The key-board controller then stores the scan codes into the key-board buffer. It (KB) switch to into the CPU memory. After scanning storing scan code key-board controller is inform the CPU. Above this incident by generating an interrupt signal.

like pen. It use to select displayed menu items or draw pictures on the monitor screen. It consist of photo cell and optical system placed in a small tube.

When the tip of light pen is moved on monitor screen then pen button is focused sensing elements and detect the screen location send to the CPU.

* Track ball:

It has an input device that is mostly used in notebook or laptop / computer. Instead of mouse. This is a ball which is hay inserted by moving fingers on the ball. Then pointer can be moved.

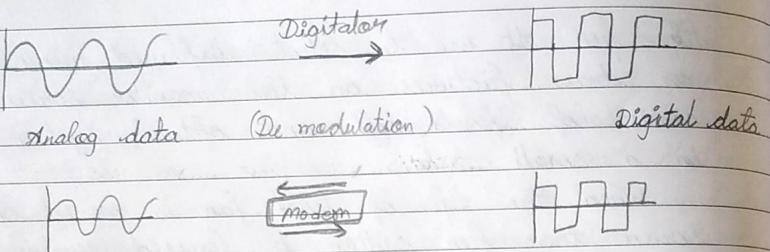
* Scanner:

It is also a input device Infuting message / Information / data in form of scanning material. All the information are scan by sensor and light emitting diode (LED). Which scanning reflected lights sense by the scanner.

Scanner scan and store the documents or an image in form of various extensions like - .bmp, .JPG, .JPEG, .PNG etc and various documents formats like .DOC, .PDF etc.

* Graphic tablet (digitizer) -

This device which convert analog information into digital information.



It convert a signal from the television or camera into a series of numbers that could be stored in a computer. It also convert graphics and pictures data into binary.

* Microphone :

It take input as a sound then store in digital form, it also use for multimedia presentation and sound mixing.

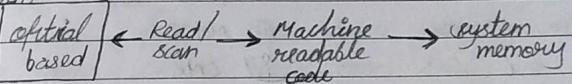
* MICR (magnetic ink character reader) : This device is used to read magnetic shots or magnetic characters written with a special magnetic liquid of ink.

It's generally used banking sectors. There are large number of cheques to be processed everyday because written information is a particular magnetic material that use machine for.

* OCR (optical character reader) : It is an another input device to use to read printed text of optical based. OCR scan the text optically, character by character and converted into a machine readable code and store

that information in the system memory.

Mechanism



* BCR (Barcode reader) :

It is device use for reading bar code data (data in the form of light and the dark lines). It is generally used in labelling goods, numbering of the books etc. It may be a handheld scanner or may be embedded scanner. It scan the barcode image, convert into an alpha numeric value and display that information on the corresponding output screen device.

* OMR (optical mark reader) :

It is special type of scanner use to recognize the type of mark made by pen or pencil. It used where one out of few alternatives selected marked. It is specially use for checking answers of the answer sheet of the exam having multiple choice question.

* ECR (electronic card reader) :

This cards are small plastic cards having encoded information which are appropriate for the applications.
For example - ATM.

Q) Pen drive - . (Flash drive) It also known as flash memory, enabling easy to transfat of data from 1 to another device.

- The size of pen drive comes in various shapes and stylish digne and may have different additional Features. It work on plug-and-plug device matanizm using USB code (universal serial bus) of any devices. It treat as a removal or fracting (easy to carry).
- Its available storage size now days like 2GB to 512GB.

Memory card or data card : It is similer to Flash drive but its shape or digne like a card.

- It also work on plug-and-plug device matanizm using a fract. (various types of fracts are available)
- Its available storage size nowdays 2 GB to 128 GB.

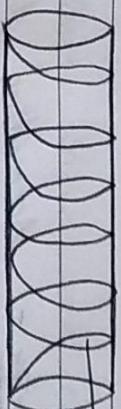
Q) Write short notes on : primary memory ④
 Cache memory
 Storage criteria
 Volatile memory
 Non-volatile memory
 EPROM
 hard disk

Q) Explain memory management in detail with flow chart. ⑫

Q) Explain secondary memory in detail. ④

Q) Explain all types of ROM in detail. ④

Q) Describe hard disk storage matanizm. ④

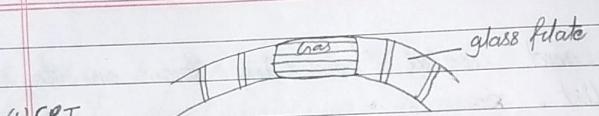


storage of data

(d) chain printer - It uses a rapidly rotating chain that is called chain printing, the chain contains information in a magnetically and point the information according to character positions its speed 400-2400 lines / minut.

(e) inkjet printer - It is an non - impact printer. It use ink draw plates spray for printing documents and image on the paper. There is the ink cartridge which is use to spray ink on the paper by the nozzles (more nozzles). When is required to print them spray the ink to the ribbon plates these plates create a magnetic field and permanently print on the paper after that this paper move to heating filament now finally the information are print on the paper. In this printer use a ink spray nozzle mechanism or method so that is called inkjet. Its printing quality depends on DPI (dot per inch) generally its DPI is varied from 300 - 1200 DPI.

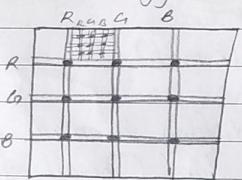
(f) Laser printer - It is also non - impact printer because it used a laser ray for printing documents or image in higher quality. It store that information in internal memory in a queue pattern then according to queue mechanism or algorithm or print the document. Printing quality and speed of laser printer a very high as compare



i) CRT

Cathod ray tube

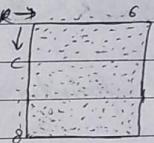
Monitors are commonly used output device. It is same like television screen. It work on a vacuum tube method known as CRT. According to CRT mechanism heating filament are generate heat in form of electrons then controlling of these electrons by cathod that produce positive and negative and positive electron are control now convert into a electron beam that electron beam is strike the phosphorous (PbSO_4) coated screen. Now PbSO_4 item is accept that striking energy and move on its higher orbit after that striking of beam energy will not continue to PbSO_4 electron item so this electron is now fall down. Its base orbit and generate a spot of light from fall down energy is called pixel.



RGB colour model
(soft output)

* Pixel: It is a smallest unit on the screen on which monitor can focus in a time or we can say a pixel individual dots on the screen or a pixel is a smallest unit of any image. quality of image is directly proportional to number of pixel. Means if pixel is high then quality of image is high if pixel is down then picture quality is also down.

* Resolution : Number of pixel in column \times No of pixel in row



$$\text{Resolution} = 8 \times 6 = 48 \text{ pixel}$$

Resolution is calculate by multiplication of row and column pixels without over lapping.

On the based on resolution there are various types-

i) VGRA (vector graphic array) - According to this, it has combination $640 \times 480 \Rightarrow 16$ colors combination and another is $320 \times 200 = 256$ colors.

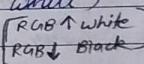
ii) SVGA (Super vector graphic array) - It has single resolution combination like :

$$1024 \times 768 = 256 \text{ colors.}$$

iii) CGA (character graphic array) - This is basic types of resolution First is :

$$640 \times 200 = 2 \text{ colors combination (Black & white)}$$

$$320 \times 200 = 40 \text{ colors combination}$$



iv) EGA (Enhanced graphic array) - It is slightly advanced category of CGA.

$$640 \times 350 \Rightarrow 256 \text{ colors}$$

* TFT-Display (thin film transfer) : This mechanism is worked on display data in between two thin films with using of various gases, other materials for example - LCD, flat panel display.

Q: What is input device? / what is input?

- With short notes on - i) mouse
ii) track ball
iii) MCR
iv) OMR

Q: Define input - meaning of key-board.

Output devices -

Output devices are those devices that are used to output or display passed data/ processed data to the user or outside world (real world).

- Several output devices are available today. They can be broadly classified into various types as categorized
- i) Monitor iv) Screen image projector
 - ii) Printer v) voice response system (speaker)
 - iii) Plotter

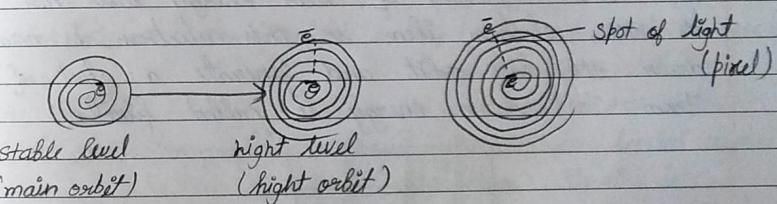
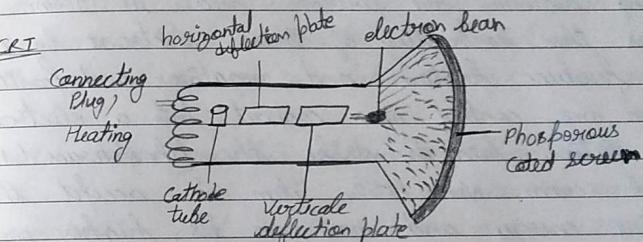
* Monitor : It is known as VDU (visual display unit)

The main output device of a computer is known as monitor. It forms images from small dots (pixel) that are arranged in a rectangular form in matrix method. On that basis of display there are various types of monitors are available like LCD (liquid crystal display), LED (light emitting diode), flat-panel display, TFT (Thin Film Transistor), CRT (cathode ray tube).

Note: Soft copy output - This output is not produced on a paper or some other material which can not

be touch and carried for being from one to another list.

Hard copy output - This output is produced on a paper and some other material, this can be touch and carried for being one to another place. They are permanent in nature.



The CRT/ monitor/ display is made up of small picture elements known as pixel (small spot of light). The smaller pixel is better for display images. The combination of pixel in a particular area without over lapping is called resolution. In other word here is explain horizontal and vertical pixel ratio (aspect ratio). Also known as resolution.

to others.

- (g) Thermal wax printer - According to its name it use wax for printing so it contains wax cartridge. After the completion of printing the paper fixes by the heating rods for permanent and quality printing.

* Plotter :

A special type of output devices called is plotter. It use for ideal or digining printing and outline printing. Generally its use architecter, engineers and city planners etc.

- * Speakers : It use for hearing output in analog or digital form of data. If you want to amplify the data then it use only analog signal and if you want to boost the data then use digital signal.

[
amplify - analog
boost - digital]

- * Projector : It also important device of output, it work on projection mechanism / method that means larger display of small things using projection mechanism.

* Types of instruction set :

It is a group of information that referent process / mechanism / method of any work start to end. So, in other work we can say that collection of steps of any work from start to end.

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boost - digital]

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control of process to another device without any condition.

(b) Conditional Branch IS - this is not cause branching, depends on some conditions if all the conditions are matched then transfer of control a process otherwise terminate.

vii Shift and rotated IS : It involved the bit wise shifting or rotation in both direction.

viii Iteration control IS : This instruction can be used to execute a series of instructions same number of times.

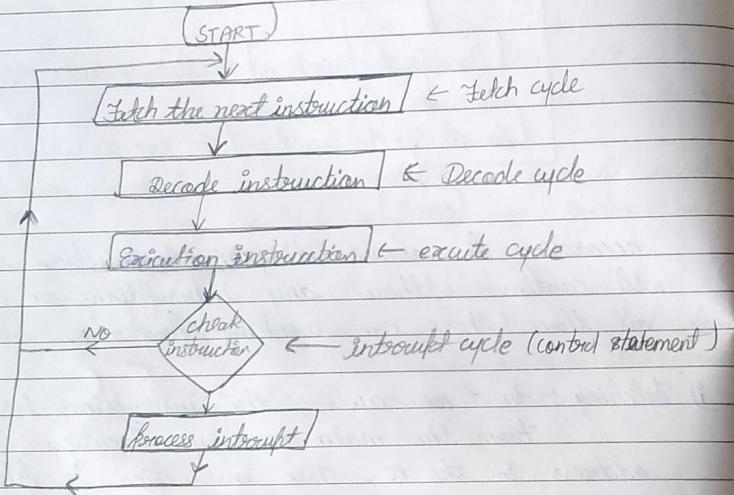
viii Interrupt and process control IS : This is used in a interruption but process will continue using skip, avoid, wait etc.

Q8 * Instruction life cycle : - the main function of CPU is execute program. A program, consisting of a sequence of instruction to perform a particular task. Programs are stored in memory.

The CPU fetch the instruction at a time from the memory and execute it. First of all CPU fetch the first instruction of the program then execute according to its priority or execution instruction after the fetch next instruction an execute that process will continue until the end instruction. All that process are divided into 3 phases.

in the destination location after that completion then PC contains the address of next instruction or new Fetching cycle.

so much VIE Interruption cycle with instruction :



In this checking the execution code before final execution if it is no error then process next instruction to Fetch cycle. If it has interrupt or error then move to process interrupt for recycling / reprocessing.

Q Explain instruction life cycle with interrupt.

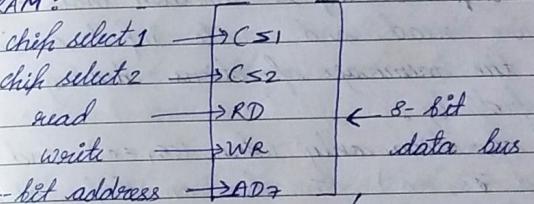
* Memory subsystem organization & interfacing : It is the construction and functions of all the memory subsystem of a computer is examined. The different types of

physical memory and internal organization of these chips are examined.

User examined the construction of the memory subsystem as well as multi-bit word organizations and advance memory organization.

These types of there are two types of memory chips.

i) RAM:



(This is block diagram of ram chip)

It is called read / write memory, can be used to store data that changes.

It use for communication with the CPU if it has one or more control lines to select the chip only it has bidirectional data bus for both read and write operations.

In show the block diagram of RAM chip it has 128 words of 8 bits per word. This diagram 7 bit address and 8 bit bidirectional data bus.

* Function of RAM chip

or

Function table of RAM chip :

i) Control - According to this all the step control (process) with program or code.

b) Text - This is control statement worked on status of process may be interrupt (terminate process) and not reply for execution of the command more that called code just before start known as waiting queue and finally it is you then go to next.

c) Read - In this reading on data in from I/O modules.

After that again a control statement check if it is yes (complete / done) then go to next instruction otherwise move to the first statement.

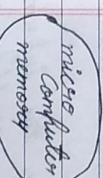
d) Interrupt driven Input-output :

According to this mode transmission of data in between two or more with interruption, detection and correction of errors then continues the process until completed.

* Classification *

Programmed input-output

According to this mode



DMA : DMA (direct memory address)

② It depends on interrupt system initialization.

③ It depends on interrupt status.

④ It depends on interrupt transmission.

Comparatively slow process of data transmission.

It requires interrupt hardware for accuracy of data received.

Definition - It is technique that transfer of data between a micro computer memory and

Processor is dedicated to processes to transfer data task of I/O and can between memory and I/O more data at gather than module. high rate.

Control : - According to this all the steps are control (process) with preprogrammed or code.

Read : - In this reading of data from input output module.

Write : - In this writing data into memory. After that again a control statement check if it yes (complete) than go to next instruction otherwise move to the first statement.

Text : - This is control statements worked status of process maybe interrupt (terminate process) and not ready for execution of the CPU then move the code just before state known as waiting queue finally if it yes then go to next.

According to data transfer means transmission of data between two or more electronic devices and internal transmission between CPU and memory, CPU and input output devices, memory and so on that bases there are three modes of data transfer.

- i) Programmed input output
- ii) Comparison between input output and interrupt driven input output.
- iii) DMA (direct memory access)

CS_1	CS_2	RD	WR	memory function	state of data bus
0	0	x	x	Inhibit	high impedance
0	1	x	x	Inhibit	high impedance
1	0	0	0	Inhibit	high impedance
1	0	0	1	write	input data to RAM
1	0	1	x	read	output data from RAM
1	1	x	x	Inhibit	high impedance

working of ram chip according to function table -

i) RD and WR are read and write input commands that specify the memory operations during read and write respectively.

ii) This input is operation only when ($CS_1=0$) and ($CS_2=1$) or ($CS_1=1$ and $CS_2=0$). The bar on top of second shift select indicate that this input is enabled when it is equal to 0 (zero).

iii) Thus, if the shift select inputs are not enabled, only they are enabled but read and write lines are not enable. The memory is inhibited and its data bus is in high impedance.

When shift select inputs are enabled for example : $CS_1=1$ and $CS_2=0$ the memory can be read or write mode.

iv) Row chip :

chip select 1	CS_1
chip select 2	CS_2
bit address	8 bit unidirectional data bus ROM

DMA operations :-

- 1) Burst mode : In this an entire block of data is transferred in one continuous sequence once the DMA controller granted access to the system bus of the CPU.
- 2) Cycle stealing mode : In this mode the DMA obtains access to the bus the same way as in burst mode using BR (bus request) and BG (Bus grant) signals.
- 3) Temparament mode : it take the most time to transfer data blocks, yet, and the most efficient mode in terms of overall performance.

* Micro operations :-

This is a primary function of CPU is to execute sequence of instruction which is in accordance with instruction life cycle. It has three phase fetching, decoding / encoding execution is called micro operations.

It is elementary operation perform on the information stored in one or more registers. Its result may replace the previous binary information of a register or it may be transfer to another register that's called is shift, count, clear and load.

Types of micro operations :-

- 1) Arithmetic micro operation : It perform arithmetic operation on numeric

the left and to the right respectively.

In this statement one bit shift to left or right in respect of register R₁ and R₂.

- Q. Explain program input/output transmission mode.

Ans write short notes on :

- i) DMA
- ii) Logical micro operations

* Classification of computer —

i) workstation

is mainframe computer

iii) Server computer

iv) Client - server

v) Tablet

vi) Netbook

vii) Laptop etc.

All classification is based on size and design and according to their performance.

ii) Workstation : It is powerful high end micro

computer the content are more mini processor. It generally come with a large and high resolution perspective screen.

Advantage — It has high quality graphics and performance.

- It work many CPU at the time.
- It used for research purpose.

Disadvantages — Size is very large.

- It not use for domestic purpose.
- Not easily available.

iii) Mainframe computer : It also known as super computer because it used in

big organization specially for used data processing like share marketing enterprises resources planning and income tax processing (GST) it solve / execute.

Advantage — It solve / execution million of instruction per second.

- It have also ability to run more than session at a time.

Disadvantage — Initial setup fast very high

because it required sum dedicated

and knowledgeable staff and employee. It required sum special kind of operating system and software.

iv) Super computer : According to its name it is

computer they accomplished typical, complex mathematical equation (exacts for 10¹²) are solved at very fast speed. "Sequoia" ray is developed first super computer at control data corporation (CDC) in 1960.

Basically super computer are used for complex calculation like space related for example CRAYZ, cyber 805, PEARL.

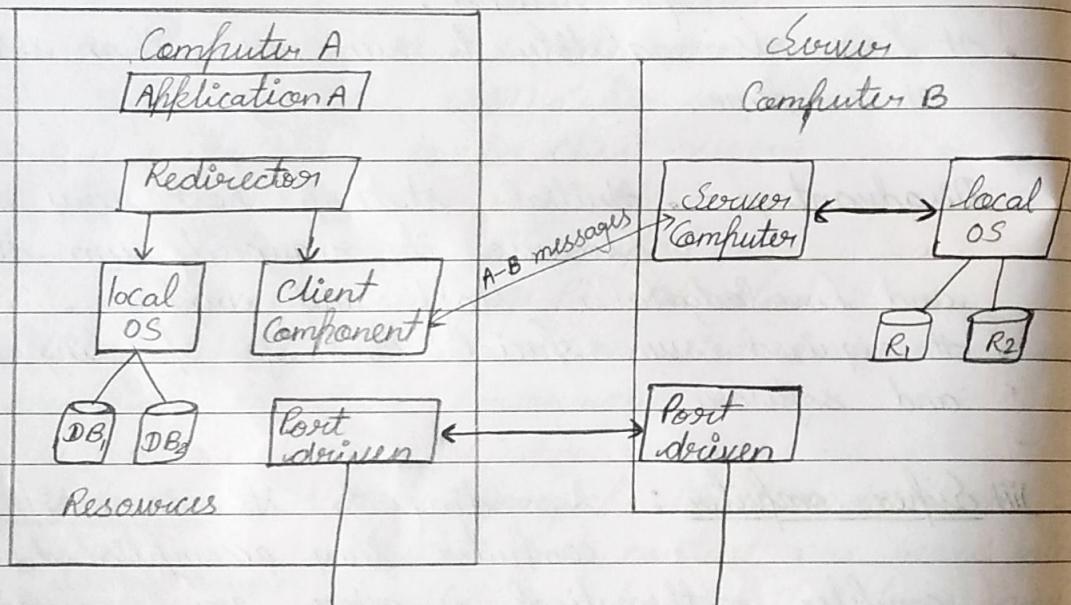
Advantage - They are used for scientific research and simulation on very fast speed.

- Large and complex calculation can be easily solved.

Disadvantage - high expensive.

- power consumption is high.
- Large in size so occupy large area.
- Its specific did same specific work.

iv) Client server computer :



This is the basic diagram of client server computer.

here R_1 & R_2 = Resources

DB_1 & DB_2 = Database

It is a distributed application structure that partition take of work load between the provider of resources and services. According to request

- iii) Sound card - It used as a sound producing device in computer that can be heard through speaker and headphones.
- iv) T.V. turner card - It use to receive T.V. signals and display on the computer screen.

Ports :

- i) Serial port - Use to external modem and address computer system.
- ii) Parallel - It use for connecting parallel devices like scanner, printer etc.
- iii) PS/2 Port - use for old computer key-board or mouse connecting.
- iv) Universal serial bus (USB) - It can connect all kind of external devices like hard disk, printer, scanner, mouse, key-board etc.
- v) Vector graphic array (VGA port) - It can use to connect monitor to a computer video card.
- vi) Power connector - use for power connecting. (earphones)
- vii) Firewire port - It use for data transfer in very fast speed.
- viii) Modem - conversion of data digital to analog and analog to digital.
- ix) Either net - It use to high speed network and connect more computer / devices.
- x) Game port - For playing game.

* Addressing techniques / mods :

It is specify who to calculate the effective memory address of an

i) Data bus : According to its name the data bus used to information carrying between two devices like input-output and other.

The purpose of data bus to serve a counter between the CPU and other devices.

Now, we can say sending of information as data, using various types of medium between 2 end points. It can may be same or different kind of devices and there communicate to each other with wiring, wireless and circuit based.

ii) Address bus : An address bus is a computer bus architecture use to transfer data between 2 or more devices that are identify by the hardware address of the physical memory. Ex- if the processor need to read data from memory at a particular location, it would place the address of that location on the address bus and send a control signal for transmission of data between source and destination.

iii) Control bus : It is used by CPU for communicating with other devices within the computer. It regulate the activity on bus and CPU generate a signal for controlling transmission process.

Typical control bus signal are read, write, interrupt, request etc.

Bus architecture :

i) ISA (Industry standardised architecture) - Basically it is a additional expansion card to be attach computer / mother-board for more data transmission.

ii) EISA (Enhanced Industry standardised architecture) - It is updated version of ISA means it provide advance and better services to user.

iii) MCA (Micro channel architecture) - It is an interface between a computer and multiple computers and its expansion cards and their associated devices.

iv) PCI (Peripheral Component Interconnect) - It use for high performance of bus intergate with chips processor and other expansion cards.

v) AGP (accelerated graphics port) - It use for increase display graphics in better show that means increase the graphics quality of information.

Expansion cards :

i) NIC (Network adaptor cards) - It also known as NIC (network interface cards) for communication between 2 or more devices.

ii) SCSI (small computer system interface) - It also called is host adapter is a PC that is installed in an expansion slot and use to computer storage.

Disadvantage - • expensive rather than pc, battery backup is not long or limit up to 3 or 4 hours.

v) Tablet computer : It is a mobile computer with touch screen display, all the ~~auxiliary~~ equipment with sensor.

Advantage - • Portable means it can work everywhere.
• smaller in size and flexible screen.

Disadvantage - • Potential screen damages so preparing very costly.
• Limited capability for works.

vi) Palmtop : It is also known as personal computer or PDA (personal digital assistant). Latest PDA work on voice based recognition.

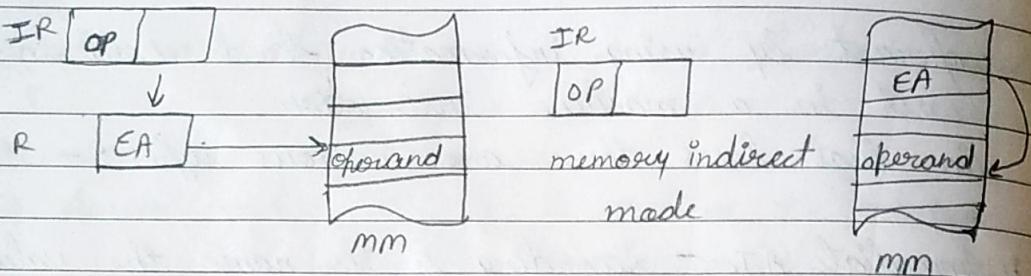
Advantage - • Small size high weight.
• Little in wireless facility and other devices.

Disadvantage - • small screen, small storage and limited features.

* Bus :

It use for transmission of data or communication between 2 or more devices using circuit based communication and also used wiring and wireless.

Buses are the information highway for the

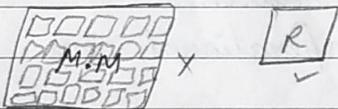


i This is also called Intermediate memory location

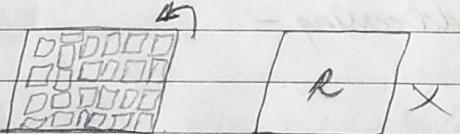
In this technique the address of the data is held in an intermediate location so that the address is first looked up and then use to locate the data it self.

iv Register direct addressing - It is similar to direct addressing that means working of this direct to memory the only difference between them address field refers to a register rather than main memory address.

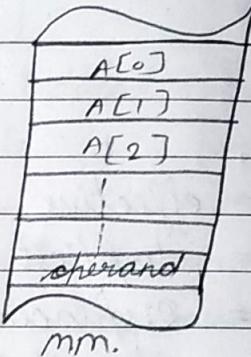
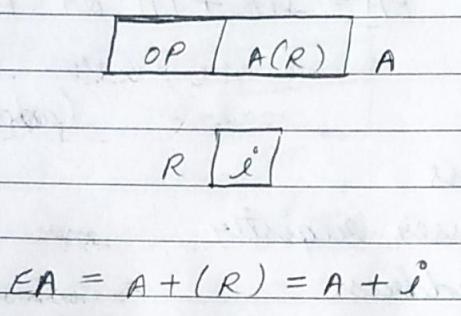
But in register addressing mode space is very limited. It depends on programmer (user) to store address in main memory registers.



v Register Indirect addressing - It is same as indirect addressing mode. Here, data will be in memory and will be in register memory. Its working like same as indirect addressing.



ix) Indexed addressing -



This register contain the address of operand with respect to a fixed memory address. In other word here is, we can say addresses are stored in sorting order. On that bases, there are two types

- (a) Preindexing
- (b) Postindexing

$$EA = (A + R)$$

$$EA = (A) + (R)$$