

IX COMPUTER

Complete Notes

MUHAMMAD HASSAM

CHAPTER # 01

CLASSIFICATION OF
COMPUTER

CLASSIFICATION OF COMPUTER

1) ACCORDING TO TYPES:

- (a) Digital Computers
- (b) Analog Computers
- (c) Hybrid Computers

2) ACCORDING TO PURPOSE:

- (a) General Purpose
 - (i) MICRO
 - (ii) MINI
 - (iii) MACRO
 - (iv) LAPTOP
 - (v) SUPER
- (b) Special Purpose

1) ACCORDING TO TYPES:

(a) DIGITAL COMPUTERS:

The digital computers operate on the basis of 'On' and 'Off' status or binary digits. These computers count the numbers (or digits) that represent numbers, letters or other special symbols. The digital computers convert received input data into binary digits and then all operations are done on these digits at extremely fast rate. The ability of digital computers is to handle alphabetical and numerical data with precision and speed. IBM PCs are the examples of Digital computers.

(b) ANALOG COMPUTERS:

The analog computers operate by measuring continuous physical or electrical magnitudes, such as pressure, temperature or current. The analog computers derive all their data from some measurement. The accuracy of the data used in an analog computer is directly related to the precision of its measurement.

Some other variable quantities, which can measure only an analog-computing device, are circular motion, distance, velocity of sound and voltage.

And all examples of analog computers are thermometer, speedometer of car, mechanical watch and barometer.

(c) HYBRID COMPUTERS:

The hybrid computers are the combination of analog and digital computers. The hybrid computers are used for special purposes and having a speed of analog and accuracy of digital computers. Filling pump is the example of hybrid computer.

2) ACCORDING TO PURPOSE:

(a) GENERAL PURPOSE:

The General-Purpose computers perform variety of operations by simple change of instructions. Most of the digital computers used in the business and commercial data processing and classified as Micro, Mini, Macro, Laptop and Super Computers.

(i) Micro Computers:

The Micro Computers are commonly termed as Personal Computer (PC). These types of computers contain a microprocessor or with control capabilities, A.L.U, Registers and input/output on a single chip.

Micros are basically very small machines, lower in price, easy to operate and there is not much difficulty in maintenance. Normally these computers are used in small business applications and for home computing.

(ii) Mini Computers:

Mini Computers actually switches between one to another user for a very short time, allowing all of them to process their work. This switching is so fast therefore no one has to wait for his turn. These computers are used in time-sharing environment and many users can utilize a single computer at the same time by attaching terminals to it. Mini computers are found to be more efficient, much faster and easy to operate as compare to macros. Uses of these computers are found in scientific laboratories and engineering work.

(iii) Macro Computers:

These types of computers are also known as “MAIN FRAME” computers. And a mainframe computer might support thousands of users, such as a worldwide airline reservation system. These large size computers include all peripherals and attach equipment and may have more than one CPU. The mainframe computers are found in the environments where a large amount of data is to be processed and where large number of terminals needs access to centralized data.

(iv) Laptop Computers:

These small size and lightweight computers look like an office brief as “Laptop” and “Portable Computers”. Very useful for businessman traveling and when they are far away from their desktop computers. All the facilities, which are available in Micro Computers, are also contain a typical Laptop called “Note Book” while the most smallest laptops are called “Palmtop”.

(v) Super Computers:

These are the most costly computers. Super computers used for complex scientific calculations and have the capability of much more than a mainframe. Used in nuclear physics research, space shuttle launching, satellite controlling, weather forecasting, and experimental oil fields etc.

(b) SPECIAL PURPOSE COMPUTERS:

The special purpose computers are widely used in industrial robotics and designed to solve specific problems.

So those computers, which are designed for machine, control or process control (like business problems and filling system) would be different than a general purpose computer. Most analog computers are special purpose computers.

The packages which can be used for this purpose are Dbase, FoxPro, Oracle, and Recital etc. They can be used to perform a verity of queries on the store data and print different reports from it. This software is also called 4GL (Fourth Generation Languages).

BUSINESS DATA ANALOG OR SPREAD SHEETS:

These packages used in business application. Spread sheet can provide very efficient modes of mathematical calculation on tabular data.

Spread sheet can also be used to draw calculation from data and perform a verity of statistical operations. Many Spread Sheets provides graphical interface and the result can be seen and printed in the form of Graphs. Some of the commonly used spread sheets are Lotus-123, Ms-Excel & Quarto Pro.

AGES OF COMPUTER

The Dark Age (3000 B.C – 1890 A.D.):

In 3000 B.C. Abacus was developed by Chinese. It consists of a frame with beads strung on wires on rods. It was able to perform simple calculations.

In 1817, John Napier designed a device called “Napier’s bones”. It consists of a set of eleven bones or rods with numbers. In 1632, “Oughtred’s Slide Rule” was invented by an English mathematician William Oughtred, by using log’s concept. It can multiply and divide very quickly. In 1642, a French mathematician named Blaise Pascal invented a calculator named “Pascal’s Calculator”. It performs addition and subtraction functions. In 1671, Pascal’s Calculator was updated by G.W. Leibniz it performs multiplication and division also in 1801, the first punched cards mechanism was invented by Joseph Marie Jacquard. This mechanism was called “Jacquard’s Loom”. In 1823, Charles Babbage, who is also known as the Father of Computer designed a machine called “Babbage’s Difference Engine”.

Just after 10 years in 1833, Charles Babbage introduced device called “Babbage’s Analytical Engine”. The true concept of computer was given by Charles Babbage.

The Middle Age (1890 A.D – 1944 A.D.):

The compilation of U.S census data was the biggest problem in middle age. Dr. Herman Hollerith, a statistician with U.S Bureau of Census, developed a 3x5 inch punched card to record data. He also constructed a box to sort data and an electro-magnetic counting mechanism to tabulate data. The 1890 census was processed in one-fourth time needed for 1880 census. In 1908, Dr. James Powers developed vertical sorting machine which processed about 200 cards per minutes. In 1911, Hollerith developed horizontal sorter machine which can process almost 275 cards per minutes. Until 1940 there was no major invention, but performance, speed and capabilities of existing machines were improved.

The Modern Age (since 1944):

In 1944, an electro-mechanical computer “Mark-1” was built by I.B.M. (International business machine) corporation.

The I.B.M launched its new version as “Mark-II” in 1945. Afterwards fully electronic computers were developed.

GENERATIONS OF COMPUTER

First Generation (1946 – 1959):

In this generation, the technology used was vacuum tubes and binary numbers system. The speed was measured in Micro seconds. One Micro Second = 1/1000. The major inventions were ENIAC which was built in 1946. In 1949, EDSAC and EDVAC were marketed. In 1951, UNIVAC and UNIVAC-1 were produced. In 1955, IBM-650, IBM-702, IBM-705, IBM-709, etc. were introduced. At the end of this generation Assembly Language was developed for programming.

Second Generation (1959 – 1964):

In this generation, the technology used was vacuum tubes and binary numbers system. The speed was measured in Micro seconds. One Micro Second = 1/1000. The major inventions were ENIAC which was built in 1946. In 1949, EDSAC and EDVAC were marketed. In 1951, UNIVAC and UNIVAC-1 were produced. In 1955, IBM-650, IBM-702, IBM-705, IBM-709, etc. were introduced. At the end of this generation Assembly Language was developed for programming.

Third Generation (1965 – 1970):

In this generation, the technology used was integrated circuit(IC’s). The speed were measured in Nanosecond = 10^{-9} = 1/1000000000. The major inventions include Intel’s 4004 chip micro processor were marketed. IBM-360, IBM-370, and UNIVAC-9000 series were launched in the market. The sizes of computers become very small with better performance and reliability.

Fourth Generation (1972 – 1981):

In this generation, the technology used was S.S.I and L.S.I. The speed was measured in Nanosecond = $10^{-9} = 1/1000000000$. The major inventions are Intel 8008 and 8088 micro processors. In 1971, 8 inches Floppy Disk was introduced and in 1978, 5.25 inches Floppy Disk was marked. In 1980, Optical Disks were invented which was big change in the computer world. In 1981, "Osborne-I" was invented. IBM-3033, IBM-370, IBM-system 34, IBM system 36, Cray-I, CP/M etc. were brought in the market.

Fifth Generation (since 1981):

In this generation, the technology used was V.L.S.I. The speed was measured in Pico Second = $10^{-12} = 1/1000000000000$. The major inventions include "First Personal Computer" which was developed in 1981. In 1984 Microsoft launched its Operating System MS-DOS. In 1984 3.5 inches Floppy Disk was introduced. In the same year, Intel's microprocessor 80286 was also developed. In 1985, 80386 Intel's microprocessor was introduced. In 1985 CD-ROM was also marketed. Programming languages like PROLOG, LISP, SQL etc. were used in the fifth generation.

ADVANTAGES AND DISADVANTAGES OF GENERATIONS

FIRST GENERATION:

Advantages:

- (a) Vacuum tubes were used as electronic components.
- (b) Electronic digits computer were developed.
- (c) These computers were the fastest calculating device of their time.
- (d) Computations were performed in milliseconds.

Disadvantages:

- (a) Very large space was required due to big size.
- (b) Non-portable.
- (c) Unreliable
- (d) Air conditioning required.

SECOND GENERATION:

Advantage:

- (a) The size of computer was very small as compared to 1st generation computer.
- (b) Less heat was generated.
- (c) Hardware failure was not so frequent.
- (d) Wider commercial used.

Disadvantages:

- (a) Air conditioning required.
- (b) Frequent maintenance required.
- (c) Commercial production was costly.

THIRD GENERATION:

Advantages:

- (a) Smaller in size as compared to previous generations due to the use of ICs.
- (b) These computers were easily portable.
- (c) Low maintenance cost.
- (d) Heat generation was rare.

Disadvantages:

- (a) Air conditioning was required in some rare.
- (b) Technology required to manufacture the IC was very advanced.

FOURTH GENERATION:

Advantages:

- (a) Smallest in size due to the use of very large scale integration (VLSI).
- (b) Heat generation was negligible.
- (c) Use of air conditions was rare.
- (d) Hardware maintenance was very rare.

Disadvantages:

- (a) Highly advanced technology was required to manufacture very large scale integration.

FIFTH GENERATION:

Advantages:

- (a) Very small in size due to the use of VLSI.
- (b) Storage capacity is very large.
- (c) Super speed computers.
- (d) These are commonly used in most of the field of technologies.

Disadvantages:

- (a) Cannot understand natural language.
- (b) Cannot recognize voices.
- (c) Power consumption was very high.
- (d) Frequent hardware failure was very high.
- (e) Primary memory was limited.

MATCHING

Q#1: Match the following:

Column-I	Column-II
(a) Charles Babbage	(a) First Programmer
(b) Lady Ada Augusta	(b) Napier bones
(c) Herman Holerith	(c) Tabulating machine
(d) Bliase Pascal	(d) Father of computer
(e) John Napier	(e) Pascal's calculator

Column-I	Column-II
(a) First generation	(a) Integrated circuits
(b) Second generation	(b) Artificial Intelligence
(c) Third generation	(c) Vacuum Tubes
(d) Fourth generation	(d) Transistor
(e) Fifth generation	(e) Very large integrated circuit

Column-I	Column-II
(a) First electro mechanical computer	(a) UNIVAC-I
(b) First commercial computer	(b) Mark-I
(c) First prestored program computer	(c) EDVAC
(d) First punch card	(d) ENIAC
(e) First electronic computer	(e) Joseph Marie Jacquard

DIFFERENCE BETWEEN

FIRST GENERATION	SECOND GENERATION
1. Internal Components	
◦ Vacuum tubes were used as internal component.	◦ Transistor were used as internal component.
2. Size	
◦ The size of the computer was very huge called as main frame.	◦ The size of computer was smaller than first generation called as mini computer.
3. Speed	
◦ They were low speed computer.	◦ They were 10 times faster than first generation computer.
4. Main Memory	
◦ Main memory was in the form of magnetic drum.	◦ Main memory was in the form of RAM and ROM.
5. Storage Device	
◦ Punch card and magnetic tape were used.	◦ Magnetic tape were used.
6. Language	
◦ Machine language was used.	◦ Assembly language was used.

THIRD GENERATION	FOURTH GENERATION
1. Internal Components	
◦ They used integrated circuit (IC) and large scale integration (LSI).	◦ They used very large scale integration (VLSI) and micro processor.
2. Size	
◦ They were smaller in size and called as micro computer.	◦ They were very small in size and called as laptop.
3. Speed	
◦ They could perform calculations in micro and nano seconds.	◦ They could perform millions of calculations per second.
4. Main Memory	
◦ Main memory was increased in the form of PROM and DRAM.	◦ Main memory was increased in the form of EPROM and SRAM.
5. Storage Device	
◦ Magnetic disks were developed.	◦ Floppy disks were used.
6. Language	
◦ High level language was used.	◦ Much easier high level language was used.

Q#2: Describe the five generations of computer with the help of a table.

Ans. The five generations of computer development can be described with the help of the following 'Generation Table'.

TABLE OF FIVE GENERATIONS OF COMPUTERS

Period → Specialities	First Generation 1944-1959	Second Generation 1959-1965	Third Generation 1965-1970	Fourth Generation 1970-1980	Fifth Generation Since 1980
Internet Computer Component	Vacuum Tube	Transistors	Integrated Circuit (IC) Large Scale Integration	Very Large Scale Integration (VLSI) Micro processor	Micro Processor
Size of the Computer	Very Huge Main Frame	Smaller than First Generation Mini Computer	Much Smaller than Second Generation Micro Computer	Very Small LAPTOP Computer	Tiny Computer DIARY Computer
Speed of the Computer	Low Speed Computer	10 times faster than First Generation	100 times faster than Second Generation	10 times faster than Third Generation	Much Faster than Fourth Generation
Storage Device	Punch Card & Magnetic Tapes	Magnetic Tapes	Magnetic Disk	Disk Storage Floppy Dish	Floppy Dish CD-ROM
Main Memory	Magnetic Drum	ROM RAM	PROM DRAM	EPROM SRAM	EEPROM SIMM
Language Programming	Machine Language	Assembly Language	High level Language	Much Easier High level Language	Artificial Intelligence
Quantity Used	Hundreds	Thousands	Ten Thousands	Million	Millions

MUHAMMAD HASSAM

CHAPTER # 02

COMPUTER COMPONENTS

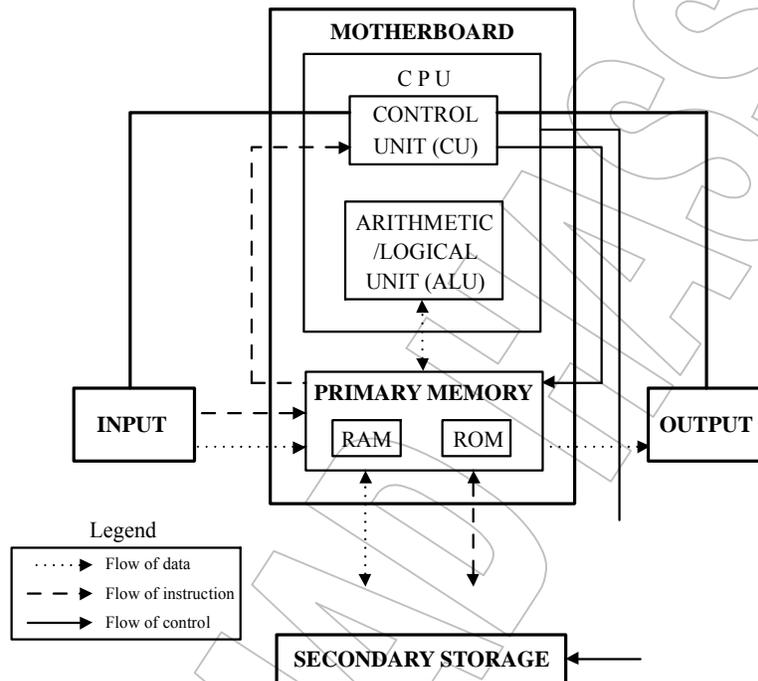
INTRODUCTION:

In this unit and in next two we will learn about different types of hardware. Hardware refers to the physical pieces of computer system.

CENTRAL PROCESS UNIT:

The Central Processing Unit (CPU) is the brain or the nerve center of the computer system. The processing or calculating function takes place in the central processing unit.

In Large machines, CPUs required one or more printed circuit boards. In personal computer the CPU is housed in a single chip called a microprocessor.



Block Diagram Of Computer System With Sub-Units Of CPU

FUNCTIONS OF THE CPU:

- Interprets the data and instructions.
- Generates arithmetic and logic operations.
- Produces the address bits needed by memory.

There are two typical components of a CPU.

1. Arithmetic and Logic Unit (ALU)
2. Control Unit (CU)

1. ARITHMETIC AND LOGIC UNIT (ALU):

This is where arithmetic operations such as addition, subtraction, division and multiplication are performed. This is where logical operations are also done such as comparison between two pieces of data.

The ALU performs arithmetic and logical operations

The ALU includes a group of registers * - high-speed volatile or temporary memory locations built directly into the CPU that are used to hold the data currently being processed.

For example, the control unit might load two numbers from memory into the registers in the ALU.

2. CONTROL UNIT (CU):

All the computer's resources are managed by the control unit (CU). It works like a traffic cop directing the flow of data between the components of the CPU and to and from the other devices. The CU of the CPU comprises of registers* which function as temporary storage devices.

It extracts instructions from memory (RAM) and decodes and executes them, calling on the ALU when necessary.

CU regulates operations in a computer by directing data flow within the CPU. It controls input and output devices and data-transfer process to and from memory. A control unit:

- interprets and carries out instructions of computer programs;
- selects program statements from memory;
- moves these to instruction registers in the control unit; and
- carries out instructions.

[*Register: A register is a type of volatile or temporary memory and is part of CPU. Data currently being processed is stored in registers. There are fourteen basic registers shared by ALU and CU.

BUSES

A processor communicates with Input/Output circuits and memory by using signals. These signals travel along a set of wires or connections called bus that connect the different components together. The address bus carries address signals, control bus carries control signals while data bus carries data signals.

ADDRESS BUS:

Connections between the CPU and memory which transmit the address from which the CPU will read, or to which the CPU will write, OR, A collection of wires connecting the CPU with main memory that is used to identify particular locations (address) in main memory where data is stored.

For example:

Modern PCs have as many as 36 address lines, which enable them theoretically to access 64 gigabytes of main memory. However, the actual amount of memory that can be accessed is usually much less than this theoretical limit due to chipset and motherboard limitations.

CONTROL BUS:

It is physical connection that carry control information between the CPU and other devices within the computer. The control bus carries signals that report the status of various devices.

For example:

One line of the bus is used to indicate whether the CPU is currently reading from or writing to main memory.

DATA BUS:

It is communication route through which data can travel between the computer's central processing unit, memory, and peripherals.

The speed at which data can travel between hardware components depends on the number of wires in the bus, just as the number of lanes on a highway determine the number of vehicles reach their destinations at the same time. Each wire transmits a single bit at a time, so 8-bits bus can transfer 8-bits at a time. Similarly, 16-bits bus can transmit 16-bits simultaneously, and so on.

MEMORY STORAGE:

Memory is the storage device inside your computer where data/ information/ programs reside. The basic type of memory is a set of chips located on the motherboard. These devices are physically separate from the CPU and are called secondary storage devices.

MOTHER BOARD:

It is a rectangular card containing the circuitry that connects the processor to the other hardware. In most personal computers many internal devices such as video card, sound cards and other devices are housed on this board.

INTERNAL MEMORY (PRIMARY STORAGE / MAIN MEMORY):

Generally, there are two types of internal memory; Random Access Memory (RAM) and Read Only Memory (ROM).

RAM:

RAM refers to read and write memory; that is; you can both write data into RAM and read data from it. It is also termed as Primary memory or main memory. It is temporary, and its contents are lost when the computer is turned off.

ROM:

While the other internal memory, ROM (read-only memory) is permanent which retains data even the computer is turned off. ROM contains the computer's essential programs that are necessary to start up the machine. ROM permits you only to read data.

EXTERNAL MEMORY (SECONDARY STORAGE):

The secondary storage is a non-volatile memory that is external to main memory of a computer. Secondary storage devices (also called auxiliary devices) are physically separated but connected directly to the Mother board through a communication cable (line) so that programs or data can be accessed with almost no intervention.

Secondary storage devices include magnetic disks like hard drives and floppy disks; optical disks such as CD-ROMs; and magnetic tapes, which were the first forms of secondary memory.

INPUT / OUTPUT DEVICES:

I/O (input/output), pronounced "eye-oh," describes a device that introduces data into or extracts data from a system. Typical I/O devices are printers, hard disks, keyboards, mice, etc.

INPUT DEVICES:

These are physical equipments that read or translate data consisting of alphabets, numbers or other symbols into electronic impulses, which can be understood by the computer.

OUTPUT DEVICES:

The output devices are also physical equipment, which present the outcome of the computations and related activities carried out in the CPU so that these can be understood by humans.

PORTS:

A port is a socket at the back of a computer used to plug-in various devices. Personal computers have various types of ports. Internally, there are several ports for connecting disk drives, display controllers, and keyboards.

Externally, personal computers have ports for connecting modems, printers scanner and other peripheral devices.

TYPES OF PARTS

There are two types of ports namely:

1. Serial Ports
2. Parallel Ports

1. SERIAL PORT:

A port or interface that can be used for serial communication, in which only 1 bit is transmitted at a time, is called serial port. A serial port, also called a male connector, has 9 or 25 pins.

A serial port is a general-purpose interface that can be used for almost any type of device, including modems, mice, and printers.

2. PARALLEL PORT:

A socket on a computer for transmitting data in parallel, which means more than one bit at a time, is called parallel port. There may be 8, 16, or 32 channels (wires); each channel carries one bit of information, so eight channels would be used to transmit 8-bits at a time.

A parallel port, also called a female connector, has 25 holes, and the cable that plugs into it has 25 pins.

SERIAL VERSUS PARALLEL PORTS:

A serial port sends information through a cable one bit at a time, whereas a parallel port sends 8-bits or time along parallel wires. A parallel port sends data faster but a serial port is reliable for transmission over a longer distance.

Generally, slow devices are connected with the serial port while the faster devices are always connected to the parallel ports.

MUHAMMAD HASSAM

CHAPTER # 03

INPUT AND OUTPUT DEVICES

KEYBOARD:

“The most common Device and the one we assume you are using is a keyboard.”

A Keyboard is used to enter programs and data or Input into a computer. It is easy to use, as it resembles the ordinary typewriter.

The Keyboard comes in plenty and each new model is introduced with new features making it easier than before.

IBM (International Business Machine) produces three types of Keyboard.

- 1) XT Keyboard
- 2) AT Keyboard
- 3) Enhanced Keyboard

The Enhanced Keyboard or Standard Keyboard has just over 100 keys and it may be divided into five groups as Alphanumeric Keypad, Numeric Keypad, Functional Keypad, special Functional Keys and Special Lock Keys.

1) **ALPHANUMERIC KEYPAD:**

This is the main part of Keyboard by using this keypad the letters a→z, A→ Z, numbers 0→9 and special characters like, ! @#\$ %^&*()_+}]][["<> etc. may be typed. Many of these characters are typed by holding Shift Key.

2) **NUMERIC KEYPAD:**

This part or pad is located on the right side of keyboard. When “NUM LOCK” key is pressed then the numbers on numeric keypad can be used to enter numeric data.

3) **FUNCTIONAL KEYPAD:**

A set of twelve keys (marked as F1 to F12) is located at the top of keyboard. All of these keys have pre-defined meanings which depend on the application software.

4) **SPECIAL FUNCTIONAL KEYS:**

Some special functional keys are spread on keyboard like Ctrl (Control), Altr (Alternate), Esc (Escape), Home, PgUp, PgDn etc.

5) **LOCKS:**

Three Lock Keys are also located on keyboard.

- (i) Num Lock (ii) Scroll Lock (iii) Caps Lock

(i) When “Num Lock” Key is pressed then the numbers on keypad can be used to enter numeric data. The indication for Num Lock is displayed at the upper portion of numeric key pad in the form of lighting LED (Light Emitting Diode). When Num Lock key is off (simply press it again to turn off) the keys marked with arrows, Home, End, PgUp, PgDn, Insurance and Del can be used.

(ii) When “Cape Lock” is pressed then Alphabet can be used in the form of AB→Z or capital. The indication keypad in the form of lightning. When “Cape Lock” key is off (simply press it again to turn off) the alphabet can be used in small form or (a b c d e f → z).

(iii) Just like above two locks the Scroll Lock” key can be used for on and off but this key breaks the scrolling key.

MOUSE:

The mouse is an alternating input device also called a “Pointing Device”. It is used to select various options or to draw lines. The mouse consists of a unit with ball at bottom. We can draw lines; even curve lines or any other type of symbol. It is essential for a number of programs to operate them.

As mouse is moved across the desk or any other flat surface the ball moves and a small location symbol (normally an arrow) moves across the screen. Thus with the help of this input device we can go anywhere on the screen).

TRACKBALL:

The function of track ball is same as of mouse but we do not have to roll the track ball over a flat surface. The ball can roll or spin in any direction in a fixed groove to move cursor at anywhere on screen. Now a day's track ball comes as a part of keyboard while we can have it separately too.

JOYSTICK:

Joystick is normally used to controls the movement of a certain object on the screen. It is used only for playing games to computer. This input device is just like a vertical handle, which is gripped by hand. The movement of object is control by this handle. Normally a push button is placed at the top of handle and one push button is placed at the base of handle called Trigger. This button is usually used for firing or hitting.

LIGHTPEN:

This input device draws fine quality pictures, while the mouse cannot draw the same effectively. It is actually needed for engineering designing. It consists of a photocell placed in a small tube. As user moves the tip of pen over the screen surface it defects light coming out from a limited view field. The photocell responds when the pen is directly pointed at lightened are. This electrical response is then transmitted to computer.

It is approximately 6.5 inches long and 0.5 inch in diameter.

MAGNETIC INK READERS:

It is widely used by banks to process the tremendous volume of cheque being written each day. The numbers and symbols are pointed on cheque with a special ink that contains magnetizable iron oxide.

In late 1950's American Bankers Association recognize to automate that processing of bank cheques and this process of recorded data on a cheque in a magnetic ink is called MICR (Magnetic Ink Character Recognition).

OPTICAL CHARACTER READERS:

Optical Character Recognition devices are designed to read sheets of paper, cards, Books or Journal tapes. It has ability to read marks, printed numerical, special characters, alphabets and hand written numerals and letters. As a source document moves past the scanning device of an optical character reader, the document is flooded with light and read by a photosensitive technique; optical character readers translate each character into code. There are many types and makes of optical character readers.

SCANNER:

This input device is just like a photo state machine. It can read sheet of paper cards, books, picture diagrams and other paper material.

Following are the types of scanners.

(i) Flatbed Scanners

(ii) Handy Scanners

VOICE SYNTHESIZER:

This input device is the latest innovation, which helps us, input data by actually talking to computer. This system requires a microphone, which takes the analog signals from voice and sends them to an analog to digit converter. This converter changes analog signal into digital signals, which are in the form of zeros and ones and called voice patterns.

DIGITIZERS:

A Digitizers converts graphics and pictorial data to binary or digital form which can be directly feed stored in computer.

OUTPUT DEVICE:

“Those devices where we are getting our results or the device which just reverse that what the input element means called Output Device.”

Printer and monitors are the main and widely used output devices.

MONITORS:

Those results or output, which are displaying on a TV like device is known as “Monitor”. It is also referred as CRT (cathode ray tube), screen, console, VDU (Video display unit), VDT (Video Display Terminal). The displayed output is called a “Soft Copy”.

MONOCHROME, Color, small size, large size, interlace, non-interlace, Dot pitches are the different types of monitors. While according to different purposes monitors are

For General Purpose,

CGA (Color Graphics Adapter)

HGA (Hercules Graphics Adapter)

EGA (Enhances Graphics Array)

VGA (Video Graphics Array)

SVGA (Super Video Graphics Array)

For Advance Purpose,

PGA (Professional Graphics adapter)

8514/A system

TIGA (Texas Instrument Graphics Architecture)

For Special Purpose,

A4 → 210 x 297 mm (size)

A3 → 297 x 420 mm (size)

PRINTERS:

A device used for printing known as “printer”. It receives information from computer and prints it on the paper and the result of printer on paper is called the permanent copy or a “Hard Copy”. Many printers can produce result in different colors called Color Printers like STAR NX-1000-COLOR printer.

Printers may be categorized according to the speed as low or high which are,

- (i) Impact Printers
- (ii) Non-Impact Printers

IMPACT PRINTERS:

These Noisy printers print by striking the ribbon against paper. It can Normally produce three carbon copies at a time and can be grouped as

- 1) Serial or Character Printers
- 2) Line Printers

1) SERIAL OR CHARACTER PRINTERS:

Those printers which are capable to print only one character at a time called “Character Printers”. These printers can print 10 to 600 characters per second and have only one printing head.

Dot Matrix Printers & Daisy Wheel Printers are the examples of character printers.

In **DAISY WHEEL** printer an electric motor spins a wheel and a print hammer strikes to produce image of character on paper. These printers cannot produce pictures drawing or graphic but print out is much better than Dot Matrix Printers.

In **DOT MATRIX** printer with only head at a time one character prints and moves to next character position. This character produced by an arrangement of tiny hammer like pins, which strike the ribbon against paper. These dots are arranged in a specified pattern to form characters. Dot Matrix printers can also prints drawings, graphics or pictures. It can print at a speed of 30 to 600 CPS (Characters Per Second).

2) **LINE PRINTERS:**

A line printer can print an entire line at a time which normally covers 80 or 132 characters and for each character have a separate printing head. Normally it can print about 250-0 lines per minute.

Drum & Chain Printers are the example of line Printers.

A **DRUM** printer consists of a solid cylindrical drum that has embossed characters in bauds on its upper surface. On printing position many bands contains all the possible characters. The drum rotates at a high speed and for each location a print hammer is located behind the paper.

In **CHAIN** printer each character links with chain which moves and for every position there is a printing hammer located behind paper. When the chain rotates the properly timed print hammers strike paper along with inked ribbon against the proper character on the chain as it passes.

NON-IMPACT PRINTERS:

Those printers, which form an image by particular methods and them, transfer it to paper as a visible character called “NON-IMPACT PRINTERS”. These Quite printers write character on page but cannot produce carbon copies. Some non-impact printers are discussed below.

LASER PRINTERS:

These **QUIET** and **PAGE PRINTERS** produce high quality printing and normally known as **LASER** (Light Amplification by stimulated Emission of Rays). HP 4L (Hewlett-Packard) is the example of laser printer. In these printers with the difference of electric charge laser exposed areas attract an ink powder called toner which is fused permanently on paper with heat or pressure. Only for 0.1 second heat fusing processes the temperature up to 200°C.

INK-JET PRINTERS:

In these good quality printers the character is formed by many tiny ink dots. Which droplets leaving a nozzle is electricity charged.

DROP-ON-DEMAND PRINTERS:

These printers produced or drop of ink when a voltage passes through a piezoelectric crystal. In these printers multiple nozzles are used to form a complete character.

THERMAL PRINTERS:

These printers used wax-linked ribbon but they used a special paper, which is slightly waxy, and when hot pins of thermal printers strike on paper it changes it color to black. This type of paper and printing is widely used in fix machines.

MUHAMMAD HASSAM

CHAPTER # 04

SECONDARY STORAGE
DEVICES

ROM:

“This permanent storage memory used all computers to hold certain startup programs such as routines disk drives, load operating systems into memory and transfer of control to new loaded operating system.”

ROM abbreviation for “READ ONLY MEMORY” is a pre-programmed memory that contains one or more programs vital to computers needs. ROM is just like software which permanently housed in hardware, the contents of ROM remain when power is switch off. Also known as “Firmware”.

A computer may have some other type of ROM chips besides simple ROM which are

PROM (Programmable Read Only Memory)

EPROM (Erasable Programmable read Only Memory)

EEPROM (Electrically Erasable Programmable read Only Memory)

EAPROM (Electrically Alterable Programmable read Only Memory)

RAM:

“It is a user’s memory an abbreviation for “Random Access Memory”. It is temporarily highly accessible and highly speedy work Area. At a time it holds only one major program and after completed the task it can be erased and new item can be replaced in working space. So we can say that it is an erasable or washable memory or reusable memory. RAM forgets that what it was holding when power is switched off.

RAM is divided into three types, which are described below.

(i) Conventional Memory:

In this memory computer loads DOS programs, application software and its data. This most fundamental memory usually holds 640 KB (Kilo Byte) and called Conventional Memory. Normally RAM holds 1 MB minimum & now days a maximum RAM slots hold 128 to 256 MB (Mega Byte) of memory.

(ii) Extended Memory:

Installment of extended memory beside conventional memory makes much software to run faster. If a computer is equipped with 8 MB of total RAM then it has 640 KB of conventional memory and 7168 KB of extended memory. It works almost as quickly as the conventional memory.

(iii) Expanded Memory:

A large memory can be installed as expanded memory. It is required for some software for better performance or even as necessity. It is must to install a small software called “Expanded Memory Manager (EMM)” which requires to actual access to expanded memory. Therefore it is slower then extended memory.

CACHE MEMORY:

“One element used during processing operation is a high-speed buffer or cache memory that is both faster and more expensive per character stored then primary storage. Due to little amount of fast registers and large amount of slow RAM any program is certain to be too big to fit entirely in registers and RAM to compromise this solution called Cache Memory.”

WORD CACHE comes out from the French word “cacher” which comes “to hide”. It is more expensive and faster than RAM but slower and less expensive than registers.

It is used to increase the speed of processing by making current programs and data available to CPU at rapid rate. The general principle is that to kept frequency accessed data in the faster cache while less frequency used items should be kept in RAM.

MEMORY MEASURING UNITS

BIT:

“Bit is an abbreviation of Binary digit, therefore we understand that BIT having one binary digit or equals to one binary digit which may be On or Off. It is also represented by 0 or 1. Computer recognizes it as a non-addressable smallest unit STORAGE represented.”

NIBBLE:

“This non-addressable unit of memory is a group of 4 bits and known as NIBBLE. It is also called a half byte.

BYTE (B):

“Byte is a combination of 8 bits. And it is the smallest addressable unit of storage location, capable of accommodate one or a special character symbol (like * ! # @ & ^ % etc).

Some micros have a combination of 16 or 32 bits.

WORD:

“This term is used in IBM/AT Computers, which are starting from 80286 microprocessors. And it is the combination of two consequent bytes or 16 bits known as WORD.”

DOUBLE WORD:

“This term is also used in IBM/AT computers but starting from 80386 microprocessors. And it is the combination of four consequent bytes or 32 bits known as DOUBLE WORD.”

KILO BYTE:

“This measuring unit contains 1024 bytes and makes 1 KILO BYTE (KB).”

1 KB = 1024 Bytes

640 KB = 655360 Bytes (because $640 \times 1024 = 655360$)

360 KB = 368640 Bytes (because $360 \times 1024 = 368640$)

MEGA BYTE:

“Mega Byte is represented as ‘MB’. This large unit of memory contains 1024 KB or 1048576 Byte (because $1024 \times 1024 = 1048576$).”

8 MB = $8 \times 1024 = 8192$ KB

8 MB = $8 \times 1024 \times 1024 = 8388608$ Bytes

GIGA BYTE:

“This huge unit of memory measuring contains 1024 MB or 1048576 KB or 1073741824 bytes. It is represented as (GB).”

1 GB = $1 \times 1024 \times 1024 = 1048576$ KB

1 GB = $1 \times 1024 \times 1024 \times 1024 = 1073741824$ Bytes

TERA BYTE:

“This largest unit of memory contains 1024 GB or 1048576 MB or 1073741824 KB or 1099511627776 Bytes. It is represented as (TB).”

CALCULATION

1.2 MB = 1.2 x 1024 x 1024 = 1258291.2 Bytes
1.44 MB = 1.44 x 1024 x 1024 = 1509949.44 Bytes
2.88 MB = 2.88 x 1024 x 1024 = 3019898.88 Bytes
4096 KB = 4096/1024 = 4 MB
1.3 GB = 1.3 x 1024 = 1331.2 MB
1.3 GB = 1.3 x 1024 x 1024 = 1363148.8 KB
1.3 GB = 1.3 x 1024 x 1024 x 1024 = 139586437.1 Bytes
760 KB = 760 x 1024 = 778240 Bytes
512 Bytes = 512/1024 = ½ KB
512 GB = 512/1024 = ½ TB

FLOPPY DISKS:

“A floppy disk is a circular shaped piece of Mylar (flexible plastic) that is coated with a magnetic material iron oxide and enclosed in a protective stiff plastic jacket. Originally the size of floppy disk was 8 inch which was first developed by IBM in 1972 but now-a-days Floppy disks are available in two sizes, 5^{1/4} inch and 3^{1/2} inch.”

On the round, flat, magnetic material layer Data is recorded in the form of magnetic are known as TRACKS. These tracks are formed as concentric circle on the surface of disk. The outer most circle is called “ZERO TRACK”. The next inner circle is track1 then track2 and so on. All of these tracks are further divided into some sectors for better accessing of data. The following Table shows the number of tracks and sectors on floppy disks of standard sizes and capacities.

STANDARD FLOPPY DISK FORMATS

FLOPPY DISK SIZE	SIDES	DISK CAPACITY	TRACKS PER SIDE	SECTORS PER TRACK
5 ^{1/4} INCH	2	360 KB	40	9
5 ^{1/4} INCH	2	1.2 KB	80	15
3 ^{1/2} INCH	2	720 KB	80	9
3 ^{1/2} INCH	2	1.44 MB	80	18
3 ^{1/2} INCH	2	2.88 MB	80	36

HARD DISK:

“Hard Disk is internally one or more inflexible platters coated with material that allows the magnetic recording of computer data. A typical hard disk is sealed to prevent contaminants from interfering with the close head-to-disk tolerance. Hard disks provide faster and are capable of storing much more information. Because platters are rigid, they can be stacked so that one hard-disk drive can access more than one platter. Most hard disks have from two to eight platters.”

MAGNETIC TAPE:

“Germans invented magnetic type during Second World War. The magnetic tape has plastic base, which is coated by magnetic substances. The data is recorded on tape in the form of small-magnetized dots or spots along the length of tape. These dots can be arranged to represent coded patterns of binary digits.

Advantages:

- (i) It is the best media for sequential processing.
- (ii) Data can be stored for a very long period of time.
- (iii) It is very inexpensive.
- (iv) It can store huge amount of data.
- (v) The magnetic tape can be reuse.
- (vi) The reels of magnetic tape can easily transported.

Limitation:

- (i) It requires the big processing unit.
- (ii) A large space is requiring for processing.
- (iii) It is a slow access media.
- (iv) If a tape tears, some data is always lost.

MUHAMMAD HASSAM

MUHAMMAD HASSAM

CHAPTER # 05

DATA REPRESENTATION

NUMBER SYSTEM:

The number system is the system of containing and calculation. Number system is based on some characters called digits. Each number is made up of these characters. The number of digits a system uses is called its base or radix. For example the number system we use in our daily life is called Decimal system. Its base is 10 (As the name 'Deci' implies.) which mean that it uses 10 digits (i.e. 0-9). There are four types of number systems used in computer operations.

- (1) Decimal (2) Binary (3) Octal (4) Hexadecimal

(1) The Decimal System:

Decimal number system is most familiar to us. We use this number system in our daily life for counting and calculations. In decimal system we count in "Tens" using the digits 0, 1, 2, 3, 4, 5, 6, 7, 8, 9 to represent a value, so the base of this system is 10.

The value that the digits represent depends on the weight, or position they hold. The weights are based on the powers of 10 as shown in Figure 1

4 th	3 rd	2 nd	1 st	Position
$10^3 = 1000$	$10^2 = 100$	$10^1 = 10$	$10^0 = 1$	Weight

(2) The Binary System:

The binary system is ideal for internal working of electronic computers. Computer circuitry represents data in a pattern of ON or OFF states of electric current. Because there are only two states, they are represented by 1 (for ON) and 0 (for OFF). Binary system is based on two fundamental digits 0 and 1 to represent its numeric values therefore the base of this system is 2.

To visualize the positional values of the binary system the weights for the first five positions are given as under:

5 th	4 th	3 rd	2 nd	1 st	Position
$2^4 = 16$	$2^3 = 8$	$2^2 = 4$	$2^1 = 2$	$2^0 = 1$	Weight

(3) The Octal System:

Octal is a Latin word used for eight (8). Octal has eight fundamental digits as, 0, 1, 2, 3, 4, 5, 6, 7, so the base of this system is 8. The weights of digit position are successive power of 8 as under:

5 th	4 th	3 rd	2 nd	1 st	Position
$8^4 = 4096$	$8^3 = 512$	$8^2 = 64$	$8^1 = 8$	$8^0 = 1$	Weight

(4) The Hexadecimal System:

Hexadecimal means 16, therefore this is a base-16 number system. IT has 16 fundamental digits. The first ten digits are same as decimal (0-9) and the rest of the 6 digits are the first six letters of English alphabet (A, B, C, D, E, and F). The letters A through F represents the decimal numbers 10 through 15.

The weights used in the hexadecimal system are the successive powers of 16. The weights of the first four digit positions are as under.

4 th	3 rd	2 nd	1 st	Position
$16^3 = 4096$	$16^2 = 256$	$16^1 = 16$	$16^0 = 1$	Weight

Table 1:

Decimal, binary, octal and hexadecimal number chart.

Decimal	Binary	Octal	Hexadecimal
0	0	0	0
1	1	1	1
2	10	2	2
3	11	3	3
4	100	4	4
5	101	5	5
6	110	6	6
7	111	7	7
8	1000	10	8
9	1001	11	9
10	1010	12	A
11	1011	13	B
12	1100	14	C
13	1101	15	D
14	1110	16	E
15	1111	17	F

REPRESENTATION OF NUMBER USING 1'S AND 2'S COMPLEMENTS:

The 1's and 2's complements of binary numbers are important because they permit the representation of negative numbers. The method of 2's complement arithmetic is commonly used in computers to handle negative numbers.

Finding the 1's complement of a number:

The 1's complement of a binary number is formed by changing all 1's to 0's and 0's to 1's.

Binary number	1	0	1	0	0	1	1	0
	↓	↓	↓	↓	↓	↓	↓	↓
1's complement	0	1	0	1	1	0	0	1

Finding the 2's complement of a number:

The 2's complement of a binary number is formed by adding 1 to the LSB (Least Significant Bit) of 1's complement.

$$2's \text{ complement} = (1's \text{ complement}) + 1$$

Example: Find the 2's complement of 10010111

Solution:	Binary number	10010111
	1's complement	01101000
	Add 1	+ 1
	2's complement	01101001

An alternating method of finding 2's complement of a binary number is as follows:

1. Start from the right with LSB and write the bits as they are up to and including the first 1.
2. Take the 1's complement of the remaining bits.

Example: Find the 2's complement of 10111000 using the alternating method.

Solution:	Binary number	10111000
	2's complement	01001000

1's complement of original bits

These bits stay the same

FIXED AND FLOATING-POINT NUMBER REPRESENTATION:

The fixed-point numbers are also called real numbers. They have a fixed format of numbers after decimal fraction. They are used to represent small fractional numbers. They don't have any exponent part.

The floating-point number system, based on scientific notation, is capable of representing very large and very small numbers without an increase in the number of bits and also for representing numbers that has both integer and fractional components.

A floating-point number (also known as real number) consists of two parts plus a sign. The exponent is the part of a floating-point number that represents the number of places that the decimal point (or binary point) is to be moved.

A decimal example will be helpful in understanding the basic concept of floating-point numbers. When the integer is expressed as a floating-point numbers, the floating-point number is written as:

$$0.2549272 \times 10^9$$

CODES:

When numbers, letters or words are represented by special group of symbols, we say they are being encoded and the group of symbols is called 'Code'.

Binary Codes:

We have seen that any decimal number can be represented by an equivalent binary number. The group of 0's and 1's in the binary number can be thought of as code representing the decimal number; we call it 'Binary Coding'.

For this reason, a method of encoding decimal numbers that combines some features of both the decimal and binary system is used in certain situations.

Binary-Coded-Decimal code (BCD):

Computer operates on a series of electrical pulses called word. A word can be represented by a binary number such as 11010101_2 . A series of digits would be called a 4-bit word and so forth. The most common are 4, 8 and 16 bit words, quite often, these words Binary-Coded Decimal inputs.

Binary-Coded Decimal, BCD, is a method of using binary digits to represent the decimal digits. A decimal digit is represented by four binary digits. The Binary coded decimal is a '8421' code. The designation '8421' indicates the binary weights of the four bits ($2^3, 2^2, 2^1, 2^0$).

Decimal	BCD 8421
0	0000
1	0001
2	0010
3	0011
4	0100
5	0101
6	0110
7	0111
8	1000
9	1001

Example: Convert each of the following decimal numbers to BCD:

- (a) 45 (b) 85 (c) 250 (d) 3269

Solution:

- (a) 4 5 (b) 8 5
- 01000101 10000101

Alphanumeric Codes:

In addition to numeric data, a computer must be able to handle, besides numbers, non-numeric information. It should recognize letters, punctuation marks and other symbols. Alphanumeric codes represent all of the various characters that are found on computer keyboard.

Modern computers use 8-bit codes, which can accommodate 36 alphanumeric characters and 220 special characters.

(i) ASCII

The American Standard Code for Information Interchange (ASCII) pronounced as 'askee' is a universally accepted alphanumeric code used in most computers and other electronic equipment. Most computer keyboards are standardized with ASCII. When you enter a letter, a number, or control command, the corresponding ASCII code goes into the computer.

ASCII has 256 characters and symbols represented by an 8-bit code series. The first 32 codes in the ASCII table represent the control characters that are not printed or displayed.

(ii) EBCDIC

Extended Binary Coded Decimal Interchange Code, pronounced as 'ebb-see-dic' is another 8-bit code popularly used in mainframe computers and mini computers.

MUHAMMAD HASSAM

CHAPTER # 06

BOOLEAN ALGEBRA

Q: What is Boolean Algebra?

BOOLEAN ALGEBRA:

Boolean Algebra is used to represent the operation of logic circuits. It was developed by an English mathematician George Boole in 1850. It is applied in the design and analysis of digital systems. Boolean algebra provides the operations and the rules for working with the set $\{0, 1\}$. Boolean algebra is being extensively used in designing of circuits used in computers.

Q: Define the following terms of Boolean algebra?

TERMS OF BOOLEAN ALGEBRA

(a) Constants:

Binary numbers 0 and 1 are used as Boolean constant.

(b) Variables:

Boolean variables are represented by letters such as x, y, z, a, b, c etc. The possible value of each variable is either 0 or 1.

(c) Truth Table:

A truth table is a table representing the condition of input and output circuits involving two or more variable.

(d) Complement:

The complement is the inverse of a variable and is indicated by a bar over the variable. For example, complement of variable A is \bar{A} .

(e) Boolean Expression:

A Boolean expression is an arrangement of variables and logical operators used to express the operation of a logic circuit.

Q: Define Boolean operators or Logical operators?

LOGICAL OR BOOLEAN OPERATORS:

There are three basic logical operators used in Boolean algebra.

(a) OR operator

(b) AND operator

(c) NOT operator

(a) OR Operator:

OR operation is represented by a “+” sign. It is used for logical addition or Boolean sum. The “+” symbol or OR operation is used by listing all possible combinations. The number of possible combinations will be calculated by the formula 2^n (n is the number of variables). If we have two variables the number of possible combinations will be $2^2 = 4$. OR operation is represented as $A + B = C$. (A and B are the input and C is the output)

Truth Table: OR (+) operator

INPUTS		OUTPUT
A	B	$A + B = C$
0	0	0
0	1	1
1	0	1
1	1	1

(b) AND operator:

AND operation is represented by a “.” sign. It is used for logical multiplication. The AND operation is defined by listing all possible combinations of, for example, A and B and the resulting value of C in the equation $A \cdot B = C$ or $AB = C$.

Truth Table: AND (.) operator

INPUTS		OUTPUT
A	B	$A \cdot B = C$
0	0	0
0	1	0
1	0	0
1	1	1

(c) NOT operator:

NOT operation is represented by a prime (‘) or bar (-) sign. It is used for complement operation. For example \bar{A} complement of A or NOT A.

Truth Table: AND (.) operator

INPUT	OUTPUT
A	\bar{A}
0	1
1	0

Q: What are the laws of Boolean algebra?

LAWS OF BOOLEAN ALGEBRA

Three of the basic laws of Boolean algebra are the same as in ordinary algebra.

- (a) Commutative laws (b) Associative laws (c) Distributive laws

(a) Commutative Laws:

(i) The commutative law of addition for two variables is written as:

$$A + B = B + A$$

This law states that the order in which the variables are ORed (added) makes no difference.

(ii) The commutative law of multiplication for two variables is written as:

$$A \cdot B = B \cdot A$$

This law states that the order in which the variables are ANDed (multiplied) makes no difference.

(b) Associative Laws:

(iii) The associative law of addition is written as follows for three variables:

$$A + (B + C) = (A + B) + C$$

This law states that when Oring more than two variables, the result is same regardless of the grouping of the variables.

(iv) The associative law of multiplication is written as follows for three variables:

$$A \cdot (B \cdot C) = (A \cdot B) \cdot C$$

This law states that when ANDing more than two variables, the result is same regardless of the grouping of the variables.

(c) Distributive Laws:

The distributive is written for three variables as follows:

$$A (B + C) = AB + AC$$

This law states that ORing two or more variables and then ANDing the result with a single variable is equivalent to ANDing the single variable with each of the two or more variables and then ORing the products.

Q: State and prove DeMorgan's theorems?

DEMORGAN'S THEOREMS:

DeMorgan, a mathematician, proposed two theorems that are an important part of Boolean algebra. They help in simplifying complicated logical expression.

There are two parts of DeMorgan's theorem:

- (a) $\overline{XY} = \overline{X} + \overline{Y}$
- (b) $\overline{X + Y} = \overline{X} \cdot \overline{Y}$

(a) $\overline{XY} = \overline{X} + \overline{Y}$:

The complement of product of variables is equal to the sum of the complements of the variables.

Proof:

The theorem can be proved by the truth table given below:

X	Y	X.Y	$\overline{X.Y}$	\overline{X}	\overline{Y}	$\overline{X + Y}$
0	0	0	1	1	1	1
0	1	0	1	1	0	1
1	0	0	1	0	1	1
1	1	1	0	0	0	0

↑—————↑
Equal

(b) $\overline{X + Y} = \overline{X} \cdot \overline{Y}$:

The complement of sum of variables is equal to the product of the complements of the variables.

Proof:

The theorem can be proved by the truth table given below:

X	Y	X + Y	$\overline{X + Y}$	\overline{X}	\overline{Y}	$\overline{X} \cdot \overline{Y}$
0	0	0	1	1	1	1
0	1	1	0	1	0	0
1	0	1	0	0	1	0
1	1	1	0	0	0	0

↑—————↑
Equal

Q: What are the standard forms of Boolean expression?

STANDARD FORMS OF BOOLEAN EXPRESSION

There are two standard forms of Boolean expression.

- (a) The sum-of-products (SOP)
- (b) The product-of-sums (POS)

(a) The sum-of-products (SOP):

When two or more products terms are summed by Boolean addition, the resulting expression is a sum-of-products (SOP).

e.g. $AB + CD, XY + XYZ + XZ, A + BC + CD.$

(b) The product-of-sums (POS):

When two or more sum terms are multiplied, the resulting expression is a product-of-sums (POS).

e.g. $(A + B + C)(A + B), (A + B)(C + D)(B + C + D)$

Q: What is Karnaugh map? How can karnaugh map help in simplifying a Boolean expression?

KARNAUGH MAP:

Karnaugh Map provides a systematic method for simplifying Boolean expressions. A Karnaugh Map is similar to a truth table because it presents all of the possible values of input variables and the resulting output for each value. Instead of being organized into columns and rows like a truth table, the Karnaugh Map is an array of cells in which each cell represents a binary value of the input variables. The cells are arranged in a way so that simplification of a given expression is simply a matter of properly grouping the cells. Karnaugh Maps can be used for expression with two, three, four and five variables.

The number of cells in a Karnaugh Map is equal to the total number of possible input variable combinations as is the number of rows in a truth table. For two variables the number of cells is $2^2 = 4$. For two variables the number of cells is $2^3 = 8$ and so on.

The 2-variable Karnaugh Map:

The two variable karnaugh maps is an array of 4 cells. Binary value of A is along the left side and the value of B is across the top.

A \ B	0	1
0		
1		

The 3-variable Karnaugh Map:

The three variable karnaugh maps is an array of 4 cells. Binary value of A and B are along the left side and the value of C are along the top.

AB \ C	0	1
00		
01		
11		
10		

The 4-variable Karnaugh Map:

The four variable karnaugh maps is an array of 4 cells. Binary value of A and B are along the left side and the value of C and D are along the top.

AB \ CD	00	01	11	10
00				
01				
11				
10				

Q: Tick the correct answer:

- (i) The complement of a variable is always
(a) 0 (b) equal to the variable
(c) 1 (d) **the inverse of the variable**
- (ii) The Boolean expression $A + B + C$ is:
(a) **a sum term** (b) a literal term
(c) a product term (d) a complemented term
- (iii) The Boolean expression $ABCD$ is
(a) a sum term (b) **a product term**
(c) a literal term (d) always 1
- (iv) According to the commutative law of addition:
(a) $AB = BA$ (b) $A = A + A$
(c) $A + (B + C) = (A + B) + C$ (d) **$A + B = B + A$**
- (v) According to the associative law multiplication:
(a) $B = BB$ (b) **$A(BC) = (AB)C$**
(c) $A + B = B + A$ (d) $B + B(B + 0)$
- (vi) Which one of the following is not a valid rule of Boolean algebra?
(a) **$A(B + C) = AB + AC$** (b) $A(BC) = ABC$
(c) $A(A + 1) = A$ (d) $A + AB = A$
- (vii) Which one of the following is not a valid rule of Boolean algebra?
(a) $A + 1 = 1$ (b) **$A = A$**
(c) $AA = A$ (d) $A + 0 = A$
- (viii) A 3-variable Karnaugh map has:
(a) **eight cells** (b) three cells
(c) sixteen cells (d) four cells

CHAPTER # 07

COMPUTER SOFTWARE

TYPES OF SOFTWARE:

General speaking software can be categorized as:

- (1) System software (2) Application software

1) SYSTEM SOFTWARE:

The programs directly released to the computer hardware and perform tasks associated with controlling and utilizing computer hardware are known as system software. System software does not solve a specific problem for the user rather it helps to solve a problem.

System software falls into following categories.

(a) Operating System:

Operating systems are the most important system software. Operating system is a set of programs that control and supervises the hardware of a computer and provides services to application software, programmers and users of computer. Without operating system a computer cannot do anything useful. The primary goal of an operating system is to make the computer convenient to use. The secondary goal is to use computer efficiently.

Operating system for mainframe and other large computers are very complex since they must keep track of several programs from several users all running in the same time frame.

Following are some of the popular operating systems used in personal computers:
DOS, Windows, Unix, Linux, Solaris, etc.

(b) Language translators:

The computer does not understand a programming language, because computer only knows the machine language or binary language. Software associated with programming language include language translators such as assemblers, interpreters and compilers.

(i) Interpreter:

An interpreter translators and executes each program statement one at a time. After execution the translation of a statement is removed from memory and next statement is loaded for translation. GWBASIC is an interpreter for BASIC language programs. Each programming language has its own interpreter.

(ii) Compiler:

Compilers translate the whole program at a time and store their translated program on disk. The original program is called "Source Program" while its translated version is called "Object Program".

(iii) Assembler:

The assembler is a language translator for a low level programming language called "Assembly language". Assembly language is a Symbolic language.

(c) Data-management software:

Data-management software includes database and file management programs that manage data for an operating system. They can organize, update and print data.

(d) Editors:

Editors allow the user to type-in a program, generate text and make modifications whenever necessary.

(e) Utility software:

These are programs that users can purchase as separate products to perform a wide range of functions. The programs for these functions are PC-Tools, Scan Disk, Norton Disk Doctor (NDD), Anti virus and some of the utilities that are mostly bundled with the operating system.

2) APPLICATION SOFTWARE:

An application is a job or task a user wants to accomplish through a computer. Application software are programs that help a user perform a specific job.

For example application software enables a user to write a letter and/ or create a drawing.

TYPES OF APPLICATION SOFTWARE

Application software can be grouped into two broad categories.

- (a) General purpose Application software.
- (b) Special purpose Application software.

(a) General purpose Application software:

These called packaged software or commercial software. A single software can be applied to a wide variety of tasks.

General purpose software includes, MS Office, Corel Draw, Page maker, Adobe Photo shop, etc.

(b) Special purpose Application software:

The software that is designed to perform a specific task is known as special purpose application software. This is also called Custom software.

For example, Software to process inventory control, software to maintain Bank Accounts, software used in Airline Booking System, etc.

DOS

Introduction:

DOS stand for disk operating system. A disk operating system stores data on a floppy disk or hard disk. It also manages the routine work of computer system, controlling everything from internal memory, monitor displays, keyboard input and external communication.

DOS has remained one of the popular operating systems for IBM and IBM compatible personal computers for a long time. The process of loading the operating system into memory is called “bootstrapping” or “booting” the system.

Wildcard characters:

While looking for a particular file (using DIR command to see the directory or DEL command to delete files), you can use two special characters called wildcards. A question mark (?) can take the place of any single character and an asterisk (*) can replace any group of characters, even the entire filename or extension.

These wildcards allows us to refer to a group of related files such as all the files with. They can be used when searching/deleting files on a disk.

For example:

TEST?	Includes TEST, TEST1, TEST2, TESTS, but not the TESTS1 (it has an extra character)
*.EXE	It refers to all files with .EXE extension.
**	Includes all files on the default drive.

DOS COMMANDS

What is a Command?

The Command is a way of communicating with the computer. DOS commands are used to perform specific tasks (mostly related to hardware).

There are two types of DOS commands.

- 1. Internal Commands.
- 2. External Commands.

1. INTERNAL COMMANDS:

Internal commands are built into DOS. Once you have started the computer and loaded DOS, you can execute these internal commands any time. Internal commands are always immediately available in memory and cannot be seen in the directory. They are stored in Command.COM file.

DOS has several Internal commands such as:-

1. DIR	2. CLS	3. DATE	4. TIME
5. COPY	6. VER	7. VOL	8. DEL
9. TYPE	10. REN	11. PROMPT	12. MD or MKDIR
13. RD or RMDIR	14. CD or CHDIR	15. Path	

2. EXTERNAL COMMANDS:

External commands are stored separately on a disk as program files. Any file with an extension of .BAT, .COM, or .EXE is considered as external commands. DOS must read these commands from the disk before you can execute them.

Some of the frequently used external DOS commands are:-

1. FORMAT	2. CHKDSK	3. LABEL	4. DISKCOPY
5. PRINT	6. SYS	7. EDIT	8. XCOPY
9. DELTREE	10. DOSKEY		

CHAPTER # 08

INTRODUCTION TO WINDOWS
OPERATING SYSTEM

Introduction:

Windows started as a true operating system in 1995 with the first version called Windows-95. Microsoft then released its enhanced and updated version later on. The latest version of Window now available for use are:

- | | |
|-----------------|---------------|
| 1. Windows 98 | 2. Windows NT |
| 2. Windows 2000 | 4. Windows XP |

STARTING THE COMPUTER WITH WINDOWS:

Windows operating system is first installed on a hard disk. When the installation is complete, the computer is ready to use this operating system. The installation procedure is given at the end of this chapter.

To start Windows, switch on the computer and Windows will start to load in the computer's memory. This will take some time (depending on the computer's speed and RAM) to completely load the windows in memory. When loading is completes, the first screen that will be displayed is called "Desktop". When Desktop appears the Windows is ready to be operational.

WINDOWS DESKTOP:

Windows "Desktop" is like a working surface of a desk. Desktop is where your applications, folders and shortcuts are located. Desktop contains the following items:

- Icons
- Task bar
- Start button

ICON

An Icon is a small colorful graphical picture that represents an object like a file, folder, program or any hardware component of the computer. Every icon has a label, which identifies it. It labels can be changed.

Icons of the Desktop:

The Icons provided by windows are:

- My Documents
- My Computer
- My Network Places
- Recycle Bin
- Internet Explorer

Working with Icons:

Selecting and Activating an Icon:

- (a) To select an Icon of the desktop, move the mouse pointer to the icon you want to select.
- (b) Click the left button of the mouse. This will change the color of the icon and select it.
- (c) Double click the left button of the mouse (in quick successions) to open the file, folder or program the icon is representing or right click the icon to display a menu, then left click the "open" command from the menu.

Changing the position of an Icon:

- (a) Select the Icon whose position you want to change by left clicking with the mouse.
- (b) Hold down left button of the mouse while moving the pointer to new location of the desktop or to the folder where you want to place the icon.

Changing the name or label of an Icon:

- (a) Move mouse pointer to the icon whose name you want to change.
- (b) Click the right button of the mouse, a menu will appear.

Deleting an Icon:

- (a) Move mouse pointer to the icon which you want to delete.
- (b) Click the right button of the mouse, a menu will appear.

TASKBAR

The Taskbar is at the bottom of Desktop, but you can move it to the top or either side of the screen by clicking and dragging it to the new location. Buttons representing programs currently running on your computer appears on the taskbar.

The above taskbar shows that two programs are running on the computer. At the very left of the Taskbar is the Start Button.

WINDOW

Window is a rectangular area of screen that displays different information. In Windows every folder or application has a window. Following are the properties of a window.

- (a) Every window has a title bar, which display the name of the window.
- (b) A window can be resized, minimized and maximized by pressing the buttons at the top right corner of the Title bar.

START BUTTON

Start button is found at the lower left corner of the screen. Click once on the Start button to open a menu of choices. Through this button we can open the programs, installed on your computer and access all the utilities available in the Windows environment.

Programs:

Place the mouse pointer to Programs entry and a submenu will open, showing all programs or applications currently installed.

Favorites:

Favorites menu presents a list of the Internet addresses that you have added to your Internet Explorer Favorites list.

Document:

The Documents menu lists the files you have recently worked on. You can open the most recently used document directly from here.

Settings:

This menu provides the facility to change or configure the hardware or software settings of the computer.

Control Panel:

The individual icons in the Control Panel refer to a variety of tools to control the way your computer, its components presents information, as well as the as the tools to control the behavior and appearance of the Windows interface.

Printers:

This option give you access to all printers available to your computer and also let you add or configure a new printer and remove any printer from your system.

Taskbar & Start menu:

The taskbar Start menu gives you another way to set Taskbar options and to add or remove items from the Start menu.

Folder Option:

This also gives you another way to set folder options i.e. how the folder should behave.

Active Desktop:

A quick way to turn on and off the Active Desktop.

Windows Updates:

An Internet connection to Windows operating system upgrades and fixes.

Find/Search:

This option of the Start menu helps in locating files or folders stored on the hard disk or network. This command is very helpful in case we forget the exact location of a file or folder we want to access.

It opens a dialog box, when the user can type a name of the file or folder to search for. The procedure of using this command is given below:

- (a) Enter the name of the file or folder in the Named text box.
- (b) Form the Lock in drop down list box choose the location where you imagine that your desired file or folder may be present.

Help:

To access the Help system of Windows, you can select Help from the Start menu. Help option helps us how to use the commands and menus and in case of problems how to troubleshoot the Windows operating system.

Run:

This command is used to execute a command or program directly instead of using the icon or program menu. Press the Browse button to locate the program you want to open through Run command.

Shutdown:

Shutdown is a process in which computer closes all programs currently running and disconnects the devices connected with it and turns itself off.

- (a) Click on the Start button to open the start menu.
- (b) Click on the Shutdown.

ICONS OF DESKTOP

The main Icons found on the Desktop of Microsoft Windows are:

1. My Computer
2. My Documents
3. My Network Places or Network neighborhood
4. Recycle Bin

1. My Computer:

My Computer lets you browse the contents of your computer. The common tasks that we can perform through My Computer are:

- (a) Access information stored as different storage devices connected with the computer, such as hard disk, floppy disk or CD ROM.
- (b) Create, move, copy, delete or rename files folders and programs from one disk to another disk.
- (c) Execute or run programs from the disks.
- (d) Configure devices of the computer.
- (e) Add or remove a printer.

2. **My Documents:**

My Documents is a desktop folder that provides a convenient place to store documents, graphics, or other files that you want to access quickly. On the desktop, it is represented by a folder with a sheet of paper in it.

The following steps may be followed to open a document from its window.

- (a) Move mouse pointer to My Documents icon.
- (b) Double click on it open its window.
- (c) Double click on any of its item to open it.

3. **My Network Places / Network Neighborhood:**

Network is a group of computer that are connected with each other to share data, information and resources of computer with each other.

4. **Recycle Bin:**

Recycle Bin makes it easy to delete and undelete files and folders. When a file or folder is deleted from any location, Windows stores it in the Recycle Bin.

USING CONTROL PANEL:

Control panel provides the facility to change the way Windows looks and works. It contains a list of icons through which you can change the settings of computer. To open Control Panel follow the steps.

1. Click on the Start button.
2. Start menu will appear.
3. Choose Settings from it.
4. A submenu will appear.
5. Click on Control Panel to open it.

CONTROL PANEL ICONS

Control panel contains a number of icons used to perform different setting of the computer. The frequency used icons are:

Accessibility Options:

The Accessibility Options makes it easier for people with disabilities to operate a computer without installing special software.

Add New Hardware:

It is used to install a new hardware to the computer. Every new hardware comes with a device driver program that connects it to the computer. For example we can connect a Digital camera and install its driver with this icon.

Add / Remove Programs:

This option helps us in installing new software or remove software that we no longer want to keep in the computer.

Date / Time:

This option allows us to change or set the Date and Time of the computer system. The date and time are displayed on the System Tray on the Taskbar.

Display:

It is used to change the display settings of the monitor. It has a number of tabs that changes or sets the display properties of the monitor screen.

Wallpaper / Background:

This is an image or color, set to the background of the Desktop. We can change it to any other image or color. Follow these steps to change this setting:

- (i) Close or minimize all open files or programs.
- (ii) A menu will appear, click on Properties.
- (iii) Display Properties dialog box will appear.
- (iv) Click the Apply button.
- (v) Wallpaper has been changed.

Applying Screen Savers:

Screen saver is an animated image or text that displays on the screen of the computer after some specific time set by the user.

Fonts:

This option can be used to add new fonts in the systems fonts folder. We can also copy or remove fonts from this icon.

Internet Options:

It changes settings for the Web Browser software. Web Browser software is used in the Internet to open web pages.

Modems:

Modem is a hardware device that enables the computers to make a dialup networking. We can connect to the Internet by modems. By using this option we can add modem driver and change its dialing settings.

Mouse:

By using this option we can change the mouse pointer styles and button setting of the mouse.

Printers:

This option allows us to add or remove a driver of the printer that is connected to the computer or on a network. Settings of the printer can also be changed through this option.

System:

This option provides us System information about all the devices connected to the computer.

Users:

This option is helpful in managing different users of the same computer.

WINDOWS EXPLORER:

Windows explorer provides another way to view the contents of the disks and its folders in a tree structure. We can navigate between files and folders through explorer. Files, folders and programs can be opened, moved and deleted through it.

Follow these steps to open Windows explorer.

1. Click on the Start button and select programs menu.
2. From Programs submenu select Accessories.
3. From Accessories submenu click on the Windows explorer.

MANAGING FILES AND FOLDERS

File:

A computer file contains data and information. A file can be a document, report, graphics, image, sound, video created using different software. Windows represents files with different icons.

Folder:

A folder is like a subdirectory in DOS. Folders are used in Windows to store and manage files. A folder can contain another folder. Every folder is identified by a label. The icons of the folder has a yellow color and look like an office folder.

Operations performed on Files and folders:

Some of the common operations performed on files or folders are:

Creating copy of a disk:

- (a) On the File menu, click on the Copy Disk.
- (b) In Copy From, click on the drive you want to copy from.
- (c) In Copy To, click the drive you want to copy to.

Creating copy of a File or Folder:

- (a) In My Computer or Windows Explorer, click the file or folder you want to copy.
- (b) On the Edit menu, click Copy or click the Copy button from toolbar.
- (c) Open the folder or disk where you want to move the files or folder.
- (d) On the Edit menu, click Paste or press the button from the toolbar.

Moving files or folder:

- (a) In My computer or Windows explore, select the file or folder you want to move.
- (b) On the Edit menu, click Cut or click the Scissors button from toolbar.
- (c) Open the folder or disk where you want to move the files or folder.
- (d) On the Edit menu, click Paste or press the paste button from the toolbar.

Creating a folder:

- (a) In My Computer or Windows explorer, select the drive where you want to create the new folder.
- (b) In the File menu, click on the New and then click on Folder.
- (c) The new folder appears with the temporary name.
- (d) Type a suitable name for the new folder and press the Enter key.

DEMONSTRATION OF INSTALLATION PROCEDURE OF WINDOWS

Hardware requirement:

Minimum hardware requirements to install Windows is Pentium I computer with 32 MB RAM. Attempt to install Windows on a lesser machine will make the computer very slow to work. It also needs 450 to 500 Mb free hard disk space.

Preliminaries:

Before installing any of the versions of Windows, there are several tasks you need to undertake to ensure a smooth and safe installation. Some depend on whether you want to install previous version of Windows or perform a fresh installation.

Boot Disk:

A boot disk is necessary only if you will be doing a clean installation of Windows. You can use either a bootable CD-ROM or Floppy disk. Windows installation CD is bootable.

Create a Boot disk:

Follow these steps to create a bootable floppy disk.

- (a) Click → Start button → Settings → Control Panel → Add / Remove Programs.
- (b) Click the Startup Disk tab and follow the instructions.
- (c) Put the floppy disk in drive.

Step-by-step installation:

Windows installation is an easy step-by-step procedure.

1. Run an up-to-date virus-scanning program.
2. Copy the entire Win98 folder from the CD-ROM to a folder on your hard drive. Name the folder something like Win98Inst, for Windows 98 source.
3. Restart your machine using either the bootable CD-ROM or Floppy disk.
4. At the DOS prompt, change to your source directory. For example, type CD win98Inst and press Enter key.
5. Type Setup and press Enter.
6. When Setup starts, it will run Scandisk program to check your hard drive. When Scandisk finishes, press Exit button.
7. You will see the Windows Setup screen. The left side of the screen, including the estimated time required to complete the installation, will be visible throughout the setup process. Total time vary from 30 to 60 minutes or more, depending on the speed of your system.
8. Read the information presented in the dialog box, then click continue. Windows 98 will perform a quick survey of your system, prepare the Setup Wizard and ask you to read and consent to the license agreement. Click Next to move on.
9. Setup will perform a more through check of your system, including looking for installed components of Windows and making sure you have enough hard disk space to complete the installation.
10. A dialog box will ask you want the Install program to save your previous Windows system files. These files make it possible to uninstall Windows 98 should you run into trouble, so it's a good idea to select yes.
11. The next choice you have to make, for a clean install only, about how much of the operating system you want to install. You can select the default option which is Typical.
12. Select the Basic Components to install windows.
13. The next dialog box asks you to give your computer a name that will identify it.
14. The Setup program asks you if you want to create a startup disk so you can boot your computer in case of trouble.
15. The Setup wizard now needs to restart your computer and finish up.
16. After restart, Windows still has a few touches to make. It will detect and setup plug-and-play devices and other possible hardware.

VIRUS:

A computer virus is a hidden program, which can infect other programs by modifying them and causes data loss. It attaches itself to other programs and executes secretly every time the host program is executed. The virus replicates itself within a computer system.

Computer viruses may perform the following malicious functions.

1. It infects other programs.
2. It destroys the data on disk.
3. It spreads from one disk to another.
4. Sometimes it makes the computer unusable.
5. It increases the file size and replicates itself, thus making the wastage of memory space.

ANTI VIRUS:

Anti virus is another software that when executed removes the virus programs from the disk. Anti virus software have been developed to get rid of the computer viruses that can destroy the valuable data and causes the computer to malfunction.

Some of the anti virus programs available are:

1. Norton Anti Virus (NAV)
2. McAfee
3. PC Clean
4. AVG

MUHAMMAD HASSAM

MUHAMMAD HASSAM

“ERROR REMOVING”

Some BASIC error Statements
will make you expect in finding
and removing errors from
a BASIC Program

Rewrite the following BASIC Statements after removing errors if any:

Q.1: INPUT ; MY FIRST CHOICE "CH"

Ans.

Q.2: LEET N = "999"

Ans.

Q.3: 90 FOR T = 10 - 100 ; NEXT

Ans.

Q.4: -35 READ "N\$" : "P\$", DATA NAME ; ALI

Ans.

Q.5: 100 REEM : MY SCHOOL

Ans.

Q.6: 06 PRINT RIGHT\$ A\$,B)

Ans.

Q.7: 25 GOTO CLS

Ans.

Q.8: 14 LOCATE 30,90 : PRINT "GOOD"

Ans.

Q.9 999 PRINT TAB (90) STRING\$ (120, "-")

Ans.

Q.10: 200 LINE (40, 80) - (300, 150),3

Ans.

Q.11: 5.6 C = 10 TO 20 STEP -2

Ans.

Q.12: 25 INPUT "DATE";D

Ans.

Q.13: 100 CLS, PRINT "NAME"

Ans.

Q.14: 55 READ ALI,ASAD:DATA A\$, B\$

Ans.

Q.15: 80 IF X = THEN END ELSE 30

Ans.

Q.16: 11 PRINT TAB (10) "ALWAYS SMILE"

Ans.

Q.17: 505 LET A+B+C

Ans.

Q.18: -32 RAM "PRACTICAL"

Ans.

Q.19: 15 C\$ = A+B

Ans.

Q.20: 20 LET N\$ = 999 : LEET N ="999"

Ans.

Q.21: 10 PRINT LEFT (5,A\$)

Ans.

Q.22: 50 INPUT " ENTER NAME;N\$"

Ans.

Q.23: 75 FOR T = 100 TO 0 STEP -10

Ans.

Q.24: LOCATE 35,90 : PRINT "ANNUAL EXAMINATION".

Ans.

Q.25: LET X = LET A + LET B

Ans.

Q.26: REM PROGRAM TO PRINT THE SUM OF TWO NUMBERS

Ans.

Q.27: 12.5 A = LET M + 1

Ans.

Q.28: 345 READ B, 70;007,A

Ans.

Q.29: 111 PRIT STRING \$ (20,-)

Ans.

Q.30: 440 PRINT TAB (290);A

Ans.

Q.31: 55 READ "GOOD";"57"

Ans.

Q.32: 60 IF A\$ = 2 THEN GOTO 30

Ans.

Q.33: NEXT "P"

Ans.

Q.34: 50PRANT *SCHOOL*

Ans.

Q.35: 5.5 INPUT TAB(90) "NAME": NS

Ans.

Q.36: -65 PRINT "MY SCHOOL"

Ans.

Q.37: 99 INPUT "ENTER YOUR NAME: NS

Ans.

Q.38: 100 C= (A^2*B^2) 2AB

Ans.

Q.39: 25 LET R = -B + (35B^2+CX^2)^1/2

Ans.

Q.40: 10 FOR A = 1 TO 100 STEP -2 ; NEST S

Ans.

Q.41: 15 LET X "=" A "*" B

Ans.

Q.42: 80 FOR I 20 TO 10 STEP -2

Ans.

Q.43: 70 PRINT "ABC" ; PRINT 123 ; PRANT "XYZ

Ans.

Q.44: 2.0 CLS: PRINT "BIOLOGY-DATA";A\$

Ans.

Q.45: 3.5 LET K\$ = A + B

Ans.

MUHAMMAD HASSAM

Convert the following algebraic expressions into BASIC formation:

ALGEBRAIC EXPRESSIONS	BASIC FORMULA
1) $a^2b^2 - 4a^2 + 3ab^2$	
2) $\sqrt{(P-Q)(2P^2 - 3PQ)}$	
3) $\frac{5xy - 7xy}{4xy} \sqrt{6z^2}$	
4) $3a - 5a(a^2 - b^2) + a^3 - B^3$	
5) $\sqrt{a^3bc}$	
6) $a^2 + 2ab + b^2$	
7) $3(X + Y) \sqrt{X^2 + Y^2}$	
8) $\frac{P(1 + R)^n}{100}$	
9) $(a + b)(a - b)(a + b)(a - b)$	
10) $a^3 - 3a^2b + 3ab^2 - b^3$	
11) $C = \frac{5(f - 32)}{9}$	
12) $(2x + y)(32 - 400)$	
13) $2a^3b + 3b^3c^3 - 4a^2b^2$	
14) $(2x^2 - 4y^2)^2$	
15) $\sqrt{a + b} / (x^2 + xy)^{1/3}$	
16) $\sqrt{(x - y) - (2x^2 - 3xy)}$	
17) $a^4b^2 - 40a^2 + 3ab^2$	
18) $(P + Q^2 - 2PQ)^{m^2 - n/2}$	
19) $a^3 + b^3 + c^3 - 3abc$	
20) $k^2 l^2 m + \sqrt{2lm}$	
21) $2a^3b + 3b^3c^2$	

22)	$(2x^2y + 3xy^2)^3$	
23)	$2x^2y^2 + 3xy + 5x^2y^2$	
24)	$\sqrt{x+y}$	
25)	$\frac{a-b}{a+b}$	
26)	$(a-b)^{1/2}$	
27)	$[\sqrt{(abc)^3}]^{5/2}$	
28)	$(a+b)(a-b)$	
29)	$\sqrt{2a} / \sqrt{4a}$	
30)	$\frac{x+y}{a-b}$	
31)	$4x^2 - y^3$	
32)	$4a - 3b$	
33)	$5x^2 + 32y$	
34)	$x^3(a+b) + y^3(a+b)$	
35)	$x^{2m}y^{2n} - x^m y^n$	
36)	$(3a^2b^2 - 4c)^2$	
37)	$25a^2b^2 - 10ab + 1$	
38)	$\frac{X-Y}{2} = \frac{3}{4}$	
39)	$x^2(x+y) + y^2(a-b)$	
40)	$\frac{xy^3 - 1}{xy}$	
41)	$(a^2)^2 - (b^2)^2$	
42)	$(2x+3y)(2x-3y)$	
43)	$1 + x + y + \sqrt{xy}$	
44)	$ab + \sqrt{b^2}$	

45) $-6a^3b + 4a^2b^2 - 8ab^3$	
46) $a(x^2 - y^2) + b(x^2 - y^2)$	
47) $-2ab(a^2 - 2ab + b^2)$	
48) $X^c(x^a + x^b)$	
49) $pqx^2 + (aq + bq)x + ab$	
50) $(a + b)^2 - (a - b)^2 = 4ab$	

MUHAMMAD HASSAM

ABBREVIATION / ACRONYMS

1)	4GL	Fourth Generation Language
2)	AI	Artificial Intelligence
3)	ALGOL	Algorithmic Oriented Language
4)	AIT	Alter Key
5)	ALU	Arithmetic Logic Unit
6)	ANSI	American National Standard Institute
7)	APL	A Programming Language
8)	ASCII	American Standard Code for information interchange
9)	AT	Advance Technology
10)	BAL	Basic Assembly Language
11)	BASIC	Beginner's All purpose Symbolic Instruction Code
12)	BCD	Binary Coded Decimal code
13)	BIOS	Basic Input Output System
14)	Bit	Binary digit
15)	BPI	Bytes Per Inch
16)	BPS	Bytes Per Second
17)	Caps Lock	Capital / small letter Lock Key
18)	CCD	Charge-coupled device
19)	CD	Compact Disk
20)	CHKDSK	Check Disk
21)	CHDIR	Change Directory (DOS Command)
22)	CLS	Clear Screen
23)	CGA	Color Graphics Adapters
24)	COBOL	Common Business Oriented Language
25)	COMPANY	Computer Output on Microfilm
26)	COM1	Communication Port 1
27)	CPI	Characters per inch
28)	CPS	Characters per second
29)	CR	Character Reader
30)	CRT	Cathode Ray Tube (Monitor)
31)	Ctrl	Control Key
32)	CU	Control Unit
33)	Del	Delete Key
34)	DELTREE	Delete Directory (DOS Ex. Command)
35)	DIR	Directory (Dos Command)
36)	DVD	Digital Video Disk
37)	DD	Double Density (Floppy Disk)
38)	DIMM	Dual In-line Memory Module
39)	DIP	Dual In Line Pin
40)	DRAM	Dynamic Random Access Memory
41)	DOS	Disk Operating System
42)	EAPROM	Electrically Alterable Programmable Read Only Memory
43)	EBCDIC	Extended Binary Coded Decima' Interchange Code
44)	EDP	Electronic Data Processing
45)	EDVAC	Electronic Discrete Variable Automatic Computer
46)	EGA	Enhanced Graphic Adaptor
47)	EMM	Expanded Memory Integrators
48)	ENIAC	Electronic Numerical Integrators and Calculator
49)	EOF	End Of File
50)	EPROM	Erasable Programmable Read Only Memory
51)	Esc	Escape Key
52)	FAT	File Allocation Table

53)	FDD	Floppy Disk Drive
54)	FORTRAN	Formula Translation
55)	GB	Giga Byte i.e. 320
56)	GUI	Graphical User Interface
57)	GWBASIC	Gee Whiz BASIC
58)	HD	High Density (Floppy Disk)
59)	HDD	Hard Disk Drive
60)	Hz	Hertz
61)	IBM	International Business Machine
62)	Ins.	Insert Key
63)	I/O	Input / Output
64)	KB	Kilo Bytes
65)	KIPS	Kilo Instruction Per Second
66)	LAN	Local Area Net working
67)	LASER	Light Amplification by Stimulated Emission of Rays
68)	LBA	Logical Block Address
69)	LCD	Liquid Crystal Display
70)	LSB	Least Significant Bit
71)	LISP	List Processing
72)	LSI	Large Scale Integration
73)	MASM	Macro Assembler
74)	MB	Mega Byte
75)	MBM	Magnetic Bubble Memory
76)	MDA	Monochrome Display Adapter
77)	MICR	Magnetic Ink Character Reader
78)	MKDIR	Make Directory
79)	MODEM	Modulator Demodulator
80)	MOS	Metal Oxide Semiconductors
81)	MSB	Most Significant Bit
82)	MSI	Multiple Scale Integration
83)	MS-DOS	Microsoft Virtual Storage
84)	MU	Memory Unit
85)	MVS	Multiple Virtual Storage
86)	NCR	National Cash Storage
87)	NDD	Orton Disk Doctor
88)	NAV	Norton Anti Virus
89)	Num lock	Number lock key / Numeric lock key
90)	OCR	Optical Character Reader
91)	OS	Operating system
92)	PC	Personal Computer
93)	Pg Dn	Page down key
94)	Pg Up	Page up key
95)	PL/1	Programming Language One
96)	PPM	Pages Per Minute
97)	POS	Products Of Sum
98)	PROLOG	Programming in Logic
99)	PROM	Programmable Read Only Memory
100)	RD	Remove Directory (DOS Command)
101)	RGB	Red Green Blue
102)	RAM	Read Access Memory
103)	REN	REName (DOS Command)
104)	ROM	Read Only Memory
105)	RPG	Report Program Generator
106)	SIMM	Single in line Memory Module

107)	SOP	Sum of Products
108)	SRAM	Static Random Access Memory
109)	SQL	Structured Query Language
110)	SSI	Small Scale Integration
111)	Tab	Tabulation Key
112)	TB	Terra Byte
113)	TV	Television
114)	TXT	Text File
115)	UNIVAC	Universal Automatic Computer
116)	VDT	Visual Display Terminal (Monitor)
117)	VDU	Video Display Unit (Monitor)
118)	VGA	Video Graphic Array
119)	WAN	Wide Area Networking
120)	XT	Extended Technology

MUHAMMAD HASSAM