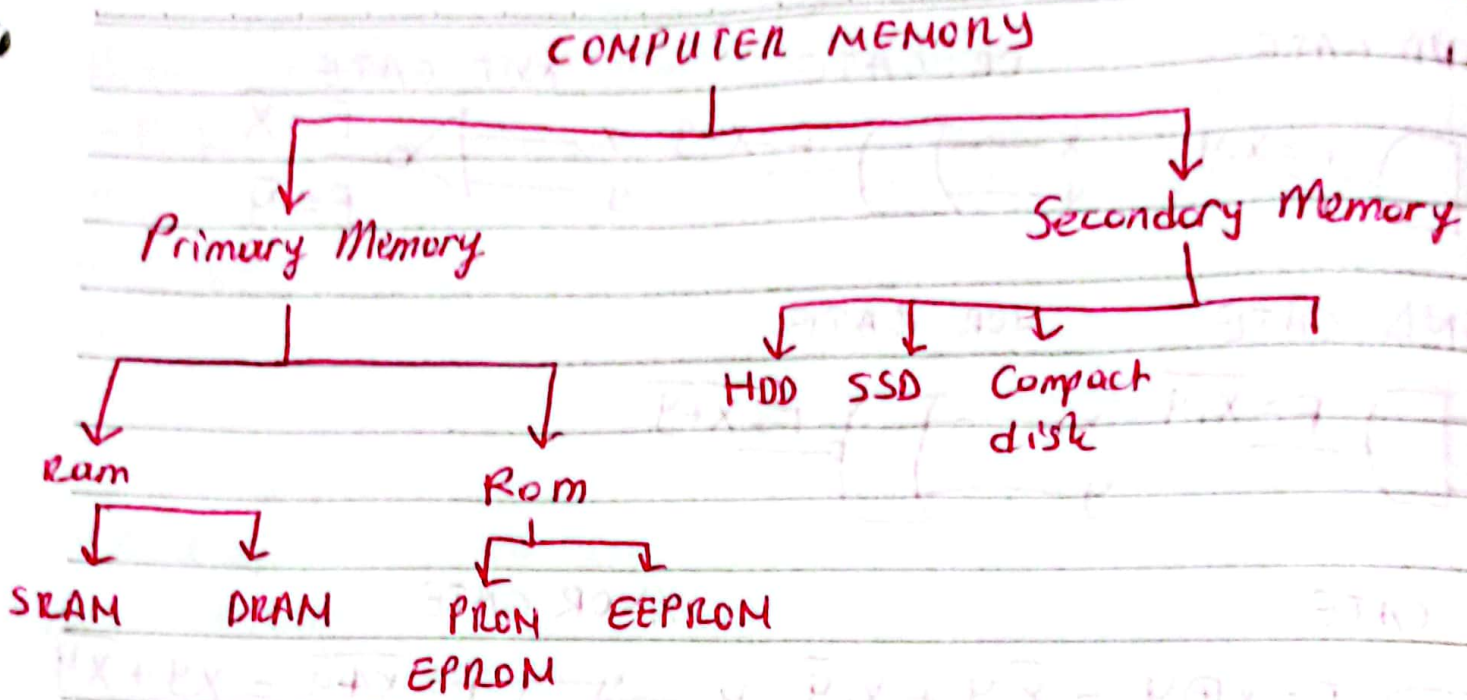
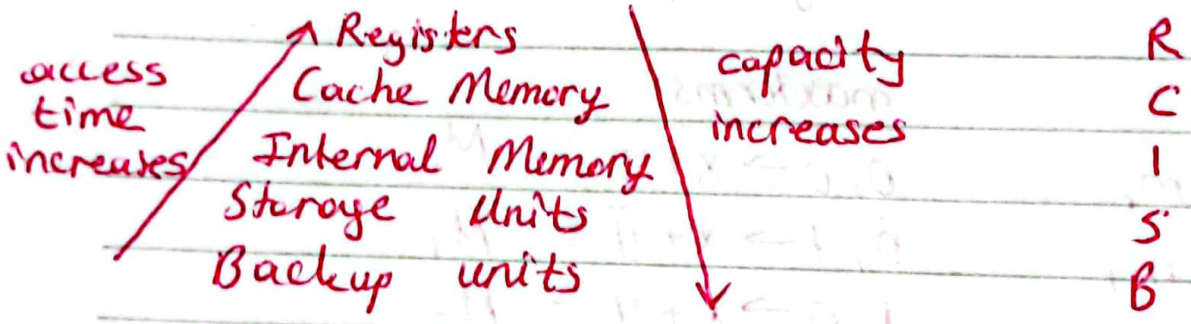




1 Hz = 1 cycle per second

1 MHz = 1 million cycle per second

1 GHz = 1 billion cycle per second

1 bit → 1b

8 bit → 1B

1024B → 1KB

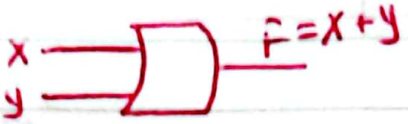
1024KB → 1GB

1024GB → 1TB

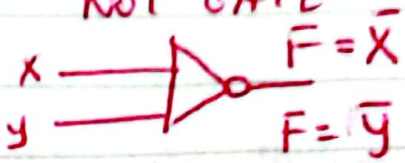
LOGIC GATES

AND GATE

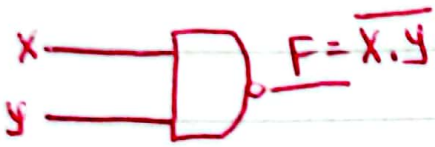
OR GATE



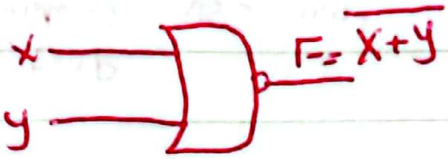
NOT GATE



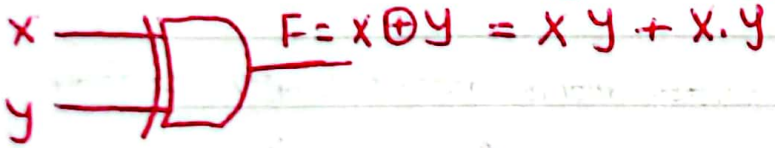
NAND GATE



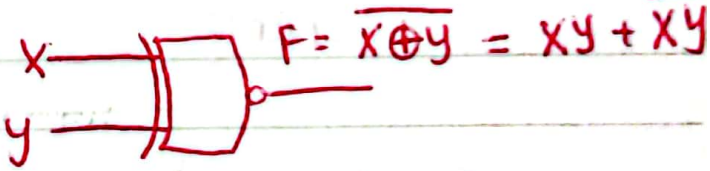
NOR GATE



XOR GATE



XNOR GATE



minterms		maxterms	
0,0 → x̄, ȳ	m_0	0,0 → x+y	M_0
0,1 → x̄.y	m_1	0,1 → x+ȳ	M_1
1,0 → x.ȳ	m_2	1,0 → x̄+y	M_2
1,1 → x.y	m_3	1,1 → x̄+ȳ	M_3

Boolean Algebra Theorems

Commutative rules: $x+y = y+x$

$x.y = y.x$

Associative rules: $x+y+z = (x+y)+z = x+(y+z)$

$x.y.z = (x.y).z = x.(y.z)$

Idempotance rules: $x+x = x$

$x.x = x$

De Morgan's Rule: $\overline{x.y} = \bar{x}+\bar{y}$

$\overline{x+y} = \bar{x}.\bar{y}$

Absorption Rule: $x + x.y = x$

$x(x+y) = x$

Basic Features Of Algorithm

- → To be effective and general
- → To be finite
- → Infallability
- → Performance
- → Valid I/O

- → Name of Algorithm
- → Task
- → Operation
- → Description

What a program is?

→ A set of instructions that a computer follows in order to perform a particular task.

Software Development Process:

1- Requirement Analysis → Software system should meet the user requirement.

2- Software Design → All modules and interfaces should be defined

3 → Coding → The stage of encoding and applying programming language directly.

4 → Certification → Testing the software

5- Maintenance → Addition of new modules and the elimination of errors.

Properties of Programming Languages:

- → Writability
- → Readability
- → Exceptional requirement and cases affordability.

Classification Of Programming Languages

GENERAL

- → Imperative
  C, Pascal
- → Data Oriented
- → Object oriented
  C++, Java, Python

APPLICATION AREA

- → Scientific - engineering
  C
- → System
  C
- → Database
  dBase, SQL
- → Artificial intelligence
  Prolog
- → General
  C, Python, Pascal

LEVELS

- → Low level
  Assemblers
- → Medium level
  C, C++, C#
- → High level
  Pascal, Python
- → Very high level
  dBase

OBJECT ORIENTED PROGRAMMING

Data abstraction: User creates classes modeling new data types.

Inheritance: Classes are expanded or privatized to create new classes

Polymorphism: Operations having the same name are processed diffrently in diffrent classes.

PROGRAMMING ENVIRONMENT

Editor: who is creating source code and making changes

Compiler: A program which converts source code to machine code.

Librarian: A library consisting of object files.

Linker: The program combines all object files included in a program into a single executable.

Loader: It copies the executable file from disk into memory.

Debugger: Solves bugs and understands the reason of errors.

Interpreter: It executes directly the source code of a program line by line.

Diffrence between compiler and interpreter:

ELEMENTS OF PROGRAMMING LANGUAGE

Syntax: is a set of rules that determines the order to which symbols should be written in order to be accepted as valid.

Semantics: the meaning of the statement which is written with a programming language.

Data: Information that has been translated into a form.

Type checking: The process of verifying and enforcing constraints of types in values.

Control Statements: are used to change the order of execution.

Subprograms: a callable sequence of instructions from several remote locations in a program.

Modules: includes large amount of data and subprograms.

What is operating system: is a collection of programs that serves as an interface between computer resources and users.

Well known Operating Systems:

→ Windows
→ Unix
→ Linux
→ Macintosh
→ IOS
→ Android

Basic functions of Operating Systems:

→ To ensure the integrity of the software-hardware
→ Resource mangagement.
→ Establishment of relationships, harmony and order between user and system.

TYPES OF OPERATING SYSTEMS

Monoprogramming: In a system based on mono-programming, only one virtual environment can be activated and a user can use all the resources of the system

Multiprogramming: If any job or program running in the system waits for input or output, synchronization etc. in this standby state processor can start another job and thus processor is used efficiently.

Multitasking: the practice of doing multiple things simultaneously.

WHAT IS JOB?

- the unit of work that a computer operator gives to the operating system.

WHAT IS TASK?

- a unit of execution or a unit of work.

CLASSIFICATION ACCORDING TO SYSTEM USAGE AND ACCESS

Dedicated processing: gives the system to the service of a user

Batch processing: It reduces planning and preparations for works. Gives more efficient use of computer.

Interactive processing: Allows users to control their jobs immediately.

CLASSIFICATION BY STRUCTURE

→ Message oriented systems
→ Procedure Oriented systems

CLASSIFICATION BY NUMBER OF USERS

→ Multi user systems
→ Personal computer

COMPUTER SYSTEM RESOURCES

→ Memory
→ Processor or CPU
→ Peripherals
→ DATA

Performance of a system depends on;

1 - Efficiency
2 - Reliability
3 - Protection
4 - Predictability
5 - Accessibility

KERNEL SYSTEM: Control functions on hardware and management of physical units are performed by the kernel system. Interruption handling, task creation and destruction, I/O operations are among the functions performed by the kernel system.

Kernel functions:

→ To assign processes to a processor
→ To manage interruptions
→ To provide communication between processes.
→ Interruption Handling
→ Management of I/O Hardware → The most complex one.
→ Connection Interface → are used to between units running at differe speeds.
→ I/O Management System
→ File management system

Deadlock: Occurs when processes are blocked because of the unit or resource that they can never reach. In other words a deadlock is a situation in which two computer programs sharing the same resource are effectively preventing each other from accessing the source, resulting in both programs ceasing to function.

Semaphore: is an integer variable, shared among multiple processes.

Memory Management: It has many functions to use computer more efficiently.

→ Single Contiguous memory: Simplest form of memory. Each memory location has an address in memory and uses the physical address of the memory directly.

→ Partitioned memory: Addressing space and physical space are divided into small pieces of equal length; the small components of the physical space is called "block", and the addressing space is called "page".

BASIC CONCEPTS OF MICROPROCESSORS ARCHITECTURE

According to Memory Management:

→ Von Neumann architecture

→ Harvard architecture

VON NEUNANN ARCHITECTURE

→ This architecture provides a simple and economical organization. Microprocessor has a single address space, so the processor's memory interface hardware is simple.

HARVARD ARCHITECTURE

→ In harvard architecture, code and data are stored in separate physical units. Since code reading and data reading/writing can be done at the same time, performance of processor is higher

According to Instruction Processing Technique

CISC (Complex Instruction Set Computer)

→ The design principle is that hardware is always faster than software. Therefore a program written by using instructions selected from hundreds of instructions can be shorter.

RISC (Reduced Instruction Set Computer)

→ RISC architecture reduces the complexity of integrated circuits by using simple instructions. However since RISC instructions are shorter it may require more instructions to complete a task.

	RISC	RISC
Cycle time	+Since it does not have to go through the micro code cycle stages, instructions are executed more quickly	- Longer code cycle stages
Programming	+more understandable and readable code usage -Longer program code for the same function	-complex assembly instructions +more jobs in less cycle
Compilation Performance	+Simpler code cycle because of uniform codes	+ Code cycle in short time
Hardware	+Simple codes and simple decoders, less hardware	+ Complex codes and complex decoders more hardware

RISC is fasther than CISC
CISC is more complicated than RISC
Codes are longer at RISC