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REGISTRATION NO. :-2021CA063

CLASS:- MCA FIRST YEAR
SUBJECT:- DCO THEORY

ASSIGNMENT :- 01
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DCO THEORY Assignment

Date
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Micro Processor	Year of Introduction	Word length	Memory addressing capacity	Pins	clock	Remarks
4004	1971	4-bit	1 KB	16	750KHz	first microprocessor
8085	1976	8-bit	64kB	40	3-6MHz	Popular 8-bit microprocessor
8086	1978	16-bit	1MB	40	5-10MHz	Popular 16 bit microprocessor
80486	1989	32-bit	4 GiB real 64GiB virtual	168 PGA	25-100 MHz	Contain MMU chache and FPU, 1.2 MT
Pentium	1993	32-bit	4 GiB real 32-bit address 64 bit data bus	237 PGA	60-200	Contain 2 ALU & caches FPU, 3.3 MT 3.3V & 5V Version
Pentium Pro	1995	32-bit	64 GiB real 36-bit address bus	387 PGA	150 200MHz	it is a data flow processor it contain chache 3.3V
Celeron	1998	32-bit	—	—	32 GHz	Low cost processor
Pentium 4	2000	32bit	64GiB	423 PGA	1.3 1.2GHz	Data flow Architecture and SIMD Instruction
Itanium	2001	64bit	64 address line	423 PGA	733 1.5GHz	64 bit EPIC
i7965XE	2009 Quad Core	32-bit	—	—	3.2GHz	Quad CPU on single chip
Xeon Processor E7-8800	—	64 bit	—	—	—	64 bit Processor for server.

Number System :- The language we use to communicate with each other is comprised of word and characters, we understand number character and word ; but this type of data is not suitable for computers. Computer only understand the numbers.

" So when we entered data, the data is converted into electronic pulse. each pulse is identified as code and the code is converted in to numeric format by ASCII. "

The number systems used in computers are.

1. Binary Number System - Base 2. Digit used : 0, 1
2. Octal Number system - Base 8. Digit used : 0 to 7
3. Decimal Number System - Base 10 Digit used : 0 to 9
4. Hexa Decimal Number System - Base 16 Digit used : 0 to 9 & Letters used : A - F

Conversion from binary to decimal

$$(101011)_2 = 1\times2^5 + 0\times2^4 + 1\times2^3 + 0\times2^2 + 1\times2^1 + 1\times2^0$$
$$= (43)_{10}$$

Conversion from binary to octal

$$(101011)_2 = (153)_8$$

Conversion from binary to hexadecimal

$$(10110001)_2 = (B1)_{16}$$

Conversion from decimal to binary

$$(27)_{10} = (11011)_2$$

Conversion from hexadecimal to binary

$(9)_{16} = (1001)_2$

Conversion from decimal to hexadecimal

$(129)_{10} = (81)_{16}$

Conversion from hexadecimal to decimal

$(5C)_{16} = (92)_{10}$

Conversion from octal to binary

$(946)_8 = (100\ 101\ 110)_2$

Ans 1.1

A	B	C	A·B·C	(A·B·C)'	A'	B'	C'	A'+B'+C'
0	0	0	0	1	1	1	1	1
0	0	1	0	1	1	1	0	1
0	1	0	0	1	1	0	1	1
0	1	1	0	1	1	0	0	1
1	0	0	0	1	0	1	1	1
1	0	1	0	1	0	1	0	1
1	1	0	0	1	0	0	1	1
1	1	1	1	0	0	0	0	0

Here we see in above truth table $(A \cdot B \cdot C)' = A' + B' + C'$

Ans 1.2

A	B	C	A⊕B	A⊕B⊕C
0	0	0	0	0
0	0	1	0	1
0	1	0	1	1
0	1	1	1	0
1	0	0	1	1
1	0	1	1	0
1	1	0	0	0
1	1	1	0	1

Ans 1.3

(a) $A + AB = A(1+B) = A$

(b) $AB + AB' = A(B+B') = A$

(c) $A'BC + AC = C(A'B + A)$
$= C(A+A')(A+B)$
$= (A+B)C$

(d) $A'B + AB'C + ABC$
$= A'B + AB(C+C')$
$= A'B + AB$
$B(A'+A) = B$

Ans 1.4 (a) $AB + A(CD + CD')$

$= AB + AC(D + D')$

$= AB + AC$

$= A(B + C)$

(b) $(BC' + A'D)(AB' + CD')$

$= ABB'C' + A'AB'D' + BCC'D' + ACC'D'D = 0$

Ans 1.5 (a) $(A + B)'(A' + B')'$

$= (A'B')(AB)$

$= 0$

(b) $A + A'B + A'B'$

$A + A'(B + B')$

$A + A'$

$= 1$

Ans 1.6 $f = x'y + xyz'$

$f' = (x + y')(x' + y' + z') = x'y' + xy' + y'y' + xz + y'z$

$= y'(1 + x' + x + z) + xz$

$= y' + xz$

Now $f \cdot f' = (x'y + xyz')(y' + xz) = 0 + 0 + 0 + 0 = 0$

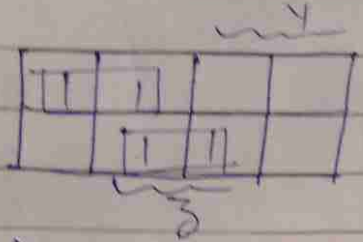
$f + f' = x'y + xyz' + y' + xz(y + y')$

$= x'y + xy(z + z') + y'(1 + xz) = x'y + xy + y'$

$= y(x + x') + y' = 1$

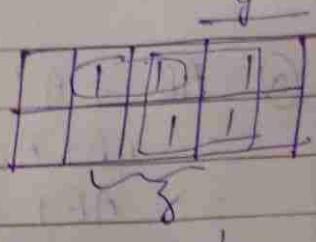
Ans 1.8

(a)



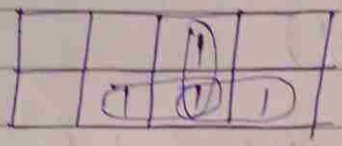
$F = x'y' + xz$

(b)

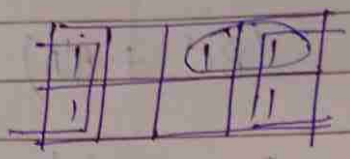


$F = y + x'z$

(c)



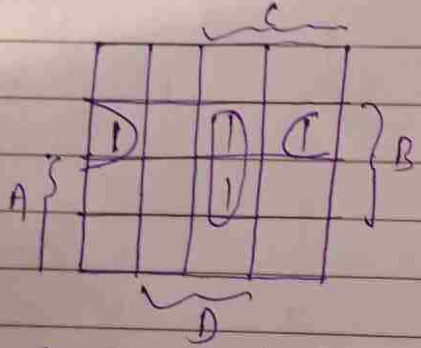
$F = xy + xz + yz$



$F = C' + A'B$

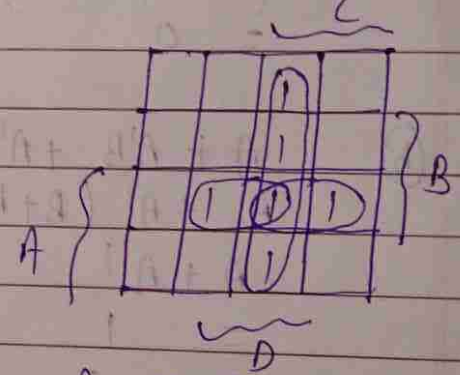
Ans 1.9

(a)



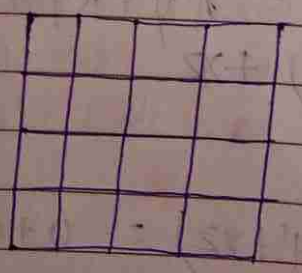
$F = BCD + A'BD'$

(b)



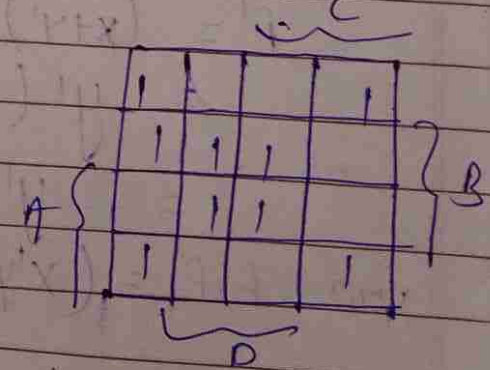
$F = CD + ABC + ABD$

(c)



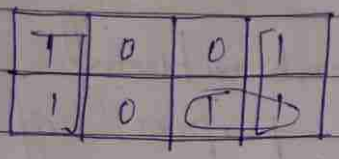
$F = A'C' + A'BD' + ACD + \begin{cases} A'BD \\ \text{or} \\ BCD \end{cases}$

(d)



$F = BD + B'D' + \begin{matrix} A'B \\ \text{or} \\ AD' \end{matrix}$

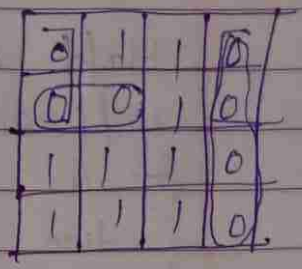
Ans 1.10 (a)



(1) $f = xy + z'$

$f' = x'z + y'z$

(b)



$f = Ac' + CD + B'D$

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Assignment - 02

Half Adder :-

Half adder is a combinational logic circuit
It is used for the purpose of adding
two single bit number
It contains two input two output (sum & carry)

Half adder is designed in following steps -

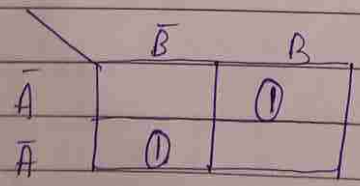
Step 1 Identify the input & output variables
-> Input variables = A, B (either 0 or 1)
-> Output variables = S, C (where S = Sum & C = Carry)

Step 2 Draw truth table -

Inputs		Outputs	
A	B	C (Carry)	S (SUM)
0	0	0	0
0	1	0	1
1	1	0	1
1	0	1	0

Step 3 Draw k-map using above truth table & determine the simplified boolean expression.

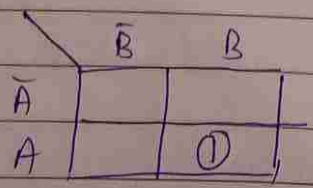
for S ->



$S = A\bar{B} + B\bar{A}$

$S = A \oplus B$

For C ->



$C = A \cdot B$

Step 4

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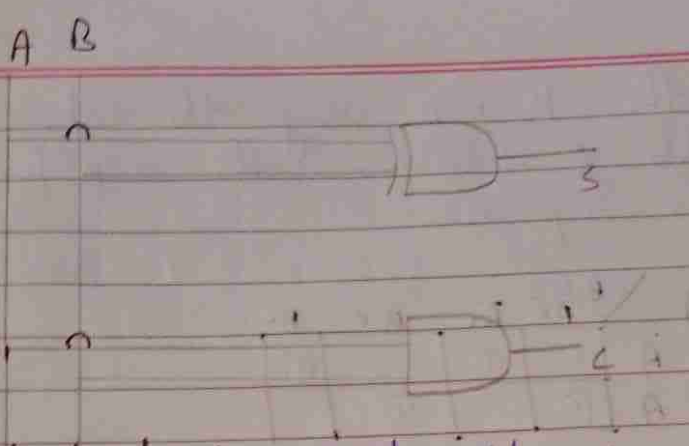


Full Adder :- Full adder is a combinational logic circuit. It is used for purpose of adding two single bit number with a carry then full adder has ability to perform the addition of 3 bit.
Full adder contain 3 input two outputs (sum and carry)
Full adder is designed in following steps -

Step1 - Identify the input output variables -
Input variable = A, B, C_{in} (either 0 or 1)
Output variable = S, Cout, where S = sum &
Cout = carry

Step2 - Draw truth table -

Inputs			Outputs	
A	B	C_{in}	Cout (carry)	S (SUM)
0	0	0	0	0
0	0	1	0	1
0	1	0	0	1
0	1	1	1	0
1	0	0	0	1
1	0	1	1	0
1	1	0	1	0
1	1	1	1	1

Step3- Draw the k-map using the above truth table & determine the simplified boolean expression -

For S

A \ BC	$\bar{B}\bar{C}$	$\bar{B}C$	BC	$B\bar{C}$
$\bar{A}$		1		1
A	1		1	

$S = A\cdot\bar{B}\cdot\bar{C} + \bar{A}\bar{B}C + A\cdot B\cdot C + AB\bar{C}$

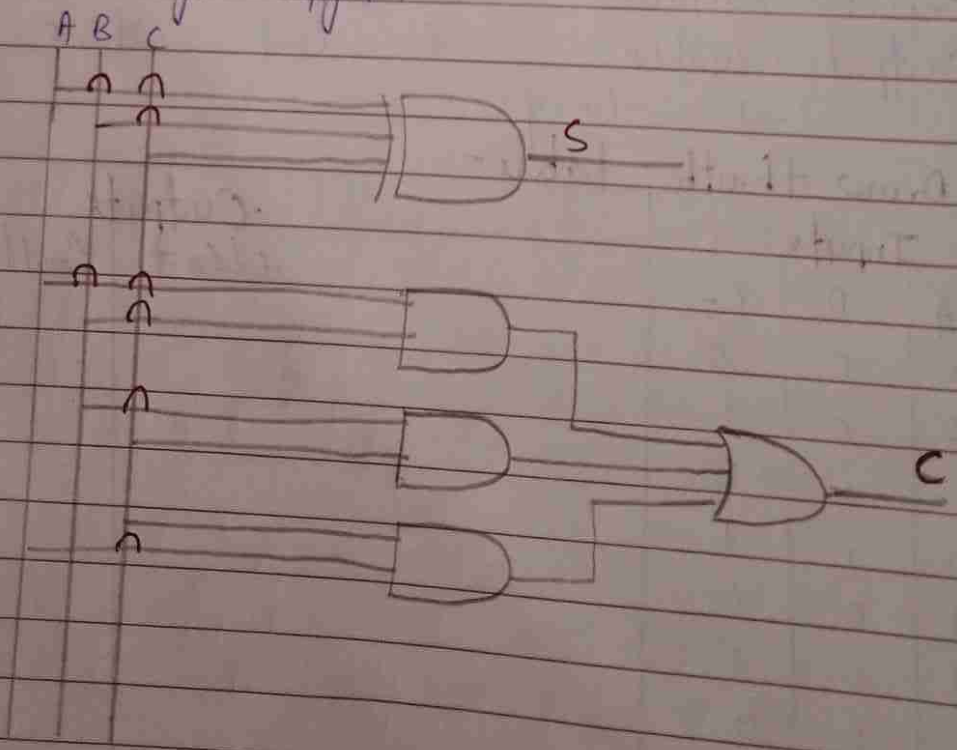
$S = A \oplus B \oplus C$

For C_{in}

A \ BC	$\bar{B}\bar{C}$	$\bar{B}C$	BC	$B\bar{C}$
			1	
	1	1	1	

$C_{out} = AB + BC + CA$

Step4 Draw logic diagram -



Half Substractor :-

Half substractor combinational logic circuit it is used for substracting two single bit number, it contains 2 input, 2 outputs (difference & borrow).

Half substractor is designed in following steps

Step1 - Identify the input & output variables.

Input variables → A, B (either 0 or 1)

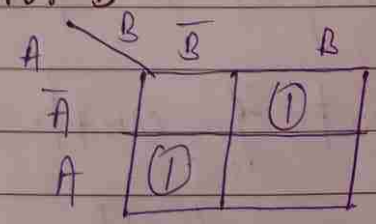
output variables → D, b where D = Difference & b = borrow.

Step2:- Draw the truth table.

Inputs		Outputs	
A	B	Difference (D)	b (Borrow)
0	0	0	0
0	1	1	1
1	0	1	0
1	1	0	0

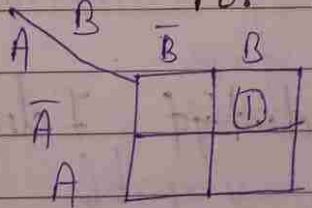
Step3 - Draw the k-map using the truth table & determine the simplified boolean expression.

for D



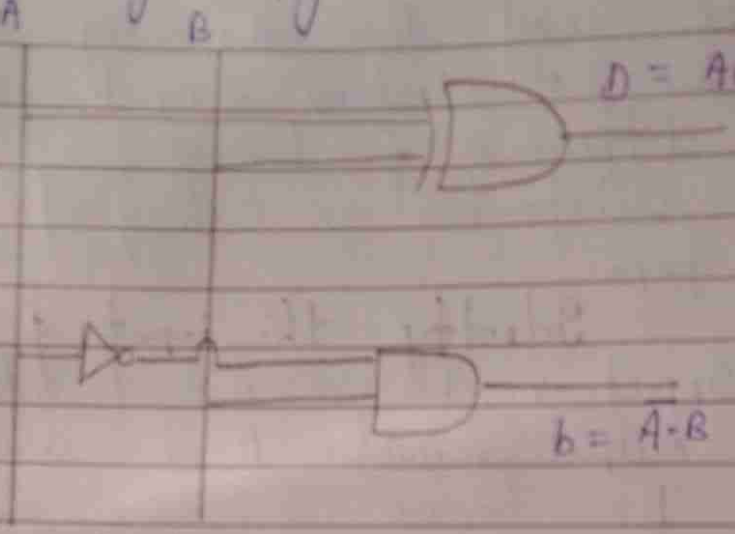
$D = A \oplus B$

for b



$b = \bar{A} \cdot B$

Step4:- Draw logic digram -



subtractor

Full ~~Adder~~ :-

Full subtractor is a combinational logic circuit. It is used for purpose of subtracting two single bit numbers. it also taken into consideration borrow of the lower significant stage thus full ~~stub~~ subtractor has the ability to perform the subtraction of 3 bits. Full subtractor contains 3 inputs & 2 outputs (Difference & Borrow)

Half subtractor can designed in following steps:-

Steps

- ~~Identify~~ Identify the input & output variable
- Input variables : A, Bin, B (either 0 or 1)
  output variables : D, Bout
  where D = Difference & Bout = Borrow.

Step 2- Draw truth table -

Inputs			Outputs	
A	B	Bin	Bout (Borrow)	D (Difference)
0	0	0	0	0
0	0	1	1	1
1	0	0	0	1
1	0	1	0	0
0	1	0	1	1
0	1	1	1	0
1	1	0	0	0
1	1	1	1	1

Step 3- Draw k-map using above truth table & determine boolean expression

for D:

A \ BBin	$\bar{B}\bar{B}_{in}$	$\bar{B}B_{in}$	BB_{in}	$B\bar{B}_{in}$
$\bar{A}$		1		1
A	1		1	

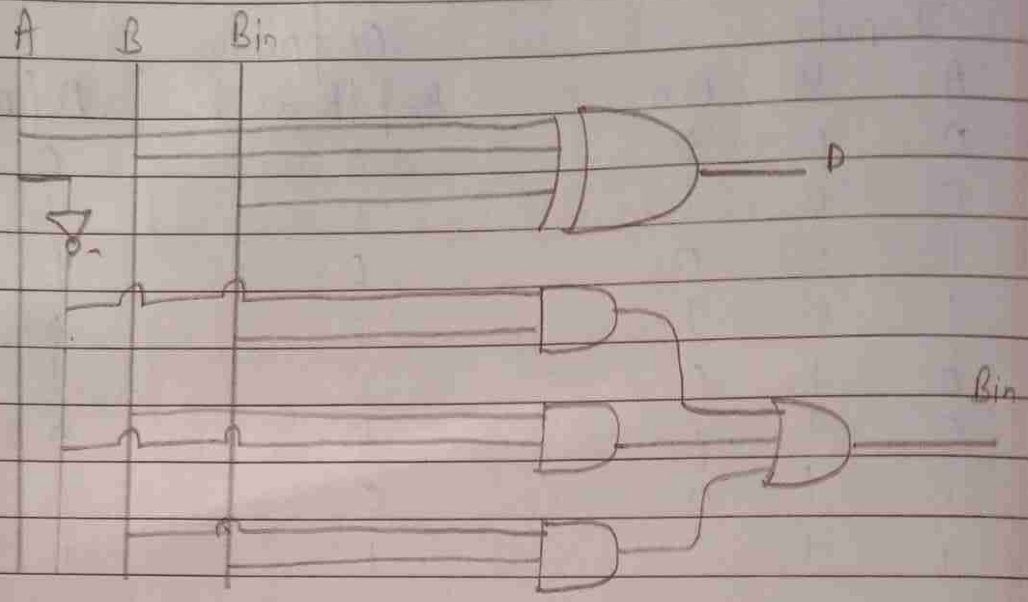
$$D = A \oplus B \oplus Bin$$

For Bin:

$\bar{A}$ \	$\bar{B}\bar{B}_{in}$	$\bar{B}B_{in}$	BB_{in}	$B\bar{B}_{in}$
$\bar{A}$		1	1	1
A			1	

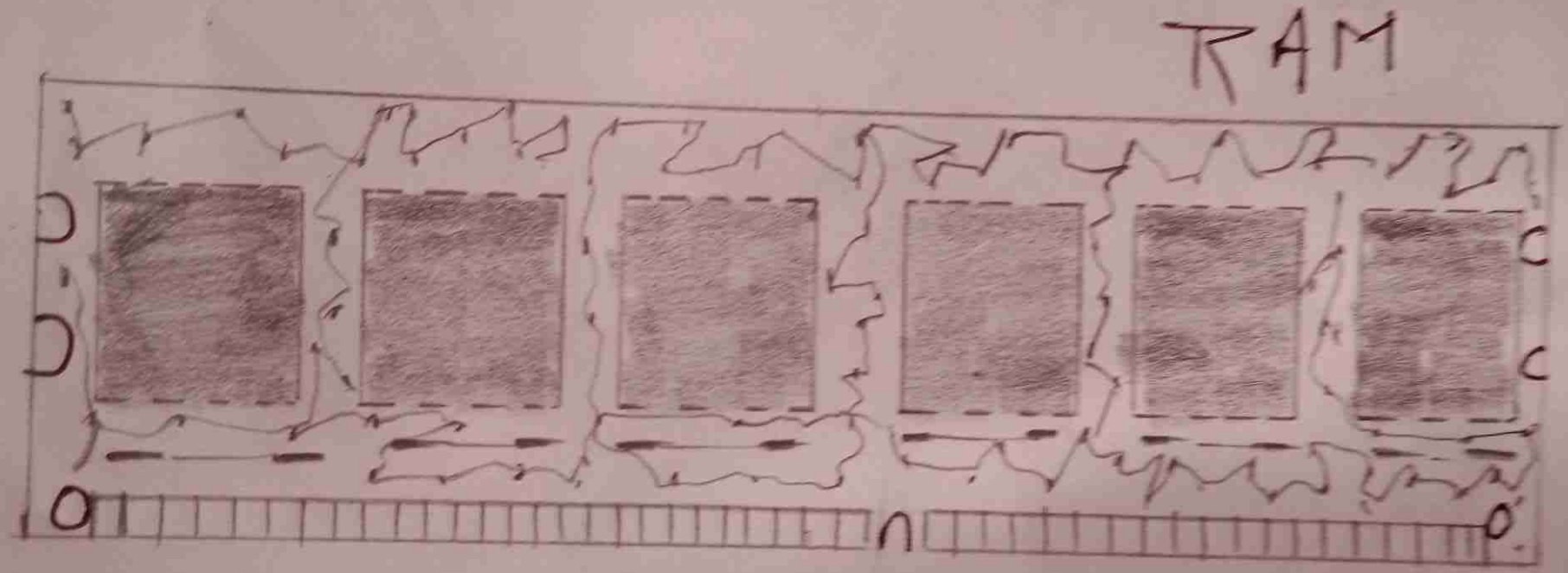
$$Bout = \bar{A}B + (\bar{A} + B)in$$

Step4:- Draw logic digram



CONSTRUCTION & WORKING OF RAM:-

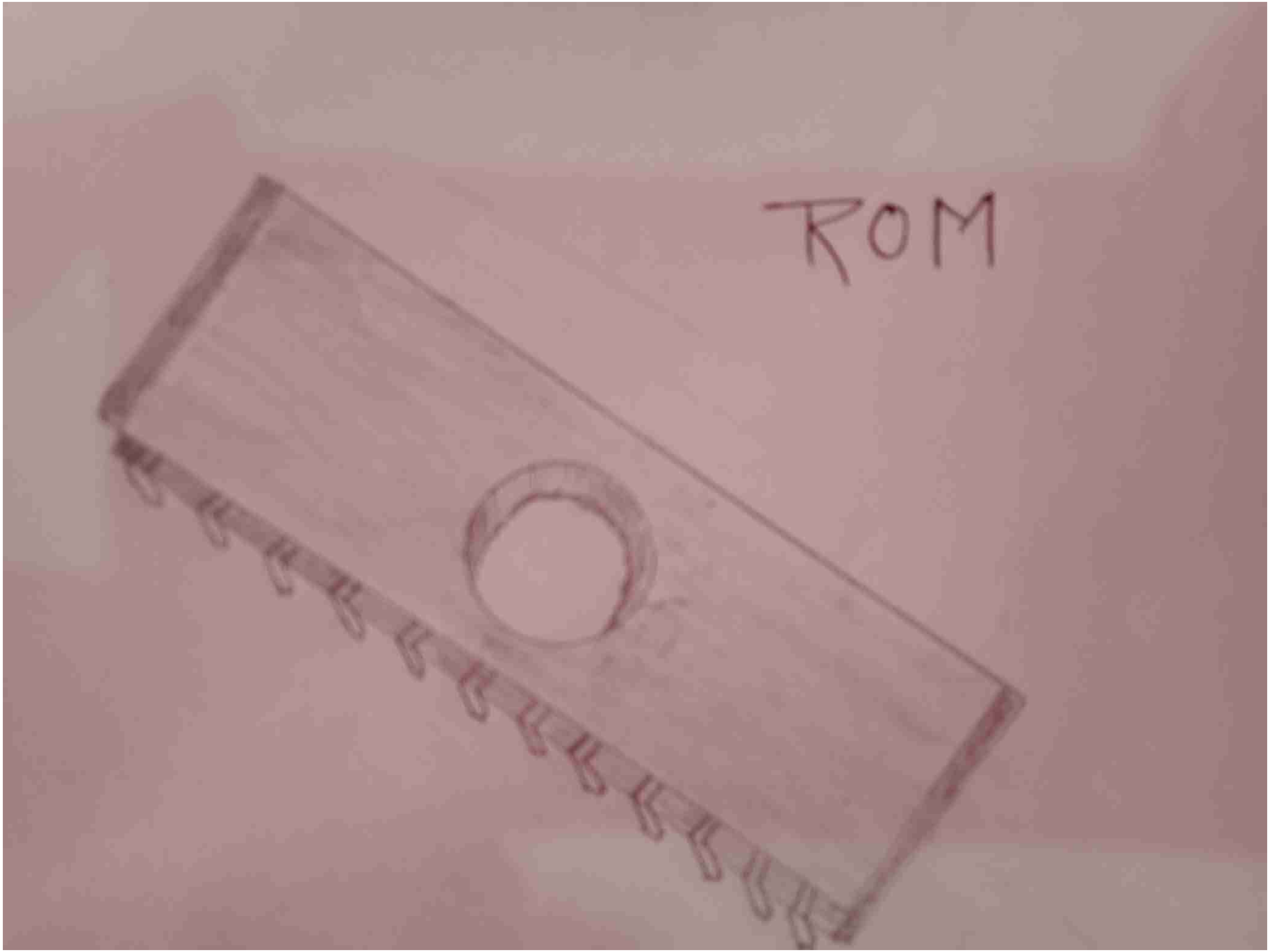
RAM stands for random access memory, in a random access memory any memory location can be accessed in a random way without going through any location. Science information can be written into or read from RAM's they are used read/write memory of a computer system. RAM is not the correct name because ROM has also random access property. RAM is volatile memory it store information as long as power is supplied to its content are lost when power supply is switched off


RAM

the kind of board and connector used for RAM in desktop computer has evolved over the past few years the first type were proprietry meaning that different computer manufacturers developed memory boards that would only work with their specific system.
then came SIMM standle for single in line module. this memory board used a 30 pin connectors and was about 3.5 X 0.75 inches in size (about 9x2 cm)
In most computer you had to install SIMM in pairs of equl capacity and speed this is because the width of bus is more than a single SIMM.

CONSTRUCTION & WORKING OF ROM:-

A ROM is a non-volatile memory it stored the information permanently it contents are not lost when power supply is switched off. ROM is used to store permanent programs. As the name suggests its contents can be read only but can not be write on it. the data that is required to be stored inside ROM is written during manufacturing phase it store such program that are essential for booting process of the computer.

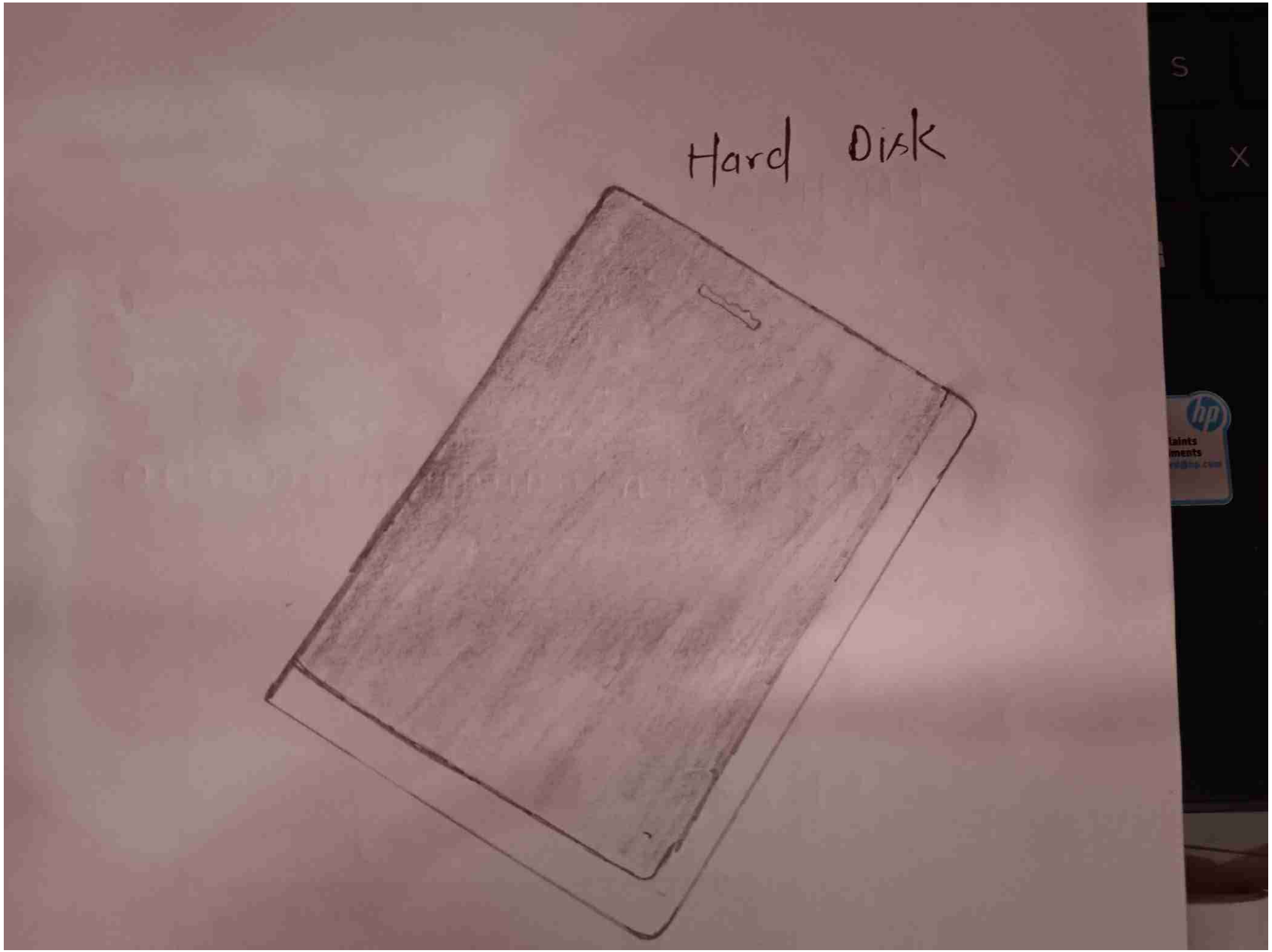

ROM

A ROM works like an array. ROM chips contain a grid of row & columns to turn off. it uses a diode to connect the line if the value is 1 if the value is 0 then these lines are not connected to at all. Each element of the array corresponds to one storage element in the memory chip. the address input to the chip is employed to pick out a specific memory location (corresponding to the array index) the value read from the memory chip corresponds to the contents of the selected element of the array.

Hard Disk Construction & Working:-

Hard disk are on-line storage drive the are used to as secondry memory for mass storage of information permanently they store program, data operating system compilers, application etc.

Hard disk are rigid platters composed of a substrate and a magnetic medium. The substrate - the platter base material - must be non-magnetic and capable of being machine to a smooth finish. it is made either of aluminum alloy or a mixture of glass and ceramic. To allow data storage both side of

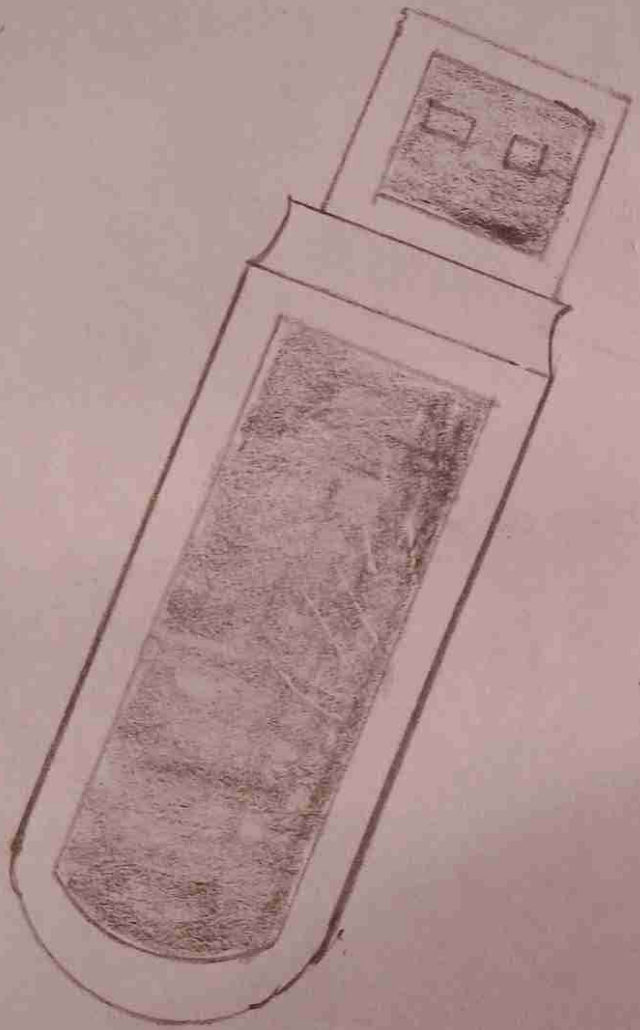

Hard Disk

each platter are coated with a magnetic medium formerly magnetic oxide but now almost exclusively, a layer of metal called a thin-film medium. this stores data in magnetic patterns with each platter capable of storing a billion or so bits per square inch (bpsi) of platter surface.

Construction & working of Pen drive :-

A pen drive is a portable Universal serial Bus (USB) flash memory device for storing and transferring data from a computer. As long as the desktop or laptop has a USB port, and the pen drive is compatible with the operating system it should be easy to move the data from the hard drive to the device, and the another computer.

Pendrive usually consist of a PCB (Printed circuit Board) with a USB connector power circuitry & a no. of integrated circuits (ICs) one of the ICs in the PCB ~~prod~~ provides an interface b/w memory and USB connector the next IC is a NAND flash memory where all the files are stored. Controller chip is considered to the brain of pendrive. A pendrive consists of a flash memory integrated with a USB interface.



PENDRIVE

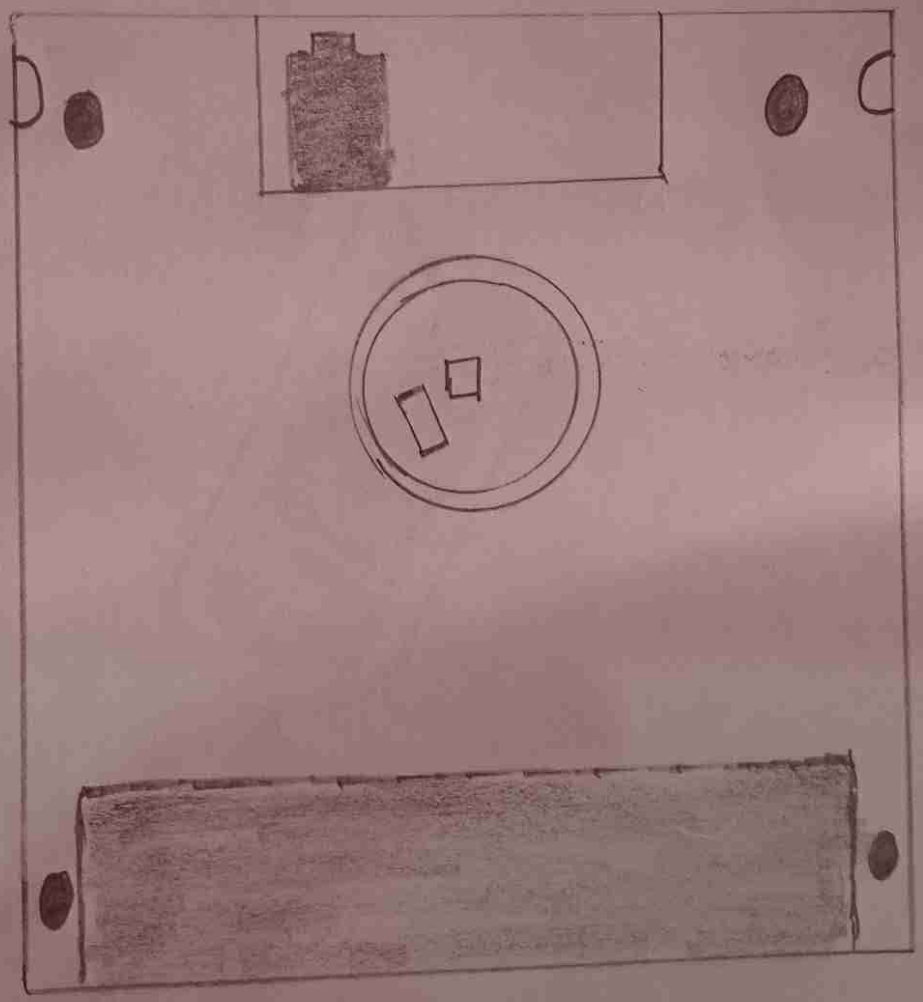
Constructing & working of floppy disk:-

Every computer does not have CD-ROM or USB. floppy disks were the only way to install a new program on the computer or backup your information. If the program was small it could be installed from one floppy disk. However because of most program were larger than 1.44 MB. disketts were usually required.

floppy disk were also a common place for users to store & backup their files for eg. a word processing file could be copied to a floppy disk on opened on another computer or stored as a backup.

A floppy disk is type of disk storing composed of a thin & flexible disk of a magnetic storage medium in a square or nearly square plastic enclosure lined with a fabric removes dust particles from the spinning disk. floppy disk store digital data which can be read & written when the disks is inserted into a floppy disk drive (FDD) connected to or inside a computer or other device.

FLOPPY DISK



Construction & working of DVD

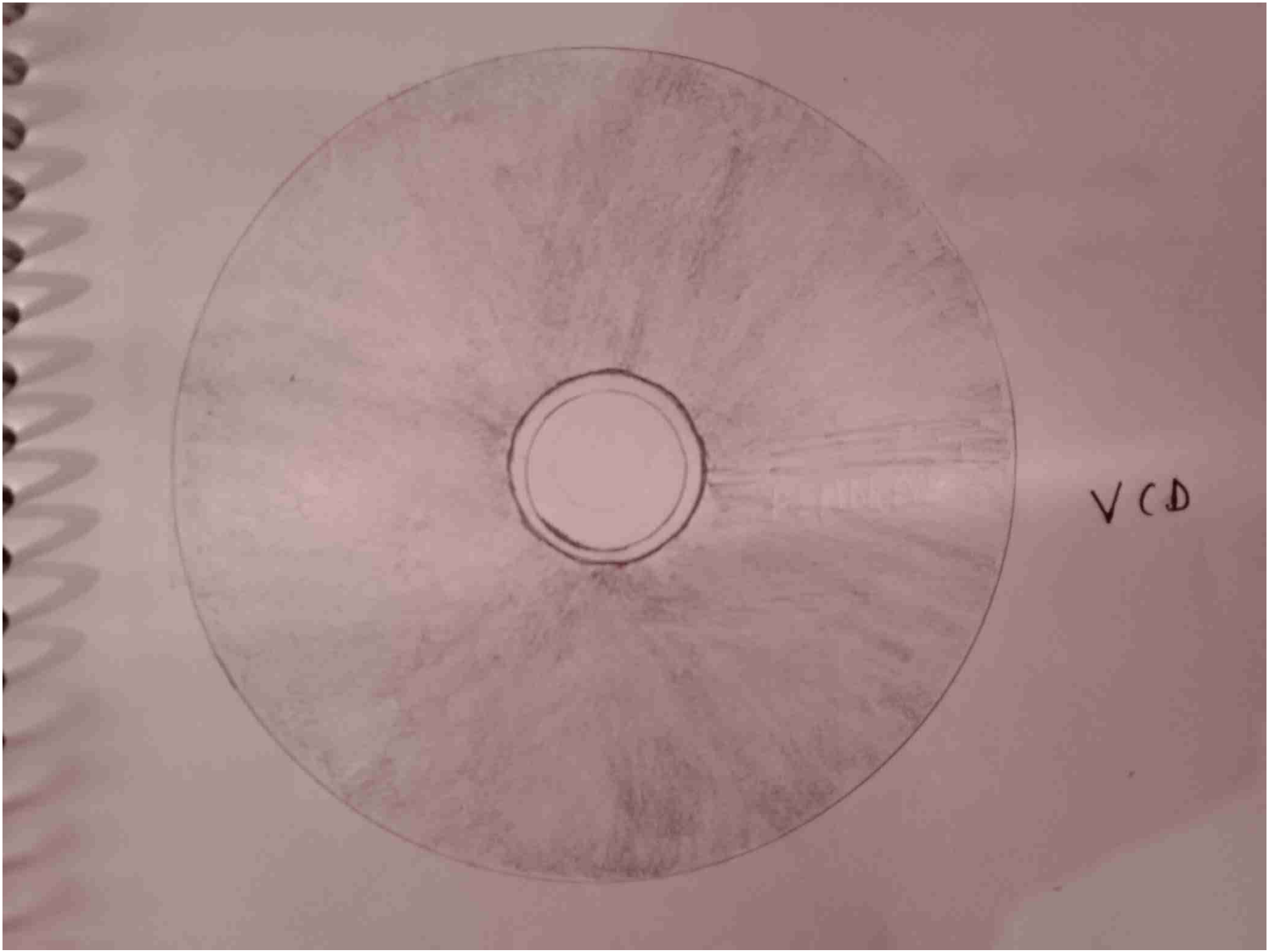
The DVD is digital optical disc data storage format invented & developed in 1995 & released in late 1996. the medium can store any kind of digital data and was widely used for software and other computer files as well as programs watched using DVD players. DVDs offer higher storage capacity than compact disc which having the same dimensions Prerecorded DVD are mass-productod using molding machines that physically stamp data onto the DVD such disc, are a form of DVD ROM because data can only be read & not written or erased Blank recordable DVD discs (DVD-R & DVD+R) can be recorded once using a DVD + ROM. DVDs are used in DVD-video consumer digital video format & in DVD-audio consumer digit audio format as well as for DVD discs written in a special AVCHD format to hold high definition material.

Digital versatile disc
(DVD)

Construction & working of VCD:-

Video CD (VCD) is a home video format & first format for distributing films on standard 120 mm optical discs. the format was widely adopted in southeast Asia central Asia and middle East superseding the VHS & Betamax systems in the regions until DVD-video finally became affordable in the first decade of the 21st century.

The format is a standard digital data formate for storing video on a compact disc. VCD's are playable in dedicated VCD players personal computers and some video game consoles However, they are less playble in most Blue-ray Disc players Vehicle audio with DVD & video games consoles such as the sony Play station & xbox due to lack of support backword compatibility for the order MPEG-1 format or inability to read MPEG-4 in .dat files alongside MPEG-1 in standard MPEG-4, AVI & matroska files.


VCD

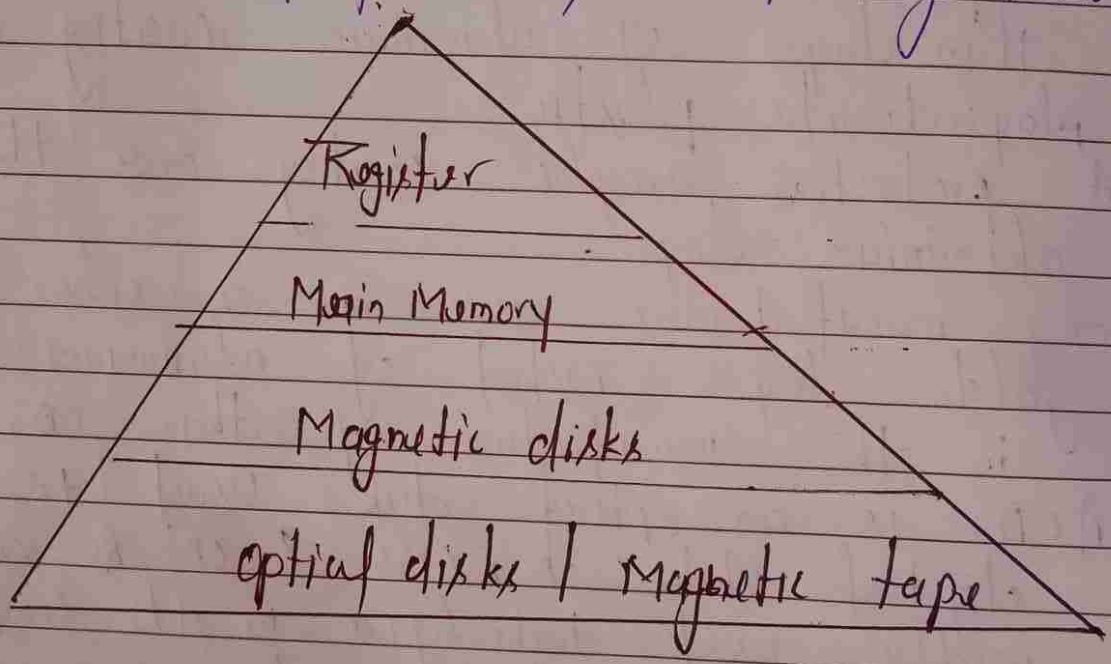
Construction & working of CD

A compact Disk (CD) is a deceptively simple looking device considering the technology required to make it CDs consist of three layers of materials
A base layer made of a polycarbonate plastic
A thin layer of aluminium coating over the polycarbonate plastic
A protective acrylic coating over the aluminium layer.
Some manufacturers use a silver or even gold layers instead of aluminium layer in the manufacture of their CD.
A CD is an optical disk used to store digital data. CD ROMs & CD-Rs remains widely used technologies in the computer industry. CD drives employ a near infrared 780 nm laser diode the laser beam is directed onto the disk via an optoelectronic tracking module, which then checks weather the beam has been reflected or scattered.
A CD is made, CD data are stored as a series of tiny indentations know as pits.

Compact disc (CD)

Memory Hierarchy :-

In computer architecture the memory hierarchy separates computer storage into a hierarchy based on response time since response time complexity and capacity are related the levels may also be distinguished by their performance & controlling technology



Difference between RAM & ROM:-

RAM

1. RAM is a volatile memory which could store data as long as power is supplied.
2. Data stored in RAM can be retrieved and altered.
3. It is a high speed memory
4. large size with higher capacity.
5. It is used to store data that has to be
6. currently processed by CPU temporarily
7. Used as CPU cache primary memory the data stored is easily accessible.

ROM

1. ROM is non-volatile memory which could retain data which retain data even when power is turned off.
2. Data stored in ROM can only be read
3. It is much slower than RAM
4. Same size with less capacity
5. it ~~stored~~ stores the instruction required during bootstrap of the computer.
6. used as firmware, micro-controllers
7. The data stored is not as ~~stored is not~~ easily accessible as in RAM
8. It is cheaper than RAM.