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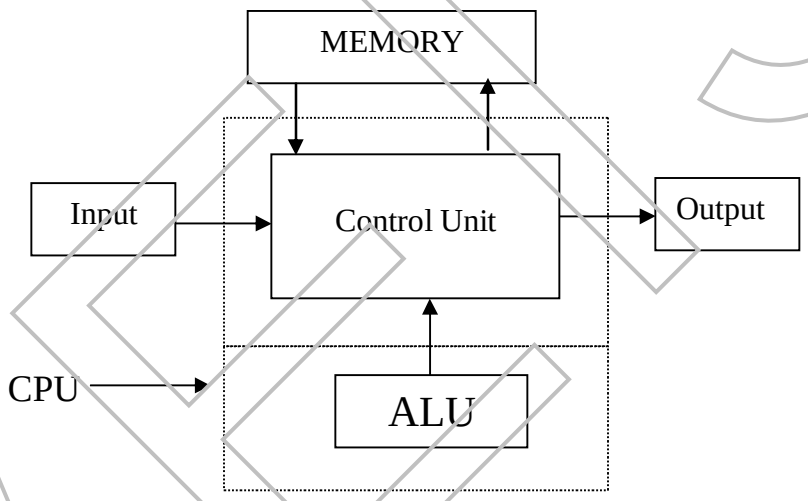
CHAPTER 1

FUNDAMENTALS OF COMPUTER

1.1 Computer

The word computer has been derived from the Latin word computare, which means to calculate. Computer is an electronic machine, which automatically process input data in accordance with the program of instructions stored within it.



Block diagram of computer

Father of Computer: Charles Babbage.

First Programmer: Lady ADA Augustus.

(a) Input: This transfers data into the computer. The input data is converted into binary form i.e. 0 and 1. Common input devices are as follows:

(i) Keyboard

(ii) Mouse

(iii) Scanner

(iv) Punched card reader

(v) Punched tape reader

(b) Control unit: The control unit guides other units of the computer about the method in which data are to be processed. It sends synchronisation pulses to other units so as to synchronise the operations.

(c) ALU (Arithmetic and Logical Unit): ALU is part of CPU, which performs arithmetic and logical operations.

(d) Memory: Memory is used to store the data temporarily or permanently. The electrical signal obtained from the input unit goes to the control unit of CPU. From there the information is send to the memory.

Units of Memory:

0 or 1	= 1 Bit
4 Bit	= 1 Nibble
8 Bit	= 1 Byte
1024 Byte	= 1 Kilo Byte (KB)
1024 Kilo Byte	= 1 Mega Byte (MB)
1024 Mega Byte	= 1 Gega Byte (GB)
1024 Gega Byte	= 1 Tera Byte (TB)

The smallest unit of memory is Bit. Bit is either 1 or 0. A flip-flop stores one bit of information, a register hold a word. To write any character into computers memory it requires one byte.

(e) Output: This is used to get final answer. The output section of a microcomputer includes a video display to allow the user to see the processed data. The output devices are monitors, printers.

- **Central Processing Unit (CPU)**

CPU comprises of the Arithmetic and Logic Unit (ALU) and Control Unit (CU).

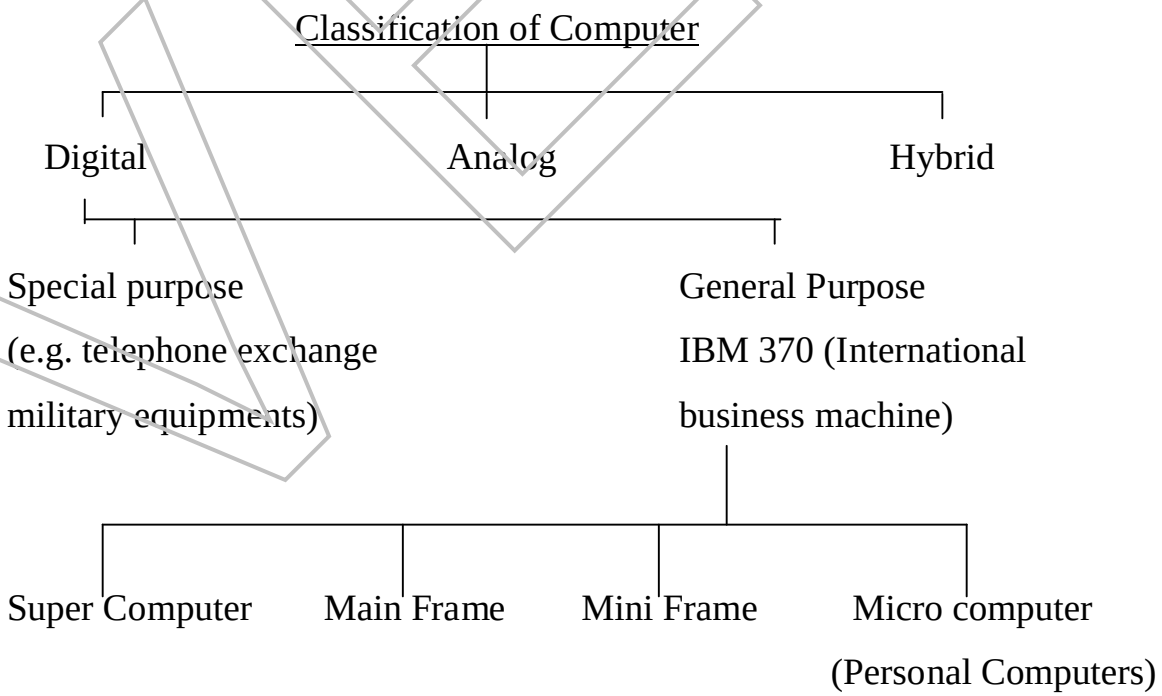
⇒ Computer = CPU + Memory + Input + Output

⇒ CPU = Control Unit + ALU

⇒ μP (Micro Processor) = CPU fabricated on a single Integrated Circuit.

⇒ μComputer (Micro Computer) = μP + Memory + Input + Output.

2. Classification of Computers



(a) Classification As per Components used

⇒ Analog: In analog computers data are represented and processed as a continuous variation e.g. speedometer, voltmeter

⇒ Digital: In this data are represented in the form of binary digit. Combination of bits are used to represent information e.g. PC.

⇒ Hybrid: It is a digital computer, which uses both analog and digital processing.

(b) Digital General Purpose Computers

- **Super Computers**: These are the most powerful computer systems available today, which process billions of instructions per day. These systems are very expensive (costly). The first Super Computer CRAY-1 was designed and introduced by Seymour Cray, of Cray Research Inc., Japan, later on the CRAY-2 was built. The Super Computers are mainly used in scientific area, weather forecasting, nuclear weapon development etc. India has developed Super computer PARAM 10000 at Pune.
- **Main Frame**: A Mainframe Computer can process large amount of data at very high speed (millions instructions per second). The mainframe computers are multi user computers, which means a single computer is connected to more than one user. These computers are used for Railway Reservation, Air India Reservations etc.
- **Mini Frame**: It is based on mainframe. It is compact and cheap. It has simple **hardware**, ease of use, ease of device attachment, limited number of users; it is used in front end *(Used as subdivision at the end of Mainframe)* of mainframe and small business computers.

- **Microcomputer or Personal Computer**: Microcomputers are smallest, cheapest and commonly used computer systems. These are designed to use by one person at a time; it uses a device known as microprocessor, which is the heart of microcomputer. The microprocessor controls all the activity of a computer.

  Mainly Intel, AMD and Cyrix companies are manufacturer of Microprocessors. The Intel has developed following microprocessors: 8085, 8086, 8088, 80286, 80386, 80486, Pentium, Pentium Pro, Pentium MMX, P II, Celeron, P III, P IV.

3. **Generations of Computers**:

The history of computer development has been divided into following six phases or generations:

(i) Zeroeth Generation: Mechanical Parts (18^{th} century)

Charles Babbage *(1732 –1871)* designed the first computer. The first computer was designed using mechanical parts like wheels, gears, cogs etc.

(ii) First Generation (1946-1958): Vacuum tubes

The first generation computers were developed using electronic components like vacuum tubes. Due to use of vacuum tubes machines were quite large. The programming was done in machine language. Some examples of the computers developed during this generation are as follows:

ENIAC (Electronic Numerical Integrator and Calculator) -1946

EDVAC (Electronic Discrete Variable Automatic Computer) known as UNIVAC ((Universal Automatic Computer)- 1949

EDSAC (Electronic Delay Storage Automatic Calculator) - 1949

(iii) Second Generation (1959-1964): Transistors

In second-generation computers transistors replaced Vacuum tubes. Thus, the size of computer reduced, speed increased, cost reduced etc.

Assembly language was developed during this period.

E.g. IBM (International Business Machine) 1401

(iv) Third Generation (1965-1971): Integrated Circuits

IBM announced 360 series of computers in 1964. In this generation computers Ics (Integrated Circuits) replaced transistors. Therefore, the size and cost of computer reduced. Operating System was developed during this generation, which was written in assembly language. The concept of "**Simultaneously Peripheral Operations On-Line (Spool)"** was fully developed during this period. Imagine if two programs were allowed to issue simultaneous instructions to write directly on the printer, then spooler program subsequently print them one by one. High-level language like FORTRAN was also developed. The operating systems were CP-67, OS/MVT etc.

(v) Fourth Generation (1970 – 1990): Large Scale Integration

Today's Microcomputers are belongs to fourth generation. In fourth generation computers LSI (Large Scale Integration) and VLSI (Very Large Scale Integration) ICs being used, which have considerably reduced the size of today's computers. "Control Program for Microcomputers (CP/M)" was the first operating system developed for microcomputer platform. It was developed on Intel 8080 in 1974. After that IBM's own PC-DOS (Personal Computer – DOS) and MSDOS (Microsoft–DOS) by Microsoft Company was developed. After MS-DOS other application software such as database

system (dBASE), word processing (WORD STAR) and spreadsheet (LOTUS 1-2-3) were developed.

E.g. IBM-4300

All microcomputers or Personal Computers

Personal Computers are classified as follows:

(a) PC-XT (PC Extended Technology) – Microprocessor 8088 & 8086 used.

(b) PC-AT (PC Advanced Technology) – Microprocessors 80286 and above used.

(vi) Fifth Generation (Since 1985)

Until now computers were not having any intelligence or common sense as they were based on GIGO (Garbage in Garbage out). The fifth generation of computers is likely to have artificial intelligence and common sense. The computers will be able to think. The scientists are trying to make the computer to understand the human language by a system known as Knowledge Information Processing System (KIPS).

4. **Applications of Computer**

Computers are used in every field; a few of them are as follows:

(i) Business and Industry.

(ii) Science and technology

(iii) Education

(iv) Government organizations

(v) Desktop Publishing (DTP)

(vi) Sports

(vii) Music

5. Computer Systems

(i) Hardware – The electrical, electronic or mechanical parts that make a computer are called hardware parts. They are as follows:

(a) Input devices
(b) Primary storage
(c) Secondary storage
(d) Control processing unit
(e) Output devices

(ii) Software – It includes the instructions, commands or programs, which runs inside the computer are called software. It includes the following:

(i) System software
(ii) Application software

(iii) Live ware – It includes a person or operator, who activates the computer system.

Exercise – 1

Q.1 Fill in the blanks

(i) ALU stands for _____. (Arithmetic and Logic Unit)
(ii) 1 Nibble = _____ bits. (4)
(iii) 1 Byte = _____ bits (8)
(iv) 1.44 MB = _____ KBs. (1.44 x 1024 x 1024)
(v) First super computer was developed by _____. (Japan)
(vi) First super computer developed in India is _____. (PARAM 10,000)
(vii) CP/M stands for _____. (Control Program for Microcomputers)
(viii) KIPS stands for _____. (Knowledge information processing system)
(ix) SPOOL stands for _____. (Simultaneously Peripheral Operations On Line)
(x) First operating system in microcomputers is _____. (CP/M)
(xi) Another name for personal computer is _____. (Microcomputers)
(xii) Operating system was developed during _____ generation. (third)
(xiii) CPU stands for _____. (Central Processing Unit)

Q.2 Write short notes

(i) Computer
(ii) ALU
(iii) CU
(iv) Super computer
(v) CU

Q.3 Explain

(i) Computer with the help of block diagram.
(ii) Generations of computers.
(iii) Classification of computers

CHAPTER 2

INPUT & OUTPUT DEVICES

1. Input Devices

Data are entered into the computer system by means of an input device. The input devices are Key Board, OMR, OCR, OBR, MICR, Punched Cards, scanner and Mouse etc.

(i) Key Board - The keyboard is a primary device used for entering text and telling the computer what to do. It is like an ordinary typewriter. Commonly it has following types of keys.

- A to Z - Alphabets keys having both small (lower case) and capital (Upper Case) alphabets.
- 0 to 9 - Numbers keys
- Special Keys

~ = Tilde	` = Apostrophe
! = Exclamation Mark	@ = at the rate
# = Hash	$ = dollar
% = Percentage)	^ = Caret
& = Ampersand	() = Parentheses
* = Asterisk	_ = underscore
| = Pipe	\ = Back slash
/ = Front slash	; = Semi colon
: = Colon	“ = Quotation Mark
‘ = Apostrophe	? = Question mark
< = Less than	> = Greater than

- = Hyphen {} = Curley Bracket

[] = Square Bracket

+ = Plus sign - = Minus sign

/ = Division * = Multiplication

- F1 to F10 or F12 - Function keys.
- Space bar, Delete, Insert, Back space, Enter, Tab, etc - Editing Keys
- Break, Shift, Caps Lock, Ctrl, Alt, Num Lock, Print Screen, Scroll Lock, and Special Purpose Keys.
- (Up, Right, Down, Left Arrows), Page Up, Page Down, Home, End, Tab - Cursor Movement Keys.
- The keyboard, which has function keys from F1 to F10, is 88 keys Keyboard and function keys from F1 to F12, is 101 keys Keyboard. Presently keyboards are available up to 110 keys or more.

  Function

(ii) OMR (Optical mark Reader) - These are used to evaluate the Answer Sheets of Competition Exams. OMR uses a device that reads pencil marks and converts them into computer usable form. The device throws light on each round and judges the answer depending upon the reflection of light. The light reflects more from white and less from black.

(iii). OCR (Optical character Reader) - OCR uses a device that reads preprinted characters in a particular font and converts them to digital code. It is useful in price checking on departmental store.

(iv). OBR (Optical bar Reader) - This method is used to read Bar codes and converts into digital codes are given as input.

(v) MICR (Magnetic Ink character Reader) - This device is used to check the originality of Bank drafts or cheques. The draft and cheque numbers are written in a special style and the ink is mixed with a specified ratio of magnet.

(vi). Punched Cards - This device is used to take attendance in big factories.

(vii). Scanner - A scanner uses laser beams and reflected light to translate images of text, drawing, photos and converts into digital form.

(viii). Mouse - Mouse is a pointing device, used on graphical user interface machines, used to select and activate the graphics.

2. **Output Devices**

(i) Monitor - It is also called Visual Display Unit (VDU). VDU is used to display the information on the screen. It is of two types.
(i) Colour Monitor (ii) Monochrome Monitor
A monitor screen is divided into rows and columns. There are total 25 rows (0 to 24) and 80 columns (0 to 79).

(ii). Printer - The printers are used to print information on the paper. Printer speed is measured as Characters per second (CPS), Lines per minute (LPM) or Pages per minute (PPM). Printers are classified as follows:

(a). Impact Printers

(b). Non-impact printers

(a) **Impact Printers** – The impact printer makes contact with the paper. It forms the print image by pressing an inked ribbon against the paper with hammer strike mechanism.

⇒ Letter Quality Printers: Letter quality printers also called character printer or serial printers because they print one character at a time. The range of speeds varies from 60 Character Per Second (cps) to 120 cps. Example: Daisy wheel printer (Normally used in canteen, Departmental store etc.).

⇒ Dot Matrix Printers (DMP) – The character is made up of dots; normally the speed of a dot matrix is from 50 cps to 400 cps. The print head of DMP has 9, 18 or 24 pins. We can make the graphics up to 360 dpi (dots per square).

⇒ High Speed Printers: The high qualities printers are line printers, print line by line. These are drum printers, belt printers and chain printers. The speed varies from 200 to 3000 Lines Per Minute (LPM).

(b) **Non-Impact Printers** - Do not hit a ribbon to print. They use thermal, chemical and inkjet technologies.

⇒ Ink Jet Printers – Ink Jet Printers form image with little dots by tiny droplets of ink. The speed is up to 270 cps. The resolution is up to 240 dpi.

⇒ Laser Printers – A LASER (Light Amplification Simulation Emission Radiation) beam is directed across the surface of a light-sensitive drum and fired as required to record an image in the form of a pattern of tiny dots. The image then transferred to the paper. Speed is approx 10,000 to 20,000 lines.

Note - The printout is also called Hard copy.

Exercise 2

Q.1 Fill in the blanks

(i) OMR stands for _____. (Optical Mark Reader)
(ii) MICR stands for _____. (Magnetic Ink Character Reader)
(iii) Escape (Esc) key is used to _____. (Cancel previously entry)
(iv) Caps lock is used for typing alphabets in _____. (capital / uppercase)
(v) Num lock is used to activate _____. (numeric keypad)

Q.2 Write short notes

(i) MICR
(ii) OMR
(iii) Mouse
(iv) Impact printers
(v) Inkjet printer

CHAPTER 3

MEMORY

Memory is used to store the data, which may be temporarily or permanent in nature. The smallest unit of memory is bit. Bit is either 1 or 0. A flip-flop stores one bit of information, a register hold a word. A character occupies one byte space.

3.1. Classification of memories

Mainly memory are classified in two groups i.e. primary memory and secondary memory but as per use, and other characteristic these can be classified as follows:

(i) Registers, main memory and secondary memory.

(ii) Sequential access memory and random access memory.

(iii) Static and dynamic memory.

(iv) Volatile and non-volatile memory.

(v) Magnetic, optical and semiconductor memory.

(i) Registers, Main memory and Secondary memory - Registers are available within the CPU to store data temporarily during arithmetic and logical operations like addition, subtraction etc. Main memories are semiconductor type. These are available external to the CPU. These are used to store program and data during the execution of a program. The R/WM and ROM are example of primary memory. This memory is a type of random access. Secondary or auxiliary memories are used to store the data permanently after the completion of program execution. The microprocessor

cannot directly execute or process programs stored in these devices. Programs need to be copied into the R/W memory.

Note: When we type the data, these are stored in main memory then to retrieve *(Get back)* later data are stored in secondary storage devices.

(ii) Sequential Access Memory & Random Access Memory - In the sequential access memory the memory locations are accessed sequentially (Sequentially means one by one in sequence). For e.g.: magnetic tape etc.
A random access memory is one in which any location can be accessed with the same speed. For eg. Hard disk, CD ROM etc.

(iii) Static and Dynamic Memory - In static memory, the content does not change with time; in dynamic memory, its content changes with time. Dynamic memory cells use the capacitance to store the data. The capacitor must be refreshed periodically in order to prevent loss of information. Static memory devices require no refreshing. and hold data as long as power is applied. Example - Static memory is registers, MOS and dynamic RAM is semiconductor dynamic RAM.

SNo	Dynamic RAM	Static RAM
(i)	Made up of MOSFETs.	Made up of flip-flops.
(ii)	Refreshing required because capacitance of MOSFET required refreshing to retain the charge	Refreshing not required
(iii)	Cheap because only one MOSFET is used to store a single bit.	Costly because required 04 to 05 transistors to store a single bit
(iv)	Slow because refreshing required.	Fast because no refreshing required.
(v)	Consume less power	Consume more power

(iv) Volatile and Non-Volatile Memory - Volatile memory loses its stored data when power to the memory circuit is removed. A non-volatile memory retains stored data permanently even after the power supply is turned off.

(v) Magnetic, and Semiconductor - These memories are classified based or the material used for construction. The magnetic memories are constructed using magnetic material. For e.g.: Magnetic tape, floppy and compact disks. Magnetic recording is the process of storing data magnetically on the surface of tape, disk.

Semiconductor memories are constructed using semiconductor material using LSI and VLSI technologies. Example: RAM ROM etc. Magnetic memories are constructed using magnetic material.

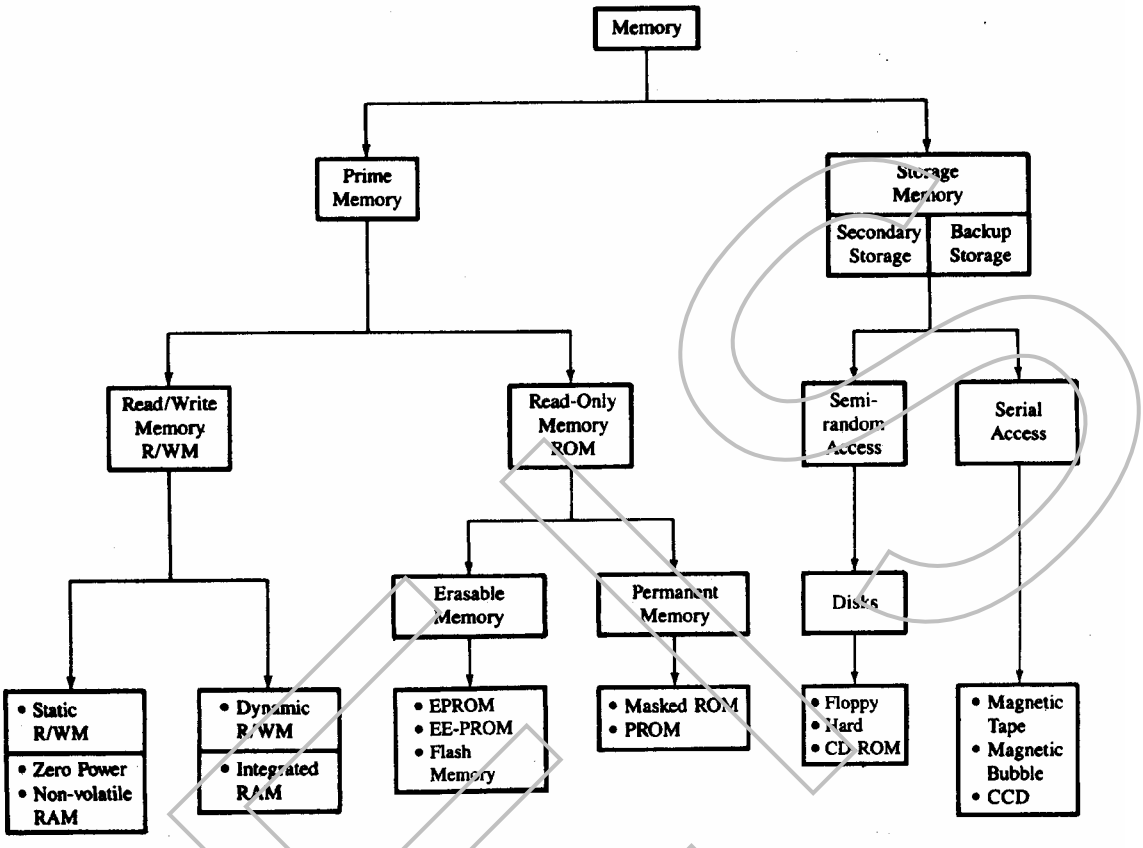


FIGURE 2.13
Memory Classification

3.2 **Details of various Primary Memories**

(i) R/WM (READ / WRITE MEMORY): The microprocessor can write into or read from this memory; it is popularly known as Random Access Memory (RAM). This is volatile.

(ii) ROM (READ-ONLY MEMORY): The ROM is non-volatile memory. This memory is used for programs that need not be altered. Once a program is stored it is permanent or semi-permanent.

⇒ Masked ROM – in masked ROM the masking and metalization process permanently records bit pattern.

⇒ PROM (Programmable Read Only Memory) – This memory has nicrome wires arranged and viewed as diodes or fuses. The user can program the memory with special PROM programmer.

⇒ EPROM (Erasable Programmable Read Only Memory) – This memory stores a bit by charging the floating gate of an FET. Information is stored by using an EPROM programmer, which applies high voltage to charge the gate. Exposing the chip to ultraviolet light can erase all the information.

⇒ EEPROM (Electrically Erasable Programmable Read Only Memory) – This chip function is similar to EPROM, except that using electrical signals can alter information at the register level rather than erasing all the information.

⇒ Flash Memory – The major difference between the flash memory and EE-PROM is in the erasure procedure. The EE-PROM can be erased at a register level, but the flash memory erased entirely or at the block level. These memory chips can be erased and programmed at least a million times.

⇒ Zero Power RAM – It is CMOS Read/Write memory with battery backup built internally. It includes lithium cells and voltage-sensing circuitry connects the lithium battery.

⇒ Non-Volatile RAM – It is high speed static R/W memory array backed up, bit for bit, by EE-PROM array for non-volatile storage. When the power is about to go off, the contents of R/W memory are quickly stored in the EE-PROM by activating the store signal on the memory chip, and the stored data can be read into the R/W memory segment when the power is again turned on.

⇒ Integrated RAM (iRAM) – It is a dynamic memory with the refreshed circuitry built on the chip.

3.3 List of various Secondary Memories

(i) Floppy Disk

(ii) Hard Disk

(iii) CDROM

(iv) Magnetic Tape

Exercise – 3

Q.1 Fill in the blanks

(i) Static memory is made up of _____. (Flip-Flops)
(ii) Dynamic memory is made up of _____. (MOSFETs)
(iii) CDROM is based on _____ technology. (optical)
(iv) The type of memory in which data are lost when the power is switched off is called _____. (volatile)
(v) Volatile memory is _____. (RAM)

Q.2 Expand following

(i) EEPROM
(ii) RAM
(iii) ROM
(iv) CDROM
(v) R/WM

Q.3 Write short notes

(i) Non-volatile
(ii) Random Access Memory
(iii) Secondary Memory
(iv) Primary memory
(v) Sequential Access Memory

Q.4 Explain the classification of memories based on different characteristics using diagram.

CHAPTER 4

INTRODUCTION TO PROGRAMMING LANGUAGE

4.1. Programs

A microcomputer performs a task by reading and executing the set of instructions written is its memory. This set of instructions, written in a sequence, is called a program. Each instruction in the program is a command.

4.2. Language

Language is a means of communication. Each machine has its own set of instructions based on the design of its microprocessor. To communicate with the computer, one must give instructions in binary language (machine language). Since it is difficult for most people to write programs in sets of 0s and 1s, so the computer manufacturers have invented *(devised)* English-like words to represent the binary instructions of a machine, which is called Assembly language. An assembly language is specific to a given machine; i.e. programs written in assembly language are not transferable from one machine to another. To overcome this limitation, general-purpose languages like BASIC and FORTRAN have been invented. A program written in these languages is machine-independent.

4.3. Types of Languages

Based on the type of coding used, the languages have been divided into following two categories:

(i) Low Level Language

(ii) High Level Language

(i) Low Level Languages - Machine language and assembly language are microprocessor–specific, therefore these are considered Low–level languages. The machine language is in binary, and the assembly language is in English-like words called Mnemonics. However, the microprocessor understands only the binary. Therefore, assembly language mnemonics is translated into binary code by a program called Assembler. Each microprocessor has its own assembler because the mnemonics and machine codes are specific to the microprocessor being used.

(ii) High Level Language - Programming languages that are intended to be machine-independent are called high-level languages. These are FORTRAN, BASIC, COBOL, PASCAL, C, C++ and all, other which have certain sets of rules, gathered from English. Instructions written in these languages are known as statements rather than mnemonics. A program written in BASIC for a microcomputer with the microprocessor 8085 can be run on another microcomputer with a different microprocessor.

4.4 **Translators**

The statements of high-level languages are converted in to binary languages are called a compiler or an interpreter. These programs accept English like

statements as their input, called the source code. The compiler or interpreter then translates the source code into the machine language compatible with the microprocessor being used in the system. This translation in the machine language is called the object code. Each high-level language needs its own complier or and interpreter to convert. The primary difference between a compiler and an interpreter is the process of generating machine code. The compiler reads the entire program first and then generates the object code. On the other hand, the interpreter reads one instruction at a time, produces its object code, and executes the instruction before reading the next instruction. BASIC is a common example of an interpreter for the BASIC language. Compiler is used in languages such as FORTRAN, COBOL, PASCAL, C, C++.

Exercise – 4

Q.1 Fill in the blanks

(i) The set of instructions written in a sequence is called _____. (programs)
(ii) Low level languages are machine _____. (dependent)
(iii) Machine language uses _____ and _____. (1, 0)
(iv) Assembly language uses English like words are called _____. (mnemonics)
(v) Each instruction in a program is called _____. (command)

Q. 2 Write short notes

(i) High level language
(ii) Assembler
(iii) Interpreter
(iv) Complier
(v) Low level language

CHAPTER 5

OPERATING SYSTEM

1. Introduction

The operating system of a computer is a group of programs that manages all the operations of computer. The computer transfers information constantly among peripherals such as floppy disk, printer, keyboard and monitor. It also stores user programs under file names on a disk. It is also responsible for managing the files on the disk and the communication between the computer and its peripherals.

2. Classification of Operating Systems

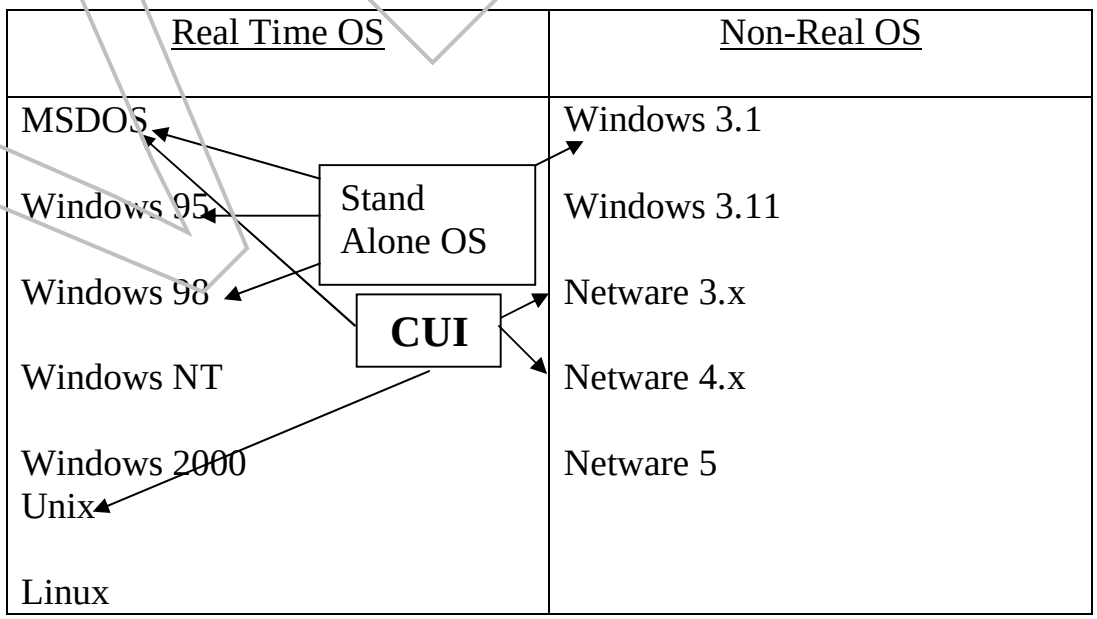
Mainly the Operating systems (OS) are classified as follows

1. Time OS and Non-Real Time OS
2. CUI and GUI
3. Stand Alone OS and Network OS.

- Real Time OS – The OS does not require the help of other OS is called Real Time Operating System. These operating systems can directly communicate with hardware. Example - MSDOS, Windows 95, Windows 98, Windows NT, Windows 2000, Unix, Linux etc.
- Non-Real Time OS – The OS require the help of other OS like MSDOS is called Non-Real Time Operating System. These operating systems communicate with hardware through other system like MSDOS. Example - Windows 3.1, Windows 3.11, Netware 3.x, Netware 4.x, Netware 5.

- CUI (Character User Interface) – Character User Interface OS provide command line to type a command. It is not a graphical. These are MSDOS, Unix, Netware 3.x, Netware 4.x.
- GUI (Graphical User Interface) – Graphical User Interface OS provide graphics called Icons. In the GUI OS with the help of mouse we can do most of the job without typing. GUI based OS are easy to work because everything is visible on the screen. These are Windows 3.1, Windows 3.11, Windows 95, Windows 98, Windows NT, Windows 2000, Linux , Windows XP.
- Stand Alone OS – These are also called single user OS. These OS are made for single machine not for network. These are MSDOS, Windows 3.1, Windows 95, Windows 98.
- Network OS – These are also called multi user OS. These OS are made for network to connect more than one computer together. These are Windows 3.11, Windows NT, Windows 2000, Unix, Linux, Netware 3.x, Netware 4.x, Netware 5.

Operating Systems



Exercise 5

Q.1 Fill in the blanks

(i) Operating system is the _____ of the computer whereas microprocessor is the brain of the computer. (soul)

(ii) Windows 3.11 is a _____, _____ operating system. (GUI, non-real time or network)

Q.2 Write short notes

(i) GUI and CUI

(ii) Real time and non-real time OS

(iii) Stand alone and network OS

(iv) Operating system

CHAPTER 6

TERMINOLOGIES

- Hardware – Any electrical, electronic or mechanical parts that can be physically seen is called hardware.

- Software - All programs, languages, operating systems, applications running inside a system are called software.

  Types of Software:

  ⇒ Application Software - These are used to perform a particular task, like Microsoft Word for letter typing, FoxPro and dBase for data handling or TT for typing practice etc.

  ⇒ System Software - These are necessary for a system to work. Example - MS-DOS, WINDOWS 98 etc.

- Live ware / Skin ware - The operator of the system is called skin ware.

- Firmware – The programs stored in a ROM chip are called firmware.

- Data – The raw facts (name, letters, numbers etc.), which forms a part of input and requires further processing is called data.

- Command - Any valid text, which computer can understand and act accordingly is called command.

- Instructions - A set of commands is called Instructions

- Program – The set of instructions written in a sequence is called a program. Each instruction in the program is called a command.
- Bug - Any error in computer software is called bug.
- Debug - Correcting the error of software is called debug.
- Character - Any symbol that has a specific meaning. Letters (A to Z and a to z), numbers(0 to 9), various symbols(+,-,*,/ etc) are called characters
- Syntax – The correct format of writing a command is called syntax.
- Flowchart – Flowchart is a graphical or pictorial representation of the sequence of operations in a program.